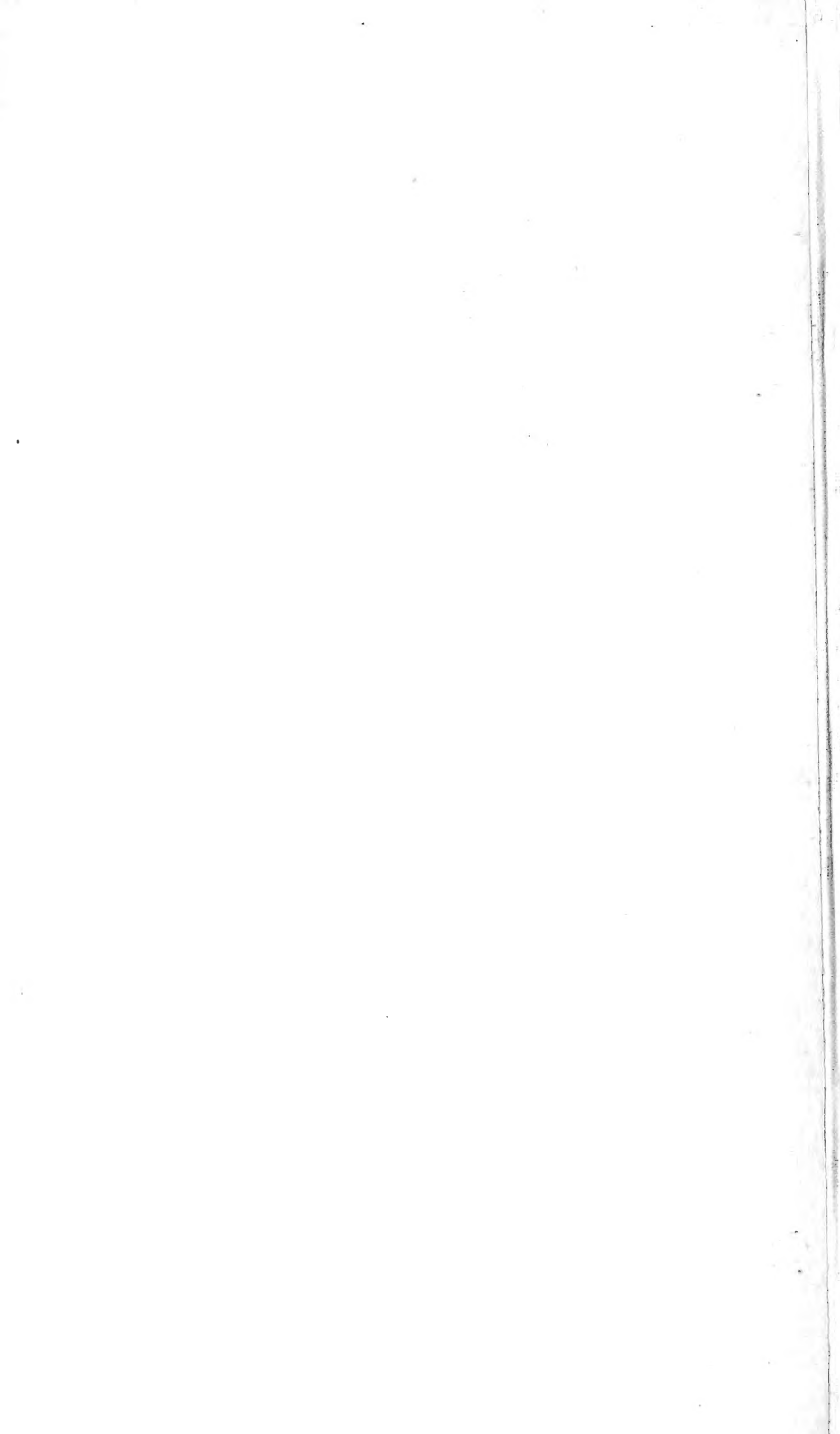


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NAUTILUS.

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DEVOTED TO THE INTERESTS OF
CONCHOLOGISTS.



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THE NAUTILUS.

VOL. XIII.

MAY, 1899.

No. 1.

A LIST OF THE LAND AND FRESH-WATER SHELLS OF MANITOBA.

BY A. W. HANHAM, WINNIPEG, MAN.

When I commenced collecting here in 1894, my enthusiasm was soon checked by the dearth of land shells, in which, since I first collected, I have been particularly interested. In fresh-water species things were different, as this list shows, but I have never felt the same interest in them, and my work here, as far as they are concerned, has been half-hearted, and I have done nothing at all during the past two seasons. Under these circumstances, I have thought it advisable to publish this list before my records get lost or destroyed. The most striking feature here (even after Quebec) was the utter absence of all the larger species of land shells (with the exception of the Succineas), and the scarcity of even the small kinds which have been taken. However, I am still impressed with the idea that some few of the larger species may occur, rarely perhaps, in the well-wooded districts lying in the extreme east, southeast and northeast of the Province. The country I have worked here has been mostly prairie, even though swampy or wooded in places, and really almost the only localities worth exploring are the river "bottoms." Water shells, especially by contrast, are quite conspicuous; the sand dredged from the Red river for building purposes contains a mass of Sphaeria, and along the river banks the large valves of Uniones are very noticeable. The railway ditches and sluices, which are generally dry early in the summer, have in their bottoms a mass of Limnaea, Aplexa and

small Planorbis. Often large areas of prairie, inundated during the spring, are covered with these dead shells, which are the "land" shells of the novice.

Soon after my arrival in Manitoba, I received a good deal of assistance from the Rev. George W. Taylor, of Gabriola Island, B. C., who kindly furnished me with lists of the species he had taken here in 1893, during a flying visit; also any other records or lists of Manitoba species that he knew of.

The lists furnished were as follows:

His own from Winnipeg in 1893.

Condray's, also from Winnipeg.

Hollands', from Norquay, Man.

Bells',)

Christy's,) all from Winnipeg eastward.

Dawson's,)

(The species taken by Condray and Holland being in his own collection.)

All these records are included in the subjoined list. Dr. V. Sterki, Mr. Ed. W. Roper, Mr. Jas. H. Ferriss and others, have kindly helped in the identification of the more troublesome things of my own taking. The numbers before the land shells (following Mr. H. A. Pilsbry's valuable catalogue), show that our local or provincial species are few and far between.

(47. *Acanthinula harpa* Say.) This species has been taken along the north of Lake Superior, both West as well as East, and I feel sure is to be found in the northern unexplored parts of the province.

48. *Vallonia pulchella* Müll. (Condray, Holland, Taylor, etc.)

50. *Vallonia costata* Müll. Taken here under stones, etc., along railway banks.

(Dr. Sterki remarks of these *costata*, "a beautiful and interesting form with rather crowded ribs.")

53. *Vallonia gracilicosta* Reinh. Winnipeg in 1893, by Taylor.

180. *Strobilops labyrinthica* Say. (Christy and Holland.)

186. *Bifidaria armifera* Say. Very rare here, also taken by Taylor. A rather small form occurs at Brandon; very few were taken.

187. *Bifidaria contracta* Say. From Carberry, by Christy.

188. *Bifidaria holzingeri* Sterki. Rather plentiful here in the Spring of 1894 in Red River drift. Also taken by Condray and Taylor.

199. *Bifidaria pentodon* Say. A few taken here, also recorded by Condray and Taylor. (Dr. Sterki writes "somewhat different from the typical figure, the last whorl comparatively small.")

219. *Vertigo binneyana* Sterki. Rare here, also taken by Condray.

222. *Vertigo ovata* Say. Not uncommon here.

Vertigo sp. (2 examples) Winnipeg. (Dr. Sterki writes, "in size, shape and striation much resembles *V. gouldii* Binn., but there is a peculiar, very strong callus in the palate.")

235. *Cochlicopa lubrica* Müll. (*F. subcylindrica*, Linn.) Well distributed and not uncommon.

254. *Vitrina limpidula* Gld. A few on "toad-stools" late in the fall. Several other records.

260. *Vitrea hammonis* Ström. (*H. radiatula* Ald.) From all points recorded.

264. *Vitrea binneyana* Morse? A few shells taken at Brandon, were recorded as this species. They have been mislaid, or would have been referred to Dr. Sterki.

270. *Vitrea indentata* Say. From Pine Creek, by Christy.

278. *Conulus fulvus* Müll. Plentiful locally. (Dr. Sterki says, "different to the usual form.")

282. *Zonitoides nitidus* Müll.? Some dead shells from river drift may be this species.

283. *Zonitoides arboreus* Say. From all points recorded.

290. *Zonitoides minusculus* Binn. A few dead shells from Red River drift. (Also Red River, Binney's Manual.)

294. *Zonitoides milium* Morse. Very rare here.

316. *Agriolimax campestris* Binn. Seen occasionally in this district, not included in the other lists.

344. *Pyramidula striatella* Anth. Plentiful, in all lists.

346. *Helicodiscus lineatus* Say. Recorded by Condray. I have taken one or two shells here.

348. *Punctum pygmaeum* Drap. Taken here, not included in other lists.

358. *Succinea retusa* Lea. (*S. ovalis* Gld.) My Winnipeg specimens are all small. (Christy, Dawson and Holland.)

360. *Succinea haydeni* W. G. Binn. (Dawson.)

361. *Succinea hawkinsi* Baird. Carberry. (Christy.)

362. *Succinea obliqua* Say. From all points recorded.

366. *Succinea grosvenorii* Lea. (*S. lineata* Binn.) Wood Mountain (Dawson).

367. *Succinea avara* Say. Rather common here. (Christy, Dawson and Taylor.) Var. *vermeta* Say? (Referred to this by Dr. Sterki.) A small colony taken under logs on railway bank near the city. (If only *S. avara*, then an unusually large coarse form.)

370. *Succinea oregonensis* Lea. (A few examples referred to this species by Dr. Sterki). From Winnipeg.

Carychium exiguum Say.) By no means abundant here. (Named
" *exile* Lea.) by Dr. Sterki.)

Sphærium sulcatum Lam. (Christy, Dawson and Holland.)

" *solidulum* Prime. Common here in Red River. (Also recorded by Christy & Dawson.)

Sphærium striatulum Lam. (Christy & Dawson.)

" *stramineum* Conrad. (Dawson.)

" *rhomboideum* Say. (Christy & Dawson.)

" *jayatum* Prime. (Christy.)

" *tenue* Prime. Souris River (Dawson).

" *transversum* Say. Playgreen Lake (Bell).

" *simile* Say. A single valve was in a lot of *S. solidulum* referred to Mr. Ed. W. Roper for naming.

Sphærium partumeium Say. (Dawson.) One specimen taken here, kindly named by Mr. Roper.

Pisidium virginicum Gmel. Lake of the Woods (Dawson).

" *variabile* Prime. Pine Creek (Christy).

" *abditum* Hald. (Holland).

" *ferrissii* Sterki. These are the only *Pisidia* I have found here, and I took a small colony of them in moss in a dried-up swamp late in the year. Only a few appeared to be full grown (named by Dr. Sterki).

Unio alatus Say. Have taken some fine shells along the banks of the Red River here. (Christy & Dawson.)

Unio asperimus Lea. A few from Red River here. (Christy).

" *borealis* A. F. Gray. Lake of the Woods (Christy).

" *canadensis* Lea. (Taylor.)

" *boydianus* Marsh. Red River here. Kindly named by Mr. Ferriss.

Unio gracilis Barnes. Not uncommon in Red River.

" *lachrymosus* Lea. (Bell, Dawson & Taylor.)

" *ligamentinus* Lam. Roseau River (Dawson).

" *hippopeus*, I understand from Mr. Ferriss that this species has been taken in Lake Winnipeg.

Unio luteolus Lam. Red River. (Christy, Dawson & Taylor.)
 “ *multiplicatus* Lea. (Christy.)
 “ *occidens* Lea.? Red River.
 “ *plicatus* Lesueur. (Bell & Christy.)
 “ *radiatus* Lam. (Bell.)
 “ *rectus* Lam. Some large specimens, with beautiful nacre, have been taken from the Red River here. (Christy, Dawson & Taylor.)

Unio rubiginosus Lea. Common in Red River. (Christy, Dawson & Taylor.)

Unio spatulatus Lea. (Red River, by Dawson.)

“ *subovatus* Lea.? (Dawson.)

“ *undulatus* Barnes. (Christy, Dawson & Taylor.) Appears to be common in Red River.

Margaritana complanata Barnes. (Bell & Dawson.)

“ *rugosa* Barnes. (Dawson.)

Anodonta ferussaciana Lea. Lake of the Woods. (Dawson.)

“ *footiana* Lea. Souris River. (Dawson.)

“ *plana* Lea.? I sent a shell to Mr. Ferriss, which he considered this species.

Anodonta subcylindracea Lea. (Holland.)

“ *undulata* Say. (Bell & Dawson.)

Valvata tricarinata Say. Rare here. (Christy & Dawson.)

“ *sincera* Say. (Christy & Dawson.)

Campeloma decisum Say. Rare here. (Lake of Woods, Dawson.)

Bythinella obtusa Lea. Winnipeg (also by Condray here).

Amnicola porata Say. Lake of the Woods. (Dawson.)

“ *pallida* Hald. (Christy & Dawson.)

“ *granum* Say. Pine Creek. (Christy.)

Limnæa stagnalis L. I have taken a few dead shells along the Assiniboine River here. Also included in the other lists.

Limnæa decollata Mighels. Lake of the Woods (Dawson.)

“ *megasoma* Say. Echimamish River (Bell.)

“ *palustris* Müll. On all the lists. Some shells which I think belong to this species are very prettily lined. This form is rather abundant in some of the marshes.

Limnæa catascopium Say. Lake Manitoba, etc. Also on Dawson's list.

Limnæa caperata Say. On all the lists.

“ *desidiosa* Say. Winnipeg. Also by Christy.

“ *humilis* Say. Winnipeg. Also by Christy and Dawson.

Physa heterostropha Say. On all the lists. Quite uncommon here.

“ *ampullacea* Gould.? (Dawson.)

“ *ancillaria* Say. Lake of the Woods (Dawson). Also rarely at Winnipeg.

Aplexa hypnorum L. On all lists. Usually a fine shell here.

Planorbis corpulentus Say. Lake of the Woods (Dawson).

“ *trivolis* Say. On all the lists.

“ *macrostomus* Whiteaves. Lake of the Woods (Dawson).

“ *bicarinatus* Say. (Bell and Dawson.)

“ *campanulatus* Say. Winnipeg, also by Bell and Dawson.

“ *exacutus* Say. Winnipeg, also by Christy, Dawson and

Holland.

Planorbis albus Müll. (Holland and Taylor.)

“ *pareus* Say. On all the lists.

“ *umbilicatellus* Ckll. (*umbilicatus* J. W. Taylor.) Brandon (Christy, etc.).

Planorbis cristatus L. A pair from this place, identified by Dr. Sterki.

Planorbula armigera Say. On all the lists.

Ancylus parallelus Hald. (Christy & Dawson.)

“ *rixularis* Say. (Dawson.)

NEW SOUTHERN UNIOS.

BY BERLIN H. WRIGHT.

N. Harperi, sp. nov.

Shell smooth, with slightly elevated growth lines, black towards the umbos and tinged with red towards the base. Shining above, rayless, oblique or very inequilateral. Umbos elevated and nicely rounded; substance of the shell moderately thick, thinner posteriorly; bluntly pointed behind with an inclination to biangulation. Dorsum slightly arched, ligament red, basal margin slightly curved; umbonal ridge rounded above and decidedly flattened out at the posterior extremity; teeth double in the left and single in the right valve, cardinals pointed, compressed and oblique, with a supplemental tooth or pointed callosity in the right valve midway between the cardinal and

lateral teeth and an accompanying depression in the opposing valve; laterals straight with an elevated collar or ridge as an extension of the lower lateral tooth and extending up to the cardinal; cicatrices confluent, cavity of the beaks very slight, nacre pale white in old and flesh-colored in young.

Diameter .75, length 1.25, width 2 inches.

Habitats—Altamaha, Suwannee and Flint Rivers.

Type in National Museum.

Remarks: Two adults were first received from the Altamaha River, Liberty County, Ga. Later three others came from the Suwannee River, Madison County, Fla., and still later twenty others from Spring Creek, a branch of the Flint River, in Decatur County, Ga.—showing quite a range, and yet in all of these places it seems to be a rare shell, as so few were received in large lots of several hundred. The teeth are quite large and solid for the size of the shell. It is difficult to place it with any group, for which reason comparisons would seem out of place. The younger specimens bear some resemblance to *simulans* or *nux*, but it is less inflated in the umbonal region, and more compressed or flattened and pointed behind than either of them, and is also more oblique or inequilateral. It has heavier and blunter umbos and beaks than *N. perovatus* Con., and also a straighter base and less pointed behind.

We dedicate this species to Prof. George W. Harper, Principal of the Woodward High School, of Cincinnati, O.

U. Tinkeri, sp. nov.

Shell black above, shading off to a lighter color posteriorly and around the base, covered with close elevated growth lines; nearly circular, somewhat inflated; rayless, except in the very young, which are covered with fine green rays; bluntly pointed behind, gracefully and continuously curved in front up to the dorsal margin; dorsum arched; base abruptly extended near its center by reason of the broad, rounded ridge which extends from umbo to base; cardinal teeth solid, direct and double in both valves; lateral teeth double in the left and single in the right valve, heavy, somewhat curved, very deeply indented and coarsely serrated; beak cavity considerable and very angular, anterior cicatrices separated by a mere thread, posterior cicatrices confluent; nacre white or slightly flesh-colored.

Diam. 1, length 1.50, width 1.75 inches.

Habitat: Tombigbee River, Alabama.

Type in National Museum.

Remarks: This is another of those shells that is not strongly distinct from other known forms and yet sufficiently removed from any to make a name necessary. It seems to lie between *U. castaneus* Lea and *U. unicolor* Lea—from the former it differs in being more circular, thinner, not tumid, not so oblique, darker colored, shorter laterals, less capacious, beaks blunter and undulations fewer and coarser. From unicolor it differs in being thicker, rougher, more inflated, narrower, pallial margin and white nacre. Some forms of it approach *U. leibi* Lea, but are less inclined to a quadrate outline and blacker, and the young are beautifully rayed.

We name this species for Prof. B. W. Tinker, Superintendent of Schools of Waterbury, Conn., who has a fine collection and takes special interest in this branch of natural science.

(To be continued.)

CREPIDULA CONVEXA SAY, VAR. GLAUCA SAY, SAN FRANCISCO BAY.

As will be seen by the following from a recent letter received from Mr. Hemphill, he has made another interesting discovery:

“I had a couple of hours a few days ago on the old oyster-beds at Alameda again, and have added *Crepidula glauca* Say to the introduced shells from the east. I send you samples of the dark and light varieties. The largest ones I send are as large as any among the 30 or 40 specimens I found.”

The largest measured $12\frac{1}{2}$ mm. by not quite 9 mm. and are quite characteristic. It remains to be seen whether this species will attain as large size in this new environment as in its native haunts. The last (February) NAUTILUS, it will be remembered, contained a brief note, announcing the detection of *Fusus* (*Urosalpinx*) *cinereus*, in this same locality, on the eastern shore of the bay, a dozen miles or so distant from where *U. cinereus* was first discovered. This is Mr. Hemphill's third find of eastern forms in San Francisco Bay.

The specimens above noted are in the U. S. National Museum No. 158501.

ROBERT E. C. STEARNS.

Los Angeles, Cal., March 10, 1899.

ON THE OCCURRENCE OF ARION FASCIATUS, NILS. IN AMERICA.

BY WALTER E. COLLINGE, F. Z. S.,
Mason University College, Birmingham, England.

Whilst in Washington, D. C., a friend of mine collected for me a few slugs from a garden, amongst which I was surprised to find a single specimen of *Arion fasciatus* Nils. The specimen measured (in alcohol) 26 mill., and is of a brown color with darker lateral bands which are continued to the anterior border of the mantle; the foot-sole is almost white and there is a faint keel; it approaches very closely the var. *neustriacus* Mabille. Adult keeled forms of this variety are very uncommon in the British Isles, and from this fact I assumed that this individual had probably been introduced from Europe. My friend has since ascertained that such is very likely the case, as he has learned that a previous owner of the garden was in the habit of importing plants which were usually packed in moss.

A. fasciatus is easily distinguished from *A. hortensis* Fér., by its white foot-sole, and from the majority of the species of this genus by the peculiar form of the receptaculum seminis, which instead of being pyriform or oval in shape, is elongated, terminating in a long pointed apex.

PISIDIA NEW TO OUR COUNTRY, AND NEW SPECIES.

BY DR. V. STERKI.

It has been considered almost an axiom that the American *Pisidia* lie eo ipso distinct from those of the eastern continent. But last year, the efforts of several conchologists have brought to light a number of species which are identical with European forms.

1. In Lake Ontario, on the New York shore, by Mr. Frank C. Baker; in the Hamilton Bay, Ontario, by Mr. James Johnston, a *Pisidium* has been collected which is absolutely identical with a form from England received as *amnicum* Müll., and, as it seems, not distinct from one of France, under the same name. Mr. Clessin, to whom a few specimens were submitted, thinks it not exactly *amnicum*. Considering the great variability of most *Pisidia*, these forms must be studied further.

2. *Pis. henslowianum* Shep. has also been collected in Hamilton Bay, Lake Ontario, by Mr. James Johnston; a number of good specimens.

3. *Pis. milium* Held, conforming with European specimens, have been collected in Straits Lake, Michigan, by Mr. Bryant Walker, and in Dallas Lake, Stearns County, Minn., by Mr. H. E. Sargent. Among a number of fossils from a marl bed in Tuscola County, Mich., also collected by Mr. Walker, there was one valve of the same species.

4. In Aroostook County, Maine, Olof O. Nylander has found a few specimens of a *Pisidium* identical with one from England named *milium* Held, which, however, Mr. Clessin says, is not that species. It is of somewhat the same shape and color, but larger and the beaks are more prominent.

The question whether these *Pisidia* be native or introduced is answered, at least for *milium*, by the fossil found. As to No. 4, an importation is rather improbable, from its habitat. For Nos. 1 and 2 the possibility of a colonization cannot be denied, just as *Bathynia tentaculata* has immigrated from Europe, and, on the other hand, *Calyculina transversa* Say seems to have been transported into England. Further researches are very desirable, and also fossils should be secured wherever such may be obtainable.

5. *Pis. contortum* Pr. This *Pisidium* has been described, in 1852, as a fossil sp. from Massachusetts, and has lately been collected from marl beds in Maine by Mr. Nylander, and in Michigan, by Mr. Walker. Last year Mr. Nylander succeeded in finding a few recent, living specimens, in Aroostook Co., Me. The shell is transparent, of a deep wine or amber color, the surface highly polished.

6. *Pis. medianum*, n. sp. Mussel of rather small size, elliptical in outline, much inflated, often of somewhat irregular growth; superior and inferior margins moderately curved, posterior well rounded, or with a slight angle above, anterior rounded or slightly truncated obliquely; beaks rather in the middle, slightly directed toward the posterior, rather high, prominent over the hinge margin; scutum and scutellum very slightly marked; surface with very fine, crowded striae, somewhat shining, light horn to yellowish or straw colored; shell thin, nacre colorless, muscle insertions barely perceptible; hinge fine, plate narrow; cardinal teeth lamellar, slightly curved, the right one in its posterior part somewhat thicker, simple or with a fine, longitudinal groove; lateral teeth pointed, the outer ones of the right valve comparatively large; ligament fine, long. 2.5 to 3.5, alt. 2.0 to 2.8, diam. 1.7 to 2.3 mill.

Habitat: Michigan, all over the state; lakes in Wisconsin.

Var. minutum, n. Smaller, less elongated, of more regular shape, almost globular when fully grown, usually of deeper color, surface with very fine striation, polished, but almost always covered with a greenish or blackish coating. Aroostook County, Me., very common in some waters, collected by Mr. Olof O. Nylander; Mohawk, N. Y., in the collection of the late Dr. James Lewis; also some forms from Michigan rather range with the variety, *e. g.*, from Hess lake, collected by Mr. L. H. Streng. This *Pisidium* has been known for years. But owing to the fact that *Pis. rotundatum* Pr., of almost the same size, was not exactly known, it was thought better to defer publication. It is one of the best characterized of our species, not nearly related to or resembling any other *Pisidium*, except *P. ferrugineum* Pr.,¹ which is at once distinguished by the strong ridges on the beaks. *Pis. medianum* is mainly characterized by its beaks being almost exactly in the middle of the mussel, its anterior part being sometimes even smaller than the posterior. Hence its name.

Specimens have been collected in deeper water, 24 meters, of Lake Michigan, off New York point, and also from the stomachs of whitefish, sent by Mr. Bryant Walker. Among a lot from Blue Lake, Michigan, collected by Dr. R. J. Kirkland, there were many specimens with that peculiar, perpendicular scar so often seen in *Pisidia* and *Sphaeria*, but unusually deep.

7. *Pis. kirklandi*, n. sp. Mussel of medium size, somewhat oblique, well inflated when mature, very little so in the young, high, rather oval in outline; superior margin strongly, inferior moderately curved, posterior slightly truncated, passing into the superior by an obtuse, rounded angle, antero-superior slightly curved or almost straight, sloping toward the rounded anterior end; scutum well, scutellum slightly marked; beaks somewhat posterior, high and prominent in the mature, low in the young mussel, with stout ridges, highest at the posterior and slanting towards the anterior ends, slightly sinuous on the outer sides; surface with very coarse, rather regular striation, dull, rugulose, straw colored in the young, light grayish in the adult with a light zone along the margin; shell rather thick, nacre almost glossy, appearing bluish in old specimens, muscle insertions distinct; hinge stout, hinge plate broad; cardinal teeth of moderate size, rather high up on the plate, the right one angular, its posterior part thick-

¹That species has, so far, been seen only from New England and New York.

ened, with or without a groove; below it is a deep excavation; left cardinal teeth: the anterior rather stout but its edge acute, the posterior oblique, slightly curved; lateral teeth stout, the outer ones of the right valve quite small; ligament strong.

Long. 4, alt. 3.8, diam. 2.7 mill.

Habitat: Michigan, Illinois, Ohio.

In a lot from the Grand River, at Grand Rapids, Mich., collected by Dr. Reynold J. Kirkland, in whose honor the species is named, there were over two hundred specimens, most of them young and half grown, in company with *Pis. compressum* Pr. (thousands of different forms), *fallax*, *cruciatum*, *punctatum*, and a number of other species. A few from Berry Lake, Chicago, were sent by the Chicago Academy of Science (Mr. F. C. Baker), and one single valve was found in the Anglaize River, tributary to the Maumee River, Lake Erie drainage, by the writer, in 1893, in company with *Pis. compressum* Pr.

Pis. kirklandi is related to *P. compressum* Pr., and more so to *fallax* St. From the former, it is at once distinguished by the more rounded outlines of the adult specimens; the young are higher in the anterior part, and the mussel is nearly square, while the young of *compressum* are more triangular; and in the latter, the beaks are higher, the (young) mussel is of comparatively larger diameter. From *P. fallax* it differs by its larger size, the coarse striation, the shape of the ridges and the grayish color.

Pis. septentrionale Prime.¹ The name being pre-occupied for a Lapland species, *P. fallax* var. *septentrionale* St. must be changed, and *v. boreale* is herewith proposed.

New Philadelphia, Ohio, March, 1899.

GENERAL NOTES.

COCHLICOPA LUBRICA in Alaska. In the article describing *Hyalina pellucida* and *H. arctica*, Science Record, II, p. 172, 1884, Mr. Lehnert records finding a specimen of the above species in the same dried-plant packing material the *Hyalinæ* were found in, from Point Barrow, Alaska.

WEST COAST OYSTER HERMAPHRODITIC.—F. L. Washburn, of the University of Oregon, has lately confirmed Prof. Schiedt's discovery that male and female elements co-exist in the West American oyster. There seems to be no evidence of protandry, mature eggs and spermatozoa existing at the same time. The full account is in *Science* for March 31.

¹ Cat. Corbiculadæ, 1895, p. 61, "Undescribed."

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COLLECTING IN ARIZONA AND NEW MEXICO.

BY REV. E. H. ASHMUN.

When I began searching this region for land shells, about four years ago, I had done no land collecting, and for that matter but very little in any line, and there have been many surprises. It is a very dry region and I did not expect to find much, and, indeed, molluscan life is scarce, but it has proven of sufficient interest to make up in quality what it lacks in quantity. This is due to the fact that these territories were little known to the conchologist, and to the existence of many mountain ranges, separated by vast stretches of semi-arid plains, isolating them, as far as their molluscan life is concerned, and thereby increasing the probability of the presence of new forms in the different mountain areas.

My collecting has had to be done "on the side," in connection with a regular vocation, as time could be snatched for it. But the regular work has taken me over a considerable part of both territories, and so afforded an opportunity of collecting in a number of different localities, though seldom giving time for a sufficiently thorough search of any of them.

With but few exceptions, no land shells are found except in the high altitudes of the mountains, these localities only supplying sufficient moisture and vegetation, and the collector must be prepared for long tramps and much climbing and hard lifting as well, in overturning rocks and logs to reveal the hiding place of these tiny creatures.

I have found shells at 10,000 feet alt., and other collectors still higher. I once walked fifteen miles in one day, and upset rocks and logs enough, I should think, to materially change the appearance of the entire locality, and had to take a train at 10 p. m. and ride till 3 o'clock. After a day of this tramping, climbing and lifting, without finding much, I have asked myself, Does this pay? but have been just as eager to improve the next opportunity, no matter how much hard work it involved.

Sometimes the most promising locality has yielded nothing of special interest, while a less likely field has produced new species. Especially has this been the case in places that at first seemed too dry to be worth investigating, but which have later been found to contain minute forms, especially Pupidæ. This fact, taken in connection with their minuteness, accounts mainly for the new Bifidariæ being mostly recent finds.

A horseback ride of twenty miles from Crittenden, Arizona, with a companion, brought us into the Santa Rita Mountains, where we camped one night with no roof but the blue canopy. A half day's collecting in what seemed a very promising cañon resulted in only about forty specimens all told; but when I found the lot to contain *Bifidaria pilsbryana*, further west than before known, and the first examples of *Bifid. ashmuni* Sterki, my disappointment was perceptibly mollified.

One Monday morning I walked four miles up the very dry Ephraim cañon, having to be back in just four hours from the time of starting. I covered the eight miles, had two hours for collecting, and was back on schedule time with but few shells, but they included *Bifidaria perversa* Sterki, and *Bifid dalliana* Sterki, both n. sp., and *Bifid. ashmuni* form *minor*. The representatives of this genus are so minute that they easily elude one's search, especially in dark cañons and beneath thick undergrowth; and I have found it of advantage, particularly when my time was limited, to gather the dirt and leaves found to contain them and carry it away. I usually have a flour sack in my pocket for the purpose. About a peck of such dirt taken home from Jerome, Arizona, nearly 500 miles, "panned out" 93 *Bifid. hordeacella* var. *parvidens* Sterki, n. var., and about 40 *Thysanophora horni* Gabb, but it took many hours to look it over. At the present writing, I have dirt from five different localities, ranging from 100 to 850 miles from home, perhaps two bushels in all, waiting to be

examined. The greater part of it is river drift. I have just now shipped it 500 miles to my new home.

My experience has given emphasis to the importance, readily appreciated in marine collecting, of securing many examples of what one finds, though time has not always permitted it. The Hoosier woman who advised her husband to "git a plenty while yer gittin," was wise in her day and generation.

In 1895, I found a quantity of *Physa virgata traski* Lea, in Salt River, at Tempe, Arizona, large and fine, and a goodly number were taken. The same locality has been revisited a half dozen times since, but not until April, 1899, have I again seen as large ones. *Cirnega* is the Spanish word applied to a marshy place from which water flows—at once a marsh and a spring. In one of these, near Crittenden, Arizona, in the summer of 1897, I found *Physa mexicana conoidea*, and under logs, *Bifidaria pentodon*; but it was late in the afternoon when I reached the place, and I could secure but few of either. I had supposed it a perpetual spring, but returning last fall, I found it as dry as a floor.

Not a little of my collecting has been done in snatches of time when it seemed almost an accident that anything was discovered. As the train on the Santa Fé Pacific R. R. stopped one morning at Navajo Springs, Ariz., I rushed down to the bed of the (then dry) Rio Puerco of the West (Arizona rivers sometimes run bottom-side up), to see if I could pick up something from the drift, not expecting the train to stop more than five minutes at the most. But fortunately a freight accident ahead delayed our train two hours, and I gathered twenty-one species. The other passengers were grumbling over a late breakfast, but a trifle like a belated meal does not disturb a "shell crank" when there is any collecting on hand.

On the 13th of last January I was taking the 90-mile stage drive to White Oaks, N. M.; as the stage stopped to change teams at 9 a. m., I walked on ahead with no thought of any collecting at that time of the year, but passing an artificial pond I concluded to take a look at it. By breaking the ice I secured five examples of *Physa mexicana*, Phil. My hands were cut on the ice and chilled by the wind. I had nothing to put my shells in, and carried them in my hand for an hour till I found an empty cartridge and could deposit my shells within a shell. At 3 p. m., when the next change was made, I again walked on; and under some rocks, where the snow had

melted, I found three *Bifid. hordeacella*, which I deposited in my spectacle case for want of a better receptacle. I expected the stage every minute, but the Mexican driver was accommodatingly slow, (his *poco tiempo* is usually *mucho tiempo*), and I had time to gather up a little dirt into my silk muffler, which contained 13 more specimens.

This is a mild climate, but not so much as to make an all night stage ride in the mountains in mid-winter, in an open rig, an un-mixed luxury. We have the same brand of snow and ice that they manufacture up in Minnesota. If the reader will take down his picture of a six-horse Concord stage with a Jehu driver and replace it with one containing a buckboard and a pair of half-starved bronchos or lazy mules and a Mexican driver, who *sabes* little English and less horsemanship, he will see the real and raw article as it is served up to us on this 22-hour ride. But a plentiful supply of wraps, including several thicknesses of paper under my vest and a heavy blanket enveloping my head and shoulders, a burning lantern between my feet and an occasional walk or run of a mile or so, served to keep me above freezing point.

Returning by a different route I halted the stage in a cañon of the Asecuras Mountains long enough to gather up into a gunny sack nearly a bushel of drift lodged by the road side, in which over 1,200 shells were found.

The localities visited have not been thoroughly examined, and many mountain ranges await the first visit of the collector. There is no reason to doubt that further search will yield excellent returns.

The following new species and varieties have rewarded my efforts:

Bifidaria perversa Sterki.

Bifidaria quadridentata Sterki.

Bifidaria ashmuni Sterki.

Bifidaria ashmuni Sterki form minor.

Bifidaria hordeacella Pils. var. *parvidens* Sterki.

Bifidaria dalliana Sterki.

Pupilla sonora Sterki.

Pupilla sonora var. *tenella* Sterki.

Ashmunella rhyssa Dall.

Ashmunella niorhyssa Dalí.

Ashmunella ashmuni Dall.

Ashmunella pseudodonta Dall.

Ashmunella pseudodontata subsp. *capitanensis* Ashmun & Cockerell.
Agriolimax ashmuni Pils. & Van.
Pyramidula Cockerelli Pilsbry.

DESCRIPTIONS OF NEW LAND SHELLS FROM SOUTH AMERICA.

BY C. F. ANCEY, DRA-EL-MIZAN, ALGERIA.

Conulus Coroicanus, Anc.

Testa turbinata, globosa, tenuis, pellucida, nitidissima, virenti-cornea, obtecte et minute perforata. Spira abrupte conica, elata, apice parvo, vix obtusiusculo. Anfractus $6\frac{1}{4}$ – $6\frac{1}{2}$ convexi, lente crescentes, sutura lineari subappressa discreti, lineolis incrementi lævibus, ultimus altus, tumidus, initio obtuse angulatus, angulo prope aperturam evanido, basi convexus. Apertura subobliqua, rotundato-lunata, ampla. Peristoma simplex, rectum, ad columellam minute supra perforationem in trianguli forma dilatatum, marginibus remotis. Diam. 6 – $6\frac{1}{2}$, alt. $5\frac{1}{5}$ – $5\frac{3}{4}$ mill.

Andes of Bolivia, east of Lake Titicaca, province of La Paz.

A very fine translucent species, remarkable on account of its large size, conic spire and tumid last whorl. It is provisionally referred to *Conulus*, until the soft parts are examined.

Stephanoda Iheringi, Anc.

Testa orbicularis, depressa, aperte lateque umbilicata, umbilicus circularis, tertio diametri vix minor, anfractus omnes præbens, albescens (subfossilis), tenuissime confertimque striata, striis parum obliquis, in ultimo subflexuosis. Spira convexa, obtusissima, parum elevata. Anfractus $4\frac{1}{3}$, lente accrescentes, convexi, sutura impressa; ultimus rotundatus, cylindricus, haud deflexus, procedente vix amplior. Apertura lunata, cæterum regulariter extus basique rotundata. Peristoma simplex, haud expansum. Diam. $1\frac{1}{2}$, alt. $\frac{2}{3}$, alt. apert. vix $\frac{1}{2}$ mill.

Rio Grande do Sul, Brazil.

An insignificant minute shell, but not referable to any other of the group.

Stephanoda Latastel, Anc.

Testa orbiculata, depressa, haud nitens, late umbilicata, umbilicus magnus, tertio diametri paulo latior, angulo obtuso cinctus, sordide fulvida, castaneo flammulata, epidermide fusco. Spira anfractu penultimo vix prominente, medio distincte concava. Anfractus $5\frac{1}{4}$ lente crescentes, sutura profunda, embryonales oculo nudo læves, sequentes lamelloso-costulati et lineis tenuissimis spiralibus sub valida lente impressi, intervallis microscopice striatulis; sculptura in anfractu

ultimo validiore, costulis flexuosis; ultimus longe et paulatim deflexus, altus, subcylindricus, pone suturam tumidulus. Apertura subobliqua, extus sinuosa, oblongo-lunata, basi obscure subangulata. Peristoma simplex, marginibus remotis. Diam. maj. 7; min. $6\frac{1}{4}$; alt. fere 4 mill.

“Cordillere de Chillan,” Chili (F. Lataste). Belongs to the typical group, which includes *S. dissimilis* d’Orb., *S. Binneyana* Pfr., *Gratioleti* Hupé, and probably allied to the latter, but surely quite distinct.

Epiphragmophora andivaga, Auc.

Testa depressa, attamen convexa, obtecte umbilicata, subsolida, nitidiuscula, corneola, fascia mediana in ultimo anfractu, utrinque late pallido-marginata, duabusque pallide fuscis in parte supera ejusdem anfractus in penultimo continuis, in ultimo versus aperturam plus minusve coalescentibus decorata, basi fuscula, centro pallidior, epidermide tenui pallide luteo-virescente induta, lineis obliquis incrementi striatula, superne striis spiralibus tenuiter incisa. Spira convexa, late subconoidea, obtusa. Anfractus $4\frac{1}{2}$ regulariter sed satis rapide crescentes, convexiusculi, sutura impressa; ultimus supra convexodeclivis, initio obscure subangulatus, antice leviter deflexus, basi post aperturam constrictus. Apertura elliptica, sublunata, valde obliqua, fasciis transmeantibus. Peristoma album, crassiusculum, reflexum, supra umbilicem mediocrem fere penitus evolutum, marginibus remotis, callo tenui junctis. Diam. $19\frac{1}{4}$, min. $15\frac{1}{2}$, alt. 10 mill.

Andes of Peru, along with *E. claromphalos* Deville et Hupé, *Bulimulus revinctus* Hupé, *B. stenacme* Pfr., *B. Moniezi* Dautz. and others.

This is a small species, not referable to *E. alsophila* Phil., *Tschudiana* Phil., *clausomphalos* Dev. & Hupé, to which it seems to be allied. It is shaped like *E. rufocincta* Newcomb, from Catalina Island, California.

Epiphragmophora Turtoni, Auc.

Teste globoso-subdepressa, imperforata vel umbilico prorsus clauso munita, solidula, sub epidermide tenui ac pallido stramineo-lutescente albida, striatula et (primis anfractibus exceptis) undique confertim et minute malleata, suboleoso-micans, fascia mediana castanea suturam anfractuum 2 inferiorum sequente cingulata. Spira elevato-subglobosa. Anfractus 5 convexi, primi lævigati, sequentes oblique striatuli; ultimus amplus, rotundatus, antice longe valdeque deflexus, subtus breviter depressus, radiatim striatulus, basi pone aperturam constrictus. Apertura obliqua, transverse oblonga, ferri equini fere exacte formam simulans, vix lunata. Peristoma album, labiatum, undique crasse valdeque rotundato-revolutum, intus prope columellam tuberculo indistincto præditum, marginibus callose appressis, valde convergentibus, callo tenui junctis, basali in umbilici loco albidilatato. Diam. maj. 29, min. $24\frac{1}{2}$, alt. 18 mill.

Habitat : unknown, but most probably Bolivian.

This fine species is quite distinct from others. The nearest ally is *E. estella* d' Orb., from which it differs in being more globose, imperforate, in having the peristome more developed with the margins approximate, and many other particulars. It cannot be confounded with *E. Tucumanensis* Doering, and *E. Saltana* Anc., from northern Argentina, in which the sculpture is not the same at all and from which the above characters may separate it at a glance.

NATURAL HISTORY OF THE TRES MARIAS ISLANDS, MEXICO.

The above is the title of "North American Fauna, No. 14," recently published by the U. S. Dept. Agriculture (Division of Biological Survey). The title should be modified by placing the words "Contributions to the," before the word "Natural," as no mention is made of the *Insecta*, and *only six species of mollusks* are given. These are all land shells, and determined by Dr. Dall as follows: *Polygyra ventrosula* Pfr., *Orthalicus undatus* Brug., *Orthalicus undatus melanocheilus* Val.,¹ *Lamellaxis* —? *Opeas subula* Pfr., and *Glandina turris* Pfr. The two forms of *Orthalicus* were heretofore known to occur in the islands; the others are additions to the list published by the National Museum in 1894. The author of this number of the N. A. Fauna, Mr. E. W. Nelson, in mentioning the names of Col. A. J. Grayson and Alphonse Forrer, says, "no other naturalist is known to have visited the islands until the spring of 1897," when in April of that year Mr. Goldman and himself crossed over by sail-boat from San Blas, remaining on the islands from the 2d to 31st of May. The summary of *animal* species collected including the six mollusks above named sums up 121. The author should have known that the islands were visited in the spring of 1876 by Mr. W. J. Fisher, who made a large collection of molluscan forms as published in the Proc. U. S. National Museum, pp. 139-204, of Vol. XVII, 1894, where 89 species were listed. Four of the land-

¹The *Orthalicus* of northwestern Mexico is not *undatus*, which is an exclusively Antillean and Floridian form. It is *O. princeps* Brod., a more boldly marked form than *undatus*, with distinct and coarser spiral striation, and various differences in the soft anatomy, which has been worked up by Strebel, and confirmed by my own preparations. Probably *melanocheilus* holds the same relation to *princeps* that *floridensis* does to *undatus*; but this has not been proven as yet.—Ed.

shells collected by Mr. Nelson, not previously detected, added to those before credited to the islands, makes a total of 93, or *three-sevenths* of the *animal* forms constituting the *Fauna* of the group, thus far reported.

It is not unlikely that insect species were collected by Grayson and Forrer and have been described and perhaps published somewhere. Only the mollusks collected by Mr. Fisher came under my notice.

ROBT. E. C. STEARNS.

Los Angeles, Cal., May 11, 1899.

NEW AMNICOLIDAE FROM FLORIDA.

BY H. A. PILSBRY.

During the past decade a number of undescribed species of this family have accumulated in our collections, chiefly gathered by Mr. C. W. Johnson, Prof. C. E. Beecher and the author.

Amnicola sanctijohannis n. sp.

Shell slightly rimate, ovate-turbinate, corneous, somewhat translucent, rather thin. Surface glossy, the growth-lines hardly visible. Spire rather high, conic, the apex rather obtuse. Whorls $4\frac{1}{2}$, rather convex, separated by a moderately impressed suture which is margined below by a conspicuous transparent border (not visible, of course, in opaque dead or incrustated shells.) Aperture ovate, angular above, a little flattened on the parietal side; peristome a trifle expanded and blackish in fully adult shells, acute, continuous, the parietal wall adnate but with distinct edge, often somewhat calloused within. Alt. 3.4, diam. 2.4 mm.; greatest axis of aperture 1.7 mm.; another specimen measures 3.2, 2.5, 1.7 mm. St. John's river, Florida, at Astor, Lake Co., (type locality), and Silver Spring Run, Marion Co., (Pilsbry & Johnson); Wekiva river (C. E. Beecher.)

This is a larger species than *A. floridana* Ffld., and differs in being imperforate, translucent waxy-whitish when taken alive, and in showing a distinct sub-sutural margin like "*Hydrobia*" *monroensis*. The aperture is distinctly angular above, not rounded as in adult *A. floridana*.

The type series was collected by C. W. Johnson and H. A. Pilsbry, in 1894. Mr. Beecher's specimens from Wekiva river are thinner and bear a delicate ferrous incrustation.

***Amnicola Johnsoni*, n. sp.**

Shell umbilicate, globose, rather thin, pale brown, somewhat transparent. Surface nearly smooth, showing faint growth-striae. Spire short, obtuse. Whorls $3\frac{1}{2}$, the first convex, planorboid above, the rest very convex, somewhat flattened and strongly "shouldered" below the sutures. Convex at periphery and around the circular umbilicus. Aperture large, oblique, oval, somewhat angular above; peristome thin, the outer and basal margins unexpanded, columellar margin expanded above, not continuous across the parietal wall, which is merely varnished by a light deposit, and is about half the length of the free columellar lip. Alt. 2.7, diam. 2.56, longest axis of aperture 1.7 mm. Operculum Amnicoloid.

St. Augustine, Florida (C. W. Johnson).

The conspicuously obtuse apex and globose contour are unlike any other Floridian species, and somewhat similar to the much larger, more solid and opaque northern *porata* form of *Amnicola limosa* (Say). It is named after Mr. Charles W. Johnson, who collected the series of some forty specimens in the collection of the Academy.

Lyogyrus Dalli Pils. & Beech. is similar to the present species in contour, but is smaller, paler, and differs generically in the closely coiled operculum. *L. granum* (Say) has a decidedly more conical and produced spire, rounder whorls, and, of course, differs in the operculum.

***Paludestrina monas*, n. sp.**

Shell turbinate-conic, rimate-perforate, thin, pale brownish horn-colored; smooth. Whorls 4, very convex, especially below the deeply impressed suture, the apex obtuse. Aperture vertical, oval, slightly narrowed at the upper extremity, the inner margin slightly less arcuate than the outer; peristome thin, the outer margin gently expanded, a little sinuous, being produced forward below. Alt. 1.8, diam. 1.3 mm.

Wekiva river, Florida, with *Lyogyrus Dalli* and *Amnicola sancti-johannis* (C. E. Becher, February, 1886).

In contour this species resembles *Bythinella Aldrichi* on a small scale. The sinuation of the outer lip is somewhat like that of *Pleurocera*, though much less pronounced. Something similar is found in *B. Hemphilli*.

The following species of this family are now known to us from Florida:

- Paludestrina* (formerly *Bythinella*) *aequicostata* (Pilsbry).
 “ “ “ *Nickliniana* var. *attenuata* (Hald.).
 “ “ “ *brevissima* (Pilsbry).
 “ *monas* Pils.

Littoridina (?) *monroensis* (Ffld.). Described as *Hydrobia*.

Ammicola sanctijohannis Pils.

“ *floridana* Ffld.

“ *johnsoni* Pils.

Lyoggyrus Dalli P. & B.

Gillia (?) *wetherbyi* (Dall). Described as *Hydrobia*.

We will be glad to hear of any other species from the State. The above-named forms are all from the St. Johns and Wekiva rivers and St. Augustine, and their occurrence elsewhere will be of interest to learn. Probably additional species will reward search in other streams.

They may be collected with a fine-meshed wire scoop, or by gathering a mass of aquatic vegetation, drying it in the air, and then shaking over a paper. This method has been very successfully practiced by Mr. C. E. Beecher in the Wekiva river.

In some places *Ammicolidae* are incredibly numerous in lake beds. The floor of Lake George, on the St. Johns, is covered in some parts with mud charged with *Paludestrina aequicostata*, and the same species has been found on the bottom of Lake Okeechobee.

NEW SOUTHERN UNIOS.

BY BERLIN H. WRIGHT.

U. rotulatus, sp. nov.

Shell black, smooth anteriorly and over the umbos and with elevated growth-lines over the remainder of the surface, circular, inflated, rayless; umbonal ridge wanting, but replaced by two slightly raised, diverging curved folds; beaks retuse, blunt and broad; substance of the shell rather thick and uniform; beak cavity very deep, wide, sharply angular and with no visible cicatrices; anterior cicatrices distinct, remarkably deep and rough; posterior cicatrices confluent, smooth and slightly impressed; cardinal teeth low, very much notched, inclined to be double in the left and single in the right valve; lateral teeth long, slightly curved, not prominent, and gradu-

ally disappearing in the dorsal region, where a broad smooth plate separates them from the cardinal teeth; nacre dead white, except for a small area in the posterior part which is silvery, iridescent.

Diameter 1.25, length 2, width 1.8 inches.

Habitat—Escambia River, Escambia County, Florida.

Type in National Museum.

Remarks: This species is clearly a member of the *circulus* group, and its southernmost member. Compared with *N. circulus* Lea, it is more uniformly inflated, black, longer laterals, teeth all less prominent, deeper beak cavity and the superior forward cicatrices are deeper and shorter. It is to be regretted that thus far the type specimen is the only one in hand, and that does not show the beaks, which are much eroded. It is, however, so radically distinct that we do not feel any hesitancy in according it specific rank.

CORRECTION: In description of *U. Harperi* Wr., in NAUTILUS for May, p. 6, "N," first line, should be "U."

(*To be continued.*)

AGASSIZ ASSOCIATION DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association, by its General Secretary, Dr. W. S. Strode.]

COLLECTING IN SOUTHERN CALIFORNIA.

[Extract from the report of Mrs. E. H. King. From the Transactions of the Isaac Lea Conchological Chapter for 1898.]

I spent the winter and spring of 1898 in Southern California, and visited the seaside a number of times, Redondo, Santa Monica, San Pedro, Terminal Island and Dead Man's Island. I collected a great quantity of fossils (about 20 species) on Dead Man's Island, among them a beautiful *Fusus* which I prize very highly. At the base of the Island in shallow pools I found a number of living *Nassa mendica*. The tide came in while we were on the Island and we were compelled to return on the sea wall, which is built of huge blocks of granite piled promiscuously. We scrambled over these and often had to jump from one to another, the burning hot sun blistering our faces, but we held on to our shells and finally reached the shore. We were told the sea-wall was a mile and a quarter long.

At Redondo I secured the largest shell of *Pachydesma crassatelloides* that I have ever seen. Terminal Island afforded more shells than any other place I visited. On muddy banks of little pools near the lagoon I found a quantity of *Cerithidea sacrata* and *Melampus olivaceus*. I had read that these were found on "mud flats of brackish pools," and a short search revealed abundance of them, also a few specimens of *Bulla nebulosa*. On the ocean side of the Island I found a good *Ocenebra Poulsonii*, a *Trophon Belcheri* and the rare *Waldheimia*. A few good shells of the following: *Psammobia rubriata*, *Lutricola alba*, *Neverita reclusianus*, *Lunatia Lewisii*, *Drillia penicillata*, *Monoceros engonatum*, *Amiantus callosa*, *Macoma secta*, *Chione succinta*, *Tapes staminea*, *Mytilus*, *Crucibulum spinosum*, and three varieties of *Acmaea*, a quantity of *Chlorostoma gallina* and *Pecten equisulcatus*, upon which were numerous *Crepidula*. The beach is strewn with dead shells, among them large specimens of *Glycimeris* and *Macoma*.

GENERAL NOTES.

Philomycus lactiformis (Blainville). This slug, described by Blainville in 1817 (Journ. de Phys., p. 443) as *Limacella lactiformis*, has been only known since that time by the original specimen, which is in the British Museum. Specimens from York Co., Pa., collected by Mr. Witmer Stone in 1889, prove to agree excellently with the Blainvillian animal, having just the same white color and semi-pellucid appearance. It is not likely that the species is separable from the ordinary forms attributed to *P. carolinensis*, except as a color variation.—H. A. P. & T. D. A. C.

J. F. Babor, of Prague, has added to our slight knowledge of the Arionine group *Ariunculus*, in describing the anatomy of *A. austriacus* n. sp., from Schneeberg, near Vienna, in the Austrian Alps. (Proc. Mal. Soc. Lond., III.)

M. Ph. Dautzenberg has recently described a collection made by M. J. L. Weyers, of Sumatran mollusks. New forms of *Cerithidea* and *Stenothyra* are described, and valuable notes and figures of Melanians and Navacellæ are given. M. Weyers found the Antillean *Subulina octona* abundant in many localities (Ann. Soc. Roy. Mal. Belg. 1899).

THE NAUTILUS.

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EPIPHRAGMOPHORA FIDELIS GRAY.

BY P. B. RANDOLPH.

This species is found in great abundance in and around Seattle. On the bicycle path that runs around the north end of town they can be seen by the score on warm spring days, and I thought a few notes on size, coloration and banding would be of interest to the readers of the NAUTILUS.

The first thing that attracts the attention of the collector is the variety of the coloration of the shells, ranging from dusky brown to nearly white.

In the dark forms the bands are nearly obscured; in the albino form (*E. fidelis flava* Hemp.), ours differ from the description (4th. Sup. 5th. Vol. Terrestrial Air-Breathing Mollusks, Binney. p. 185) in that the bands are very faint on the upper half of the body whorl and from the periphery gradually growing darker to the umbilicus. In twelve examples before me there are no signs of bands on the other whorls. From the body whorl the color grows lighter and the embryonic whorl shows a decidedly pinkish tinge. The entire shell is covered with a thin yellow epidermis which in adult specimens is generally destroyed, leaving the upper surface a dead white.

Albinos are not uncommon, averaging about one in one hundred of the common form. This form and var. *minor*, have been found, to my knowledge, only in or near clearings, never in the deep woods or swamps.

A favorite spot for depositing their eggs is in the heavy bark of some old fir stump, a foot or more from the ground. Two years ago I collected over fifty specimens on and near the base of a big stump in a clearing.

A few pass the winter in trees twenty feet or more from the ground. Our broad-leaved maple (*Acer macrophyllum*) which grows a very rugged and massive trunk, is one of their favorite retreats, especially for the young of the late summer brood.

A theory current in this section is that the reason *E. fidelis* has departed from *E. infumata* in height of spire and coloration, is that the latter pass so much of their lives under burnt logs that the spire has become depressed and they have assumed the protective coloration so characteristic of that species.

Never having visited the haunts of *E. infumata*, I do not know how thick the timber may be or how large the burnt districts are, but I venture to say that nowhere on the Pacific Coast is the timber larger, or are there more down and burnt tracts than on Puget Sound. And still I have never seen a *fidelis* that I could not tell at a glance from *E. infumata*, and in life the animals differ so much from each other in coloration that I do not understand why the latter is not a good species instead of a mere variety.

The number of bands on the body whorl is six, though in some the bands are but faintly seen as mere lines of different shade from the adjoining bands. The width and brightness of the bands are most striking, and for convenience I have called the typical form figured in Binney's Land Shells No. 1, and the extreme form of banding No. 2.

Measuring them on the body whorl $\frac{3}{4}$ of an inch back from the extreme edge of lip, I find that No. 1 has bands of the following width and color:

Band i, $\frac{3}{16}$ in. wide, Chestnut with dark blotches.

Band ii, $\frac{1}{16}$ in. wide, Light yellowish, merging into band above.

Band iii, $\frac{1}{8}$ in. wide, Black band.

Band iv, $\frac{1}{16}$ in. wide, Light yellow, merging into No. v.

Band v, Narrow chestnut.

Band vi, Entire base of shell black, darker near the umbilicus.

Greatest diameter of shell measured $1\frac{1}{2}$ inches.

No. 2.

The greatest variation is seen in the following:

Band i, $\frac{3}{8}$ in. wide, Light chestnut with dark blotches.

Band ii, Light edge to No. i.

Band iii, $\frac{1}{8}$, Black.

Band iv, Light edge to band iii.

Band v, $\frac{3}{8}$ in. wide, Yellow, gradually merging to black of base.

Band vi, No. 6, Black to umbilicus.

Greatest diameter of shell measured $1\frac{1}{4}$ in.

In size they vary greatly. The following are the extremes.

Largest.	Smallest.
Greatest Diam. $1\frac{1}{2}$ in.	Greatest Diam. $1\frac{1}{8}$ in.
Smallest " $1\frac{1}{4}$ in.	Smallest " $\frac{7}{8}$ in.
Altitude, $\frac{7}{8}$ in.	Altitude, $\frac{9}{16}$ in.

DREDGING OFF SAN PEDRO.

BY H. N. LOWE.

Last summer, while the late Mr. Edward W. Roper was living in Long Beach, we (that is, Mr. Roper and myself) decided to do a little dredging off San Pedro. As there had been no extensive work done in that line at San Pedro in late years, we were in hopes of being rewarded with some rare shells and possibly some new species.

Mr. Roper sent for his dredging outfit which he had previously used at Eastport, Maine. We chartered the little sloop "North Star" and made three dredging trips with moderate success. We dredged in water from 5 to 20 fathoms depth, on muddy, sandy, gravelly, once on a bottom composed of dead bivalves for the most part, and two or three times among the rocks at 10 fathoms.

I made one subsequent trip with Mrs. M. Burton Williamson with the same boat and dredging outfit. We were greatly troubled in dredging by a species of red algæ, which covered the bottom so thickly in places as to choke the mouth of the dredge, thus preventing the shells from entering. For the past two years, the ocean has been full of this moss, and at times the beach has been covered with it. From this algæ in the dredge we obtained a few live specimens of *Calliostoma splendens* Cpr. and *C. gloriosum* Dall.

Besides the shells, we dredged a number of curious crustaceans and echinoderms not found on shore.

The following list includes all the species taken in the four dredging trips: all are live specimens unless marked dead:

List of Shells Dredged.

- Bittium asperum* Cpr., plentiful at 10 fathoms.
Cadulus fusiformis Pils. & Sharp, a few alive in sandy mud.
Calliostoma gloriosum Dall.
Calliostoma splendens (Mke.) Cpr.
Calliostoma tricolor Gabb. alive in sandy mud.
Callista subdiaphana Cpr. several young shells alive, one large dead one, one inch in diameter.
Chrysallida communis C. B. Ads.
Corbula chittyana C. B. Ads, two specimens alive at 20 fathoms soft mud. "This is exactly like West Indian specimens, and I should question its Pacific coast habitat if it were not that we have one worn valve apparently the same from Lower Cal." Dall.
Corbula luteola Cpr.
Crepidula adunca Sby., dead.
Crepidula navecelloides Nutt. var., two live ones of a very thin cup-shaped form with brown epidermis.
Cylichna attonsa Cpr.
Dentalium neohexagonum Pils., sandy mud at 10 fathoms.
Dentalium semipolatum Cpr. alive with *D. neohexagonum* Pils.
Drillia cancellata Cpr., 10 to 20 fathoms, fine gray sand.
Drillia empyrosia Dall., dead.
Drillia Hemphilli Stearns, 5 to 15 fathoms.
Drillia inermis Cpr.
Drillia pedroana Dall., dead.
Drillia pudica Hds.
Drillia quisqualis Hds., with *D. pudica* at 10 fathoms in sandy mud.
Eucosmia substriata Cpr.
Eulima micans Cpr.
Eulima rutila Cpr.
Eulima thersites Cpr., one live one at 15 fathoms.
Galerus mamillaris, on dead bivalves.
Halistylus pupoideus Cpr.
Labiosa undulata Gld., dead.
Lacuna unifasciata Cpr.

- Leda acuta* Conr., with *L. taphria*, rare.
Leda taphria Dall., plentiful at 5 fathoms.
Leptothyra sanguinea Cpr., one dead, "unusually elevated variety or malformation." Dall.
Lyonsia californica Conr.
Macoma goldiformis Cpr.
Mangilia anguilata Cpr., rare at 20 fathoms.
Mangilia sculpturata Dall., a few at 20 fathoms.
Mangilia variegata Cpr.
Modiola fornicata Cpr.
Myurella simplex Cpr.
Murex trialatus Sby., one fine specimen dredged from rocks at 10 fathoms, had beautiful recurved frills.
Muricidea barbarensis Gabb., one live one.
Muricidea incessa Brod.
Muricidea santa-rosæ Dall., rare at 10 fathoms.
Nucula exigua Ads., dead.
Nucula tenuis Ads., one live one at 20 fathoms.
Ocenebra foreolata Hds., dead.
Odostomia inflecta Cpr., one "live" example at 20 faths. soft mud.
Odostomia subplanata Cpr.
Olivella boetica Cpr., plentiful at 5 faths.
Pecten latiauritus Cpr.
Placunanomia macroschisma Desh var., two specimens found inside of an old barnacle were of a dark chocolate color on the inside, diameter $2\frac{1}{2}$ inches.
Psamobia edentula Gabb., one young shell showing color pattern.
Scala bellastrata Cpr., one live specimen.
Semele pulchra Sby.
Semele rubropicta Dall.
Cadulus (Polyschides) quadrifissatus Cpr., with *Cadulus*.
Solen ensis L. var. minor Conr.
Solen sicarius Gld.
Tellina Idæ Dall., one dead shell.
Tellina modestus Cpr., 5 to 10 fathoms sandy mud.
Terebratella transversa Sby.
Tornatina culcitella Gld.
Tornatina inculta Gld.
Turbonilla chocolata Cpr.

Turbonilla tenuicula Gld.

Turbonilla torquata Gld.

Turbonilla tridentata Cpr.

Turbonilla sp? a few specimens dredged at 15 fathoms were of a light brown color and extremely slender. Held at Washington for further study.

Turritella Cooperi Cpr.

Venus toreuma Gld., one dead shell.

Volvula cylindrica Cpr.

NOTES ON THE MOLLUSKS OF LILYCASH CREEK.

BY FRANK C. BAKER.

Some time ago Mr. J. H. Handwerk and Mr. W. Chadwick began a systematic survey of the little stream known as Lilycash creek, near Joliet, Ill., dividing it into sections. Section I extended from the mouth of the creek, where it emptied into the Desplaines River, to the Plainfield road, a distance of about two and one-half miles. Later, they propose to take up section II, which will include the balance of the creek. A list of the species found within that area, which Mr. Handwerk was kind enough to submit to me for identification, may be of interest, since the region has afforded several peculiar new species, and is very prolific in Sphæriidæ.

The writer is indebted to Dr. V. Sterki and Prof. H. A. Pilsbry for the identification of several of the species enumerated.

The following species were collected :

<i>Sphærium stamineum</i> Conrad.	<i>Pisidium</i> sp. Now in the hands
<i>Sphærium lilycashense</i> Baker.	of Dr. V. Sterki, who believes it
<i>Sphærium striatinum</i> Lamarck.	to be a new species.
<i>Sphærium simile</i> Say.	<i>Pisidium roperi</i> Sterki.
<i>Sphærium occidentale</i> Prime.	<i>Limnæa humilis</i> Say.
<i>Calyculina transversa</i> Say.	<i>Limnæa desidiosa</i> Say.
<i>Calyculina truncata</i> Linsley.	<i>Planorbis parvus</i> Say.
<i>Pisidium virginicum</i> Gmelin.	<i>Physa heterostropha</i> Say.
<i>Pisidium abditum</i> Haldeman.	<i>Pleurocera elevatum</i> Say.
<i>Pisidium compressum</i> Prime.	<i>Amnicola limosa</i> Say.

<i>Pisidium walkeri</i> Sterki.	<i>Annicola limosa</i> var. <i>parva</i> Lea.
<i>Pisidium cruciatum</i> Sterki.	<i>Cincinnatia cincinnatiensis</i> Lea.
<i>Pisidium punctatum</i> Sterki.	<i>Pomatiopsis cincinnatiensis</i> An-
<i>Pisidium fallax</i> Sterki.	thony.
<i>Pisidium splendidulum</i> Sterki.	<i>Cameloma rufum</i> Haldeman. Re-
<i>Pisidium variabile</i> Prime.	versed.
Total 28 species.	

NEW SOUTHERN UNIOS.

BY BERLIN H. WRIGHT.

Unio Danielsi, sp. nov.

Shell uniformly solid, very inequilateral, subquadrate, rayless; posterior area closely, irregularly and sharply wrinkled; umbonal region traversed by several parallel, well-separated, flattened ridges or growth lines, which merge together towards the base; umbos exceedingly inflated and umbonal ridge very sharp above, gradually flattening out into biangulation towards the base; umbos broad and gracefully rounded; beaks erect but evidently not prominent; ligament dark red, not heavy; dorsal margin somewhat arched, abruptly rounded before, nearly straight on base and bluntly pointed behind; teeth heavy, well separated, the laterals long and curved, the single one having a central deep notch; cicatrices deep, smooth, the posterior ones confluent and the anterior ones distinct; beak cavity very slight; nacre creamy white with lavender border and very iridescent.

Diameter 1.25, length 1.5, width 2.25 inches.

Habitat: Spring Creek, Decatur Co., Ga.

Type in National Museum.

Remarks: Several quite distinct forms of this general type have recently come to hand, some of which have been distributed under the name of "*U. incrassatus* Lea. var.?" This form, however, departs so far from that of the type of the group as to fully warrant erection into specific rank. Its distinguishing feature is the remarkable degree of inflation in the posterior umbonal region, prolonged posterior and notched single lateral tooth. It is also rayless.

It gives pleasure to name this for Mr. L. E. Daniels, of La Porte, Ind., who, with others, has rendered financial aid to make these discoveries possible.

VARIATIONS OF *HELIX HORTENSIS* AT ROCKPORT, MASS.

BY T. D. A. COCKERELL.

I have just received from Mr. G. H. Clapp a little series of *H. hortensis* collected at Rockport, Mass. The specimens (40) include all the variations Mr. Clapp could find in a series of about 300 shells collected. Mr. Clapp says: "The bandless or very faintly banded forms were by far the most common. Typical shells were scarce, even less plenty than the transparent banded variety. On rainy days the shells were out by the hundreds."

The variations in the series are as follows:

(1.) v. *subglobosa*, Binney; shell greenish. . 00000 and 00₃₄0.

(2.) v. *arenicola*, MacGillivray; bands colorless, translucent. 12345.

(3.) v. *subalbida*, Locard; yellowish-white or very pale yellowish. 00000 and 003₄₅.

(4.) v. *lutea*, Moq.; yellow. 00000, ₁03₄₅, 1234₅₅, 0034₅, 12345, 123(45), (123)(45), 1₂345, 10345, 00334₅ (two), 00₃00, 003₄0, 12045. Some are unusually thin; most of the bandless yellow specimens are very brilliantly colored; one 12345 specimen is very small, only 16 millim. diam.

The really interesting thing about the series is that no less than three specimens show split bands, indicating apparently that this colony of *H. hortensis* is varying in the same direction as the Lexington, Va., *H. nemoralis*. The two split-band formulæ are new, to the best of my knowledge.

DR. BABOR'S REDISCOVERY OF *ASPIDOPORUS*.¹

In 1833, Fitzinger described as *Aspidoporus limax* a slug from the mountains of Austria, which had the character, anomalous for a European form, of an opening in the mantle, as in the tropical African *Urocyclus*. It remained for a good many years unnoticed; but in 1884, Heynemann saw the original example, and declared it

¹ Ueber *Aspidoporus limax* Fitz., in *Annalen des K. K. Naturhistorischen Hofmuseums*, xiii, Heft I.

to be a deformed or abnormal *Amalia*. This view was adopted by Tryon and others; Mörch, Binney and Fischer having doubted the very existence of such a slug.

In examining the slugs of the Vienna Museum lately, Dr. Babor found Fitzinger's specimens, and he also obtained fresh individuals collected by Dr. Sturany in northern Steiermark, and by Dr. Werner in Montenegro. These specimens prove that *Aspidoporus limax* is not only a valid species, correctly observed by Fitzinger, but it belongs to a special group of at least subgeneric value.

The mantle is formed as in *Amalia*, having the impressed "horse-shoe," but there is a small orifice which in some specimens penetrates to the shell-sack, while in others it is merely a short, sharp impression, not penetrating through the mantle. The shell-plate is small and moderately thick. Pallial organs and nervous system as in *Amalia*, and the jaw and teeth are also not peculiar, except that the former is a little notched in the middle, below. The intestine is somewhat peculiar. There are six longitudinal folds, G_5 and the lower part of G_6 (forming the last posterior loop), being independent of the spiral torsion of the normal *Amalia* folds, lying to one side. There is no cœcum.

In the genital system the accessory gland (characteristic of *Amalia*), is completely wanting.

Dr. Babor, in discussing the systematic position of *Aspidoporus* and *Amalia*, gives evidence for regarding them as independent of the *Limacidae*, and as a branch from the family *Helicidae* (in the narrow sense). The main argument for this view is that the embryologic origin of the spermatheca is diverse in the two groups, *Amalia* being of the Helicid triaule type, while *Limax* is of the diaule type. An adequate discussion of this question would require more space than is available in this place; but it should be said that the well-developed pedal grooves show *Amalia* to be a typical Anlacopodous snail, and, therefore, far removed from the *Helicidae*; while the particular modification of the retractor muscle system distinctly points to the *Limacidae*. This is not likely to be a wholly independent parallel evolution. Moreover, I fail to see any such resemblance between the intestinal arrangements of *Aspidoporus* and the Helices as Dr. Babor alludes to, though the gut is wholly unlike that of *Limax*.

It is very gratifying to have the real existence of *Aspidoporus* proven, especially as the genus is undoubtedly more primitive than

Amalia, and a valuable link in the phylogenetic history of that group; and it is fortunate that the material fell into the hands of so competent a naturalist as Dr. Babor. H. A. P.

AGASSIZ ASSOCIATION DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association, by its General Secretary, Dr. W. S. Strode.]

SHELLS AND MASTODON.

[Extract from the report of Mr. W. Hilles Smith, Niles, Mich. From the Transactions of the Isaac Lea Conchological Chapter for 1899.]

Since my last report I have had the pleasure of gathering shells that were cohabitant with the Mastodon. About two miles west and a little north of the village of Buchanan, Berrien Co., Mich., is what is known as the Bakertown Marsh. In company with Prof. E. H. Frane, of Colon, Mich., who was hunting for remains of the Mastodon, I was hunting for remains of the mollusks, each in pursuit of his own hobby. The marsh had in former years been a lake about three miles long and one mile wide, and is now grown up to marsh grass without a sign of a tree in it anywhere, but in our excavations and along the large ditch was a layer or stratum of timber or drift wood, if such it might be called. The main part of our search was along the large ditch which is fully a mile long and runs through the middle of the marsh, made for the purpose of draining it, and all along on both sides of this ditch this layer of drift wood could be plainly seen. At one place was to be seen a large stone which would measure fully a cubic yard, lying right on top of this drift, and its weight had depressed the wood fully eight inches, showing unmistakable evidence of glacial drift. Some of the timber was as large as six inches in diameter, but the most of it was small and closely resembled our black oak of to-day. Commencing at the top and reading down, the strata appear as follows: Marsh bog, 16 inches. Recent peat, 20 inches. Peat and drift wood, 10 inches. Lake silt with no whole shells, 8 inches. Semi-ligneous peat, 12 inches. Shells and lake drift, 8 inches. Blue clay, 7 inches. Quick sand, 7 to 10 feet.

The skulls of the mastodon were found partly in and partly under the semi-ligneous peat, showing the shells to be as old or older than the mastodon. You may think, What has all this to do with shells? It is to give you, dear reader, some small idea of how long these shells have been lying there in what was once thought to be their last resting place, and how little the species differ from the same kind of the present day. The shells, so far as found, are as follows:

Limnæa stagnalis L., *L. desidiosa* Say, *L. humilis* Say; *Planorbis deflectus* Say, *P. parvus* Say, *P. bicarinatus* Say, *P. trivolvis* Say, *P. campanulatus* Say; *Ancylus rivularis* Say; *Amnicola limosa* Say, *A. lustrica* Pils.; *Campeloma integer* Say, *C. obesum* Lewis, *C. subsolidum* Anth.; *Physa ancillaria* Say, *P. heterostropha* Say, *P. integra* Hald.; *Strobilops labyrinthica* Say; *Succinea ovalis* Gld.; *Carychium exiguum* Say; *Valvata tricarinata* Say; *Zonites radiatulus* Ald.; *Pleurocera elevatum* Say, *Goniobasis livescens* Mke., *Margaritana rugosa* Bar., *M. deltoidea* Lea, *Anodonta subcylindracea* Lea, *A. footiana* Lea, *Sphærium simile* Say, *S. striatinum* Lam., *Pisidium compressum* Prime, *Unio pressus* Lea, *U. novi-eboraci* Lea, *U. ventricosus* Bar., *U. spatulatus* Lea.

All the shells are white and very frail except the *Pleurocera elevatum*, which is strong and still retains its coloring. The *Limnæa stagnalis* is larger than any that has come to my notice of the present day shells, some of them measuring over two inches long, and the *Planorbis campanulatus* and *bicarinatus* are also very large, larger than the present day shells of the same species. The *Valvata tricarinata* was also larger than any that I have seen and was quite plentiful.

One thing struck me as rather singular, that the shells seemed to be in colonies. For instance, take the whole line of that ditch, and there was only one place about a rod long where the *Pleurocera elevatum* was found, and the other shells had their localities where they were plentiful and almost none at all elsewhere. The *Valvata tricarinata* seemed to be as evenly distributed as any, and it was more plentiful in some places than it was in others.

There are many things to be found by a careful observer in overhauling a mass of such stuff as that lake drift. For instance, Prof. Cram in searching a lump of the dirt found a perfect skeleton head of a fly of the general appearance of our house fly, only larger, and we found unmistakable evidence of man by the presence of flint implements and horn tools.

GENERAL NOTES.

Bifidaria armifera var. nov. *ruidosensis*.—Shell only 4 mm. long, with the two outer teeth a considerable distance within the aperture. Three specimens collected by Mr. C. M. Barber in the nest of an ant (*Pogonomyrmex*) at Blackwell's Ranch, Ruidoso, New Mexico, Oct. 10, 1898, together with *Succinea avara*, *Cochlicopa lubrica*, *Helicodiscus lineatus*, *Vitrea indentata*, *Zonitoides arboreus*, *Leucocheila fallax* and *Vallonia gracilicosta*. The shells have quite a distinct appearance, and the locality is a long way from the ordinary range of *B. armifera*. Dr. Sterki, to whom I sent a specimen, says he has known the form for many years, and has seen it from Kansas, Missouri and Minnesota; he also states that he has seen true *armifera* from Mexico.—T. D. A. COCKERELL.

The collection of the late H. D. Van Nostrand has been acquired by Columbia University, New York, where it will be suitably displayed.—S. R. R.

Among other interesting forms described by Professor Ralph Tate in the last volume of the Trans. Royal Society of South Australia, are five species of the curious genus *Philobrya*, from the tertiary and recent faunæ of Australia and New Zealand. The genus is referred to the family *Mytilidæ* by Tate, who gives a list of all the species now known. Though the shells are so small, the genus should be easily recognized by the peculiar spreading embryonic shells perched at the apices of the valves.

A NEW SPECIES OF PRISTILOMA.—Mr. E. G. Vanatta has recently described, with a figure, a new *Pristiloma* (*P. pilsbryi*) from Portland, Oregon. The summits of the whorls are nodulous "very much like *Macrochlamys diadema* Dall." (Proc. Acad. Nat. Sci. Phila., 1899.)

Another new form has recently been described by Mr. Pilsbry as *Pristiloma Taylora*, types having been collected by the Rev. Geo. W. Taylor at Nanaimo, Vancouver Island. The *Pristiloma arctica* of Lehnert, from Point Barrow, Alaska, is also figured in the same paper (Proc. Acad. Nat. Sci., Phila., 1899), and a key to the known species of the genus is given.

A NEW VARIETY OF POLYGYRA MONODON.—*P. monodon friersoni*: Shell large, alt. 7, greatest diam. $10\frac{1}{2}$ mm., differing from the typical form in having $6\frac{1}{2}$ whorls or over, which are more closely coiled and narrower in consequence of their greater number; base very convex, strongly swollen around the deep axial excavation; perforation very narrow and oblique. From Frierson, La., collected by Mr. L. S. Frierson.

H. A. PILSBRY.

THE NAUTILUS.

VOL. XIII.

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No. 4.

NEW SOUTHWESTERN FORMS OF POLYGYRA.

BY H. A. PILSBRY.

Mr. James H. Ferriss made a journey through Arkansas and the Choctaw Nation of Indian Territory, during February of this year. It was too early in the season for the best results with snails; they were partially torpid, and not readily flushed from cover; and while some log-rolling had to be done, Mr. Ferriss missed the excitement of moving half a ton of rock for each one, as he was accustomed to do in the Smokies. Nevertheless, some interesting things were collected. Near Texarkana, Ark., on the Red River, numerous specimens were taken of a variety of *Polygyra Dorfeulliana*, agreeing with var. *Sampsoni* Wetherby, in the ample umbilical region, but differing in the heavy rib-striation of the whole base (*Sampsoni* being nearly smooth beneath), and in the almost marginal position of the upper lip-tooth, which is less immersed than in any of the other forms of the species. This form may be known as var. *percostata*. But Ferriss' greatest success was in stalking big game. It isn't everybody who can find unknown *Polygyras* nearly an inch in diameter; and Mr. Ferriss is prouder of it than a boy with a new knife.

The new form was at first thought to be *P. kiowaënsis* var. *arkansænsis*, but a comparison with the types of that shell shows the new one to be quite different. As not many more large and distinct new *Polygyras* can reasonably be expected in these United States, and

the name of Mr. W. G. Binney has not yet been given to one of the genus, Mr. Ferriss unites with me in calling this one *Polygyra Binneyana* n. sp. (Binney's Mesodon).

It may best be described by a comparison with the most nearly allied species, *P. divesta* (Gld.). Shell of about the same depressed form as the large variety of *P. divesta*, narrow, its width contained 15-18 times in that of the shell, and half covered by the reflexed but not appressed lip. Color, brownish-yellow. Sculpture similar to that of the large variety of *divesta*, the surface being glossy and finely striated, showing under a lens very fine, close spiral striæ. Whorls $5\frac{1}{2}$, rather slowly increasing, the last becoming much wider, rounded at the periphery, a little deflexed in front, constricted behind the peristome. Aperture oblique, elliptical-lunate; peristome rather narrowly reflexed, with its face rounded and the edge a little recurved; baso-columellar margin arcuate, sometimes showing a very slight median callus.

Alt. $12\frac{1}{2}$, diam. 22 mm. (Hardy).

Alt. 11, diam. $19\frac{1}{2}$ mm. (Tushkahoma).

Typical *P. divesta* is very much more coarsely striated, with the umbilicus wholly covered by a well-developed, appressed callus, as in *P. albolabris*.

P. Binneyana occurred at Hardy, Sharp Co., in northern central Arkansas, and at Tushkahoma, Choctaw Nation.

Polygyra divesta was originally described from Arkansas, no special locality being given. The original specimens, of which two from Gould are before me, are very coarsely striated, with the lip flattened and not recurved at the edge, and measure $16\frac{1}{2}$ and 18 mm. in diameter. This rather coarse form is before me from the following localities:

Louisiana: Grand Cane, De Soto Parish, in N.-W. La. (Williamson).

Arkansas: Mabelvale, Pulaski Co. (C. W. Johnson) and Hot Springs, Garland Co., in the central, and Eureka Springs, Carroll Co. (Sampson) in the northwestern part of the State. Binney gives the locality Washita Springs.

Missouri: Chadwick, Christian Co., and Springfield, Greene Co. (Ferriss) both in the southwestern part of the State.

Kansas: Fort Scott, Bourbon Co. (Sampson), on the southeastern edge of the State.

Indian Territory: Port Gibson (C. T. Simpson), in the Cherokee County, northeastern part of the Territory.

Binney reports *divesta* from Vernon Co., Mississippi; but as there is no county of that name in that State, a reliable locality for the species east of the Mississippi river is still wanting. Probably the reference is an error for the parish in Louisiana of the same name.

In some of the lots the lip is quite narrow and recurved a little at the edge; and there is great variation in size, the smallest specimens being from Eureka Springs, Ark., and Springfield, Mo., with a diameter of 15 mm.; the largest are from Eureka Springs, Ark., and Grand Cane, La., and measure 19 mm. in greatest diameter. Binney gives measurements of a specimen 20 mm. diameter.

In the Indian Territory, at Limestone Gap, Choctaw Nation. (C. T. Simpson), and Tushkahoma, about 40 miles farther eastward in the Choctaw Nation (J. H. Ferriss, 1899), a large form occurs, diameter 21 to 27 mm., with glossy, shining surface and very fine striation, the last whorl proportionately wider than in the typical form, lip narrow and recurved. This is apparently a well-marked sub-species, and may be called *P. divesta indianorum*. It adds another to the small group of forms such as *P. jacksoni deltoidea* Simp., *P. cragini* Call, *P. kiawaensis* Simp., and *Vitrea Simpsoni* Pils., which give a certain individuality to the fauna of a small territory in this region. When the areas of the southwestern snails come to be mapped, as Mr. Bryant Walker has mapped the Michigan species, we will find that this tract has quite a number of special species and sub-species.

Polygyra vultuosa and allied species.

In the recently published catalogue, *P. vultuosa*, *Henriettae*, *Copei* and *Cragini* were united as sub-species of the first. A careful review of the forms of this group, in the light of material and hints furnished by A. G. Wetherby, has caused some modifications of that arrangement, which was originally proposed by Mr. Binney. I would now define the southwestern species and sub-species of *Triodopsis* thus:

I. Basal lip with a keel on its face.

a. Keel slight, umbilicus narrow. *P. vultuosa*.

a'. Keel very strong; aperture lunate; umbilicus wider.

P. vultuosa Copei.

a². Keel strong; aperture triangular; spire higher.

P. vultuosa Henriettae.

II. No trace of a keel on the convex face of the basal lip.

a. Umbilicus small, showing the penultimate whorl only; striation fine. *P. Cragini*.

a'. Umbilicus wide, showing all the whorls within, cylindrical and wide at the bottom where the first whorl is prominently seen; striation coarser than in *Cragini*, base more convex, spire flatter; basal lip somewhat sinuous; teeth stronger, the upper one square, the basal tubercular; diam. 11–12 mm. *P. neglecta* n. sp.

The type locality of *P. vultuosa* is "Arkansas and Texas." This is rather vague; but I have collected the typical form in Calcasieu Parish in southwestern Louisiana and at Houston, Texas. Mr. Singley has sent it from Lee Co., Texas.

P. vultuosa Henriettae (Mazyck, January, 1878) was described from "Eastern Texas." Forms probably referable to it, though certainly not typical, have been sent by Mr. Singley from Robertson Co., and Wheelock, Texas.

P. vultuosa Copei (Wetherby, March, 1878) was from Hardin Co., 20 miles N. of Beaumont, eastern Texas. I have it from Angelina Co., also (McDaniel).

P. Cragini (Call, Dec. 1886) originally came from the banks of Chetopa Creek, Neosho Co., southeastern Kansas. Mr. Jas. H. Ferriss collected it at Thayer, also in Neosho Co. Mr. Simpson got specimens at McAllister, in the eastern part of Indian Territory, and it extends south to Wood Co., in northeastern Texas. The sole locality in Arkansas is near Texarkana on the Red River (Ferriss). *P. Cragini* is easily distinguished from all forms of *vultuosa* by the total absence of a keel on the face of the basal lip. It is brown and glossy, usually between $7\frac{1}{2}$ and $9\frac{1}{2}$ mm. diameter, and the umbilicus is quite small.

P. neglecta (n. sp.) has been in our collection from several localities and collectors for some years, under the names "*vultuosa*," "*Cragini*," and "*fallax* var." It is much depressed, light yellowish-corneous, glossy and finely rib-striate, with five closely coiled whorls, the last much constricted and opaque behind the peristome and a little deflexed in front. Aperture small, "dished" as in *P. fraudulentata*, with a square tooth on the outer lip, bent inward, a smaller tubercular marginal tooth on the basal lip, and an abruptly bent parietal tooth, connected or almost connected with the colu-

mellar end of the peristome. The umbilicus is ample and deep, and shows the base of the first whorl prominently at the bottom: enlarged a little at the mouth by the deviation of the last whorl.

Alt. $5\frac{1}{2}$, diam. $12\frac{1}{3}$ mm. (Eureka Springs).

Alt. $4\frac{1}{2}$, diam. $10\frac{1}{2}$ mm. (Springfield).

This is a very constant and easily recognized form, without the keel on the face of the basal lip of *vultuosa*, the dark color, fine striation and raised spire of *Cragini*, and differing from both and from the large *P. fraudulenta* in the peculiar umbilicus. The localities are:

Southwestern Missouri: Springfield, Greene Co., and Pearson's Creek (A. G. Wetherby).

Eastern Kansas: Fort Scott, Bourbon Co. (F. A. Sampson).

Northwestern Arkansas: Eureka Springs (Sampson).

It will be seen that although the range of *P. neglecta* comprises localities in three States, they are not far removed from one another, and so far, the total area indicated for the species is remarkably small.

The only reference to this form in previous conchological literature is under the name

Triodopsis fallax, small variety, F. A. Sampson. Ann. Rep. Geol. Survey of Arkansas for 1891, ii, p. 189 (1893).

NOTES ON TWO VARIETIES OF PYRAMIDULA (PATULA)
ALTERNATA (SAY).

BY GEORGE H. CLAPP.

In the American Journal of Conchology, Vol. 6, page 188, the late Dr. Jas. Lewis published a paper entitled "Notes on the Land Shells of East Tennessee," in which he gave a very brief description of *Helix alternata* Say var. *costata*.

As this variety is found in various collections under the names of Var. *mordax* and Var. *costifera*, it is thought that a description of it will prove of interest.

Pyramidula (Patula) alternata var. *costata* (Lewis). Shell flattened on upper surface, more convex below, carinated, heavily ribbed above, ribs ending on the carina, almost smooth below but ribs faintly continued into the umbilicus with light intermediate ribs

radiating from the umbilicus and ending at the carina. Color like the type, generally yellow or yellowish-white with very faint or no brown patches on under surface. Whorls about $5\frac{1}{2}$.

Greater diam. 19, lesser 17, alt. 9 mm.

Greater diam. 19, lesser $16\frac{1}{2}$, alt. 9 mm.

The very heavy ribs ending *on the carina* will serve at once to distinguish this from any of the other numerous varieties of *alternata*. There is a wide variation in the number of ribs on the body-whorl as the following figures will show :

Diam. 19 mm., 24 ribs.

Diam. 19 mm., 38 ribs.

Diam. $17\frac{1}{2}$ mm., 32 ribs.

So far reported from "East Tennessee" (Lewis) and Cades Cove, Blount Co., Tenn. (Ferriss & Clapp).

Another variety of *alternata* is found near Knoxville, Tenn. It is a large, coarse shell with rounded body-whorl and scarcely a trace of carination. Color dull brown with *very faint* darker markings, ribs low but fairly strong, epidermis very heavy and wrinkled, the wrinkles under a glass having a netted appearance like the venation in the wings of insects. Whorls $5\frac{1}{2}$.

Greater diam. $23\frac{1}{2}$, lesser 20, alt. $12\frac{1}{2}$ mm.

NEW SOUTHERN UNIOS.

BY BERLIN H. WRIGHT.

U. polymorphus, sp. nov.

Shell smooth, uniformly but moderately solid, red or dark red, very inequilateral, oval, oblong or subquadrate, rayless or with rays; posterior area smooth, wrinkled or subpiculate; umbos flattened or inflated, umbonal ridge sharp and area abrupt, or ridge depressed and area flattened; base nearly straight or emarginate, dorsum arched, abruptly rounded in front and bluntly pointed behind; beaks not prominent; teeth solid in proportion to shell, laterals nearly straight or remarkably curved, prominent and well separated, double in the left and single in the right valve, cardinals quite oblique, usually disposed to be double in both valves and covered with shallow serrations; dorsal cicatrices in a row immediately under the posterior cardinal or under the dorsal plate, anterior cicatrices quite remote, very

deeply impressed and smooth, posterior cicatrices confluent; shell cavity moderate and uniform, beak cavity slight; nacre dead white, purple or pink, or a combination of these shades.

Diameter 1.25, length 2.00, width 3.75 inches.

Habitat: Spanish Creek, Okefenokee Swamp, Charlton Co., Ga.

Type lot in National Museum.

Remarks: This is one of the most variable forms we have ever handled. It belongs to the *forbesianus*, *vestitus*, *Moussonianus* group, with which we have tried hard to place it specifically. Out of several hundred specimens, none could be found that were typical of any of the above-named species. It is the connecting link between the beautiful *hartwrightii* of South Florida, and the group above named, of Georgia. It is usually rayless, though some of the younger forms are densely covered with broad green rays, and it becomes very rough and ponderous in old age. In view of the many phases it assumes, it has been thought best to select no one individual as a type, but to make the description broad enough to embrace all of its variations, and to deposit examples of all with the National Museum.

ADDENDUM: July NAUTILUS, p. 31, first line of description of *Unio danielsii* insert the words "yet black" after "solid."

(*To be continued.*)

**ANNOTATED LIST OF LAND AND FRESH-WATER SHELLS RECENTLY
COLLECTED IN THE VICINITY OF MIAMI, FLORIDA.**

BY SAMUEL N. RHOADS.

The collection forming the subject of the following paper, was secured during a visit to Miami, covering a period of about four weeks, from January 12, 1899. The size and completeness of the collection is largely due to the field assistance of my kind friends, Messrs. Stevenson and Dickinson, of Miami, the former of whom has searched out the shells of South Florida for the past two years with commendable perseverance.

The classification of land species follows that of Pilsbry and Johnson's catalogue. The identifications were all made by Prof. H. A. Pilsbry, of the Academy of Natural Sciences of Philadelphia, where the collection is now located.

Family CYCLOSTOMATIDÆ.

Chondropoma dentatum (Say). Miami; pine woods under flat rocks; very abundant.

Family TRUNCATELLIDÆ.

Truncatella caribæensis "Sowb.," Rve. Miami. Found sparingly and only beneath the wet drift. Far above high-water mark on the bay side. Not found in similar positions in the tide-water limits of the Miami River, brackish water not seeming to agree with it.

Truncatella bilabiata Pfr. Miami. Abundant. The above notes on *caribæensis* are equally applicable to this associated species, which is easily distinguishable by its smaller size and dark coloration. It is ten times as numerous as the preceding.

Family HELICINIDÆ.

Helicina orbiculata Say. Miami and Lemon City. Abounding; especially in dense hammock at the bases of trees well under the vegetable mold in the winter season.

Family HELICIDÆ.

Cepolis varians (Mke.). Virginia Key. The remarks given under *Cerion incanum* equally apply to this shell. They are only found alive on "Hammock Keys." Virginia Key is too low for hammock growths.

Polygyra cereolus (Muhlf.). Virginia Key. A single bleached specimen taken on the beach.

Polygyra cereolus carpenteriana (Bld.). Miami and Virginia Key. Abundant and of universal distribution in all kinds of situations except muckland. The most abundant land snail of South Florida.

Polygyra septemvolva Say. Miami and Lemon City. The open muckland and wet prairie species, distinguished by large size, flatness and angularity. It is rare in the districts named.

Polygyra uvulifera (Shuttl.). Miami and Lemon City. Associated with *Chondropoma* under flat stones in pine woods in the proportion of one to ten of the latter. Rare in the wet lands.

Polygyra avara Say. Miami. Rare; only two specimens taken.

Polygyra pustula (Fér.). Miami. Another rare and strangely local species: found under decaying vegetation on the ground beneath oak hammock. Not taken in the pine woods.

Polygyra jejuna (Say). Miami and Lemon City. Local and generally rare, but abundant in colonies at certain seasons. On the underside of young cabbage palms in the early morning I found this neat species almost abundant in a small area near the standpipe in Miami. Elsewhere it was very scarce. It hibernates under stones in rock piles.

Thysanophora vortex (Pfr.). Miami. Abundant in most situations except the pine barrens.

Thysanophora dioscoricola caeca (Gpy.). Numerous in certain localities on the under surface of the leaves of magnolia and of palmetto. On the latter sometimes a score can be taken from a single leaf.

Thysanophora plagioptycha granum (Streb.). Miami. Only one specimen secured.

Family BULIMULIDÆ.

Drymæus dominicus Rve. Miami and Lemon City. Rare. The very young of this fragile snail are often found associated with *P. dioscoricola caeca*, but the adults are seldom seen.

Liguus fasciatus (Müll.). Miami. Abundant; distribution limited to a narrow strip of hammock lands bordering the bay not more than one-fourth of a mile wide. Not found in mangroves. Dark colored varieties rare and apparently confined to the most densely forested hammock. This snail is largely eaten by tree crabs, which bite the shells in half during their winter hibernation on the tree trunks. The numerous basal portions of the shells firmly cemented to the trees is evidence of the frequency of this destruction.

Family UROCOPTIDÆ.

Urocoptis poeyana (Orb.). Miami. Abundant under stones in pine barrens. Perfect adult specimens with uninjured spires are very rare and when found exceedingly difficult to preserve.

Macroceramus pontificus (Gld.). Miami; rather rare; under edges of flat rocks.

Cerion incanum (Binn.). Virginia Key. Only dead shells of this species were found on this Key, whither they had probably been carried by the tide from some larger Key. All those secured were inhabited by crabs.

Family PUPIDÆ.

Strobilops labyrinthica Say (Pfr.). Miami and Lemon City; not rare, preferring moist hammock.

Strobilops hubbardi stevensoni Pilsbry. n. var. Miami. Rare: found only under bark of dead limbs in mangrove swamp. This subspecies was discovered by the writer in mangroves skirting the Bay close to the State Agricultural Experimental Station in the suburbs of Miami, and was found nowhere else. I requested Prof. Pilsbry to name it after my friend Mr. Stevenson, to whose conchological researches and friendly services the success of my work at Miami was largely due.

Bifidaria contracta (Say). Miami and Lemon City. Rather rare; in hammock mold.

Bifidaria servilis (Gld.). Miami. Very rare, only two specimens being secured.

Bifidaria pentodon (Say). Lemon City. Rare, one specimen only, from hammock.

Bifidaria rupicola (Say). Miami. Rare, in moist hammock under bark and leaves.

Bifidaria rhoadsi Pils., n. sp. Miami, very rare.

Family ACHATINIDÆ.

Opeas octonoides (C. B. Ad.). Miami. Only found in damp mold under hammock trees along the high tide borders of the Miami River. Rare.

Opeas gracillima (Pfr.). Miami. Associated with the preceding, but less numerous. Sometimes found alive under rocks in same situations.

Family GLANDINIDÆ.

Glandina truncata minor Pilsbry. n. var. Miami, Lemon City and New Smyrna. Abundant. This depauperate form rarely grows to more than half the size of largest *truncata*.

Family ZONITIDÆ.

Vitrea indentata (Say). Miami and Lemon City. Rarely associated with *Zonitoides arboreus*, which it so closely resembles.

Conulus chersinus (Say). Miami. Rare; associated with its more numerous and darker counterpart, *Strobilops labyrinthicus*, under moist rotten bark of open hammock.

Guppya gundlachi (Pfr.) Miami and Lemon City. Not common. Associated with *Zonitoides* and *Vitrea* under bark of logs.

Zonitoides arboreus (Say). Miami and Lemon City. Abundant.

Zonitoides dallianus (Simp.) Miami. Only eleven specimens found among two hundred *arboreus* collected.

Zonitoides minusculus alachuuanus (Dall.) Miami, Lemon City and New Smyrna. This small white *Zonitoides* is found everywhere under decaying bark in damp hammock lands.

Family VAGINULIDÆ.

Vaginulus floridanus Binn. Miami. Not common. This seems to be the first record for *Vaginulus* from the east coast of the main land. Previous Florida records are from Charlotte Harbor and Punta Rossa.

Family AMPULLARIDÆ.

Ampullaria depressa Say. Miami River and Everglades. Abundant.

Family AMNICOLIDÆ.

Amnicola sanctijohannis Pilsbry. Miami River. Rare.

Potamopyrgus coronatus (Pfr.). Miami River. Rare; inhabiting small streams and ditches upon the aquatic vegetation in company with *Amnicola sanctijohannis*.

Family AURICULIDÆ.

Auricula pellucens Mke. Miami. This rare snail was found only in and under soft, rotten mangrove branches which lay on the mud in the mangrove swamps along the bay side. They have the power to deeply imbed themselves into the soft rotten wood.

Carychium exiguum (Say). Lemon City; locally plentiful in dark hammock under leaves and logs.

Melampus floridanus Shuttl. Miami. This rarer small species seems confined to the brackish water areas of the Miami River.

Melampus coffeus (Linn.). Miami. Abundant in salt water and more brackish areas, seeming to prefer mangrove swamps, but also in more open marshy places, where it ascends the higher sedges at certain seasons, apparently to deposit its eggs, as it does not seem to eat the grasses on which it is found.

Family LIMNÆIDÆ.

Limnæa cubensis Pfr. Miami River. A rare species.

Planorbis tumidus Pfr. Miami and Lemon City. In the edge of the Everglades at the head of the Miami River and in the ditches of the muck gardens in that neighborhood this animal abounded, associated with *intercalaris* in about equal numbers. It was rare in the Everglades proper.

Planorbis intercalaris Pilsbry. Miami and Lemon City. Abund-

ant. This is found sparingly associated with the following in the true Everglade territory.

Planorbis scalaris (Jay). Head of Miami River and Everglades adjacent. Rather rare. This peculiar form is most typical of the glades as contrasted with the *Planorbis* of the streams.

Planorbis dilatatus Gld. Lemon City. Rare; three specimens taken in a small stream.

Planorbis parvus Say. Lemon City. Only one specimen taken.

Planorbis cultratus Orb. Very rare. One specimen secured from a drainage ditch flowing into the Miami River two miles above its mouth. The type locality for *cultratus* is Cuba. It was subsequently found in Texas. This is the first record of it from Florida.

Ancylus peninsulæ Pils. & Johns. Miami and Lemon City. Rather rare. Taken on rotten leaves in still water.

Family PHYSIDÆ.

Physa heterostropha peninsulæ Pilsbry. Miami, Lemon City, Everglades, head of Miami River. Locally abundant, preferring small streams in swift water, where they are generally attached to weeds far below the surface.

Family CYRENIDÆ.

Pisidium abditum Hald. Miami and Lemon City. This minute species is rare and difficult to secure alive.

Family CYRENOIDIDÆ.

Cyrenoidea floridana Dall. Miami. Abundant locally in the outer edges of the Mangrove swamps skirting the bay.

Family UNIONIDÆ.

Unio paludicolus Gld. Upper Miami River and Everglades. Rare, or at least difficult to secure, owing to its hiding among the roots of thick algæ in swift water. One was dredged in a small stream near the town.

Unio papyraceus Gld. Head of Miami River above the rapids. Only three specimens of this fragile *Unio* were dredged while forty of *paludicolus* were being secured. It is more than possible that Gould's types of these two species came from the Miami region and perhaps from the Miami River.

GENERAL NOTES.

PLANORBIS OPERCULARIS Var. OREGONENSIS Van., Nautilus IX. p. 54, September, 1895, is preoccupied by *P. oregonensis* Tryon. Mon. Fresh-water Univalve Moll. of the U. S. 1870, p. 200. I would here propose the name *multilineatus* for my variety.—E. G. VANATTA.

THE NAUTILUS.

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No. 5.

ANOTHER NEW ASHMUNELLA.

BY H. A. PILSBRY AND T. D. A. COCKERELL.

Ashmunella thomsoniana porterae, n. var.

Shell corneous, shining, with distinct lines of growth and minute spiral incised lines; umbilicus broadly exposing the penultimate whorl; whorls $5\frac{1}{2}$ to nearly 6; lip ochreous-tinged above and at the edge, the teeth white; parietal tooth well-developed, outer tooth long, basal tooth *always bifid*. Max. diam. 14–16 $\frac{1}{2}$ mm.

Tentacles and dorsal surface of animal dark plumbeous; foot a lighter brownish-grey; exposed part of mantle grey. Genitalia as in typical *Ashmunella*: penis with the thick basal part 4 mm. long, the narrow terminal part (scarcely broader than the epiphallus) 3 mm.; epiphallus 28 mm. with the retractor muscle 3 mm. from its beginning (thus higher up than in *A. minorhyssa*); flagellum 1 mm.; spermatheca filiform, 21 mm. long including duct. Eggs pellucid white, 3 x 2 $\frac{1}{4}$ mm.

Beulah (Upper Sapello Cañon), New Mexico, 1899: numerous specimens collected by Miss Wilmatte Porter, after whom the variety is named. Other specimens later collected by Miss Helen Blake at the same place.

This form will fall into the first division of the two keys to the species of *Ashmunella* given by the writers in Proceedings of the Academy of Natural Sciences of Phila., 1899, p. 193.¹

¹ "Ashmunella, a new genus of Helices," by H. A. Pilsbry and T. D. A. Cockerell.

The following modification of the key may be made :

- a.* Aperture strongly 3-dentate or 4-dentate.
b. Basal tooth simple, tubercular or somewhat elongate ;
 diam. 12–13 mm. *A. thomsoniana*.
*b*¹. Basal tooth distinctly bifid ; diam. 14–16½ mm. ; umbilicus
 wider. *A. thomsoniana porterae*.
*a*¹. Aperture toothless or without teeth on the outer lip, etc., etc.

To those who do not have access to Ancy's original description, it may be useful to have his note on the supposed variety *orobæna*. He says: "Very closely allied to the preceding [*thomsoniana*], being similar in the number of whorls and size, but differing in having the last whorl scarcely descending at its termination, higher, the aperture larger and less oblique."

These characters seem to be merely individual rather than racial. It is from the same locality as *A. thomsoniana*. Besides the specimens of *thomsoniana* in the Academy received from the late Mr. J. H. Thomson, of New Bedford, Mass., part of the original lot, we have received *A. thomsoniana* from Mr. Ashmun, who has lately collected a few specimens in Santa Fè Cañon, the original locality. The species differs widely from *Polygyra levettei*, which is not an *Ashmunella* but apparently a true *Polygyra*.

NEW SOUTHERN UNIOS.

BY BERLIN H. WRIGHT.

U. dispalans, sp. nov.

Shell uniformly thin, oblong-elliptical, flattened, inequilateral, smooth, with close slightly elevated growth ridges; anterior margin abruptly and uniformly rounded, base very slightly rounded, anterior abruptly pointed, dorsal margin straight; epidermis yellowish and nearly occulted by the light green fasciculated rays; beaks small and surrounded by four or five irregular undulating ridges; umbonal slope uniformly rounded or subangular; beak cavities slight; cicatrices smooth, slightly impressed and showing the successive nacreous layers, anterior ones distinct, posterior ones indistinguishable; dorsal notch very long and shallow, ligament long, depressed, thin; cardinal teeth low, very oblique, thin and obliquely striated, lateral teeth slender, long, nearly straight, double in the left and single in right

valve, and extending quite up to the cardinals by a fine thread-like elevation; dorsal plate entirely wanting; nacre silvery white, tinged with pink towards the beaks and more or less spotted with thin layers of vitreous-like matter; pallial line hardly discernible. Width $2\frac{1}{2}$, length $1\frac{3}{16}$, diameter $\frac{5}{8}$ inches.

Habitat: Suwannee River, Florida.

Type in National Museum.

Remarks: Affinity, *U. lamellatus* Lea. A large series of this shell has been in hand for two years and for a time it was doubtfully referred to *U. subinflatus* Con. Mr. Simpson compared them with authentic specimens of that species in the National Museum without being impressed with their likeness, but said they seemed nearer to that species than to any other. A comparison of the teeth with that of the Indian species, given as its affinity, leads to the conclusion that they should group together. The cardinals are shorter and more robust, but have the same direction and sculpture. At first glance the shell reminds one of *U. camptodon*, Say, but the radical differences in the beak sculpture and teeth clearly distinguish it from members of that group.

To be Continued.

PLANORBIS RUBELLUS STERKI, AND P. HARNI PILSBRY.

BY H. A. PILSBRY.

In this Journal for April, 1891, Mr. E. H. Harn gave a list of the shells found in western Pennsylvania, chiefly around his home in Blairsville. A few of the species had been submitted to me for determination, among them a *Planorbis* of the *exacutus* group, which I consider a new species, or possibly a new variety of *exacutus*. This was entered in the list as "*Planorbis* (? var.) *Harni* Pilsbry." (*Nautilus* IV, p. 137.) I intended at the time to describe the species; but other matters crowded it out of mind, and the name remains a nude one to this day.

Mr. E. G. Vanatta has recently called my attention to the specific identity of my types of *P. Harni* with a form received from Dr. V. Sterki as "*P. exacutus* var. *rubellus*." This variety was described by Dr. Sterki on page 7 of a privately printed brochure entitled "*The Land and Fresh Water Mollusks in the vicinity of New Philadelphia*," (Beobachter Press, New Philadelphia, Ohio, 1894).

As Dr. Sterki stated the differential characters of his variety while my own was without a description, his name for it will stand, my *P. Harni* becoming a synonym, though several years earlier in date.

The species is smaller than *P. exacutus*, the last whorl seen from above less wide, the suture deeper and the apex a little more sunken. Below, the umbilicus of *P. rubellus* is very much wider and less deep, and the last whorl is consequently far narrower than in *exacutus*, and the aperture is smaller. As in *exacutus*, the form is biconvex and the periphery acutely keeled, color reddish corneous. Alt. 1, diam. $4\frac{1}{2}$ mm., or somewhat smaller.

The localities now known are as follows: Pennsylvania: Blairsville, Indiana Co., in a small stagnant pond, adhering to the under sides of dead leaves (E. H. Harn, March, 1889). Ohio: Tuscaroras Co., near New Philadelphia.

There is also a tray of 8 specimens in our collection without locality record.

The shells seem always to be covered with a ferruginous crust. I regard *P. rubellus* as specifically distinct from *P. exacutus*, the characters being quite constant in the series of some twenty-four specimens examined. *P. exacutus* is a wide-ranging species, extending from New England to New Mexico.

COLLECTING ON THE GULF COAST OF FLORIDA.

BY E. J. POST.

The keys at the entrance to Tampa Bay, are perhaps one of the most favorable collecting grounds on the gulf coast. The result of a twelve days' trip in March is shown by the accompanying list, with the number of specimens collected; most of the collecting was done at Pass-a-Grille, Long Key, and the north end of Mullet Key. All dredging was done with a small hand sieve at low tide. *Haminea succinea* were very abundant in the drifts between Point Pinellas and St. Petersburg. *Melampus coffeus* and *M. coffeus* var. *gundlachi*, were collected on the south end of Long Key; they were unusually large and fine. There was an immense wash of *Bittium varium* ashore, the second that has come under my observation in eight years collecting. Helices were very abundant on Long Key. I collected 175 specimens under one thistle, 85 of which were *Polygyra uvulifera*,

the other being *P. cereolus* and the var. *carpenteriana*. Very large specimens of *P. cereolus* were also collected on Mullet Key.

List of Species Collected.

Anomia simplex Orb.	80	Marginella minuta Pfeiffer.	900
Pecten dislocatus Say.	1	Marginella succinea Conr.	4
Pecten nucleus Born	205	Fasciolaria gigantea Kiener.	2
Avicula atlantica Lam.	1	Fasciolaria tulipa L.	27
Modiola tulipa L.	25	Fasciolaria distans Lam.	36
Modiola plicatula Lam.	50	Fulgur pyrum Dill	6
Modiolaria lateralis Say	15	Fulgur perversum L.	45
Nucula proxima Say	1	Melongena corona Gruef	40
Cardita floridana Conr.	370	Nassa vibex Say.	1144
Parastarte triquetra Conr.	12	Columbella rusticoides Heilp.	95
Lucina floridana Conr.	12	Columbella avara Say.	22
Lucina costata T & H.	4	Columbella similis Ravenel.	10
Lucina crenulata Conr.	1	Columbella lunata Say	54
Lucina lintea Conr.	12	Murex rufus Lam.	2
Cardium magnum Born	6	Eupleura caudata Say.	2
Cardium isocardia L.	1	Urosalpinx perrugatus Conr.	100
Cardium mortoni Conr.	30	Eulima gracilis C. B. Ads.	21
Venus cancellata L.	20	Pyramidella candida Mörch.	298
Venus rostrata Sowb.	295	Turbonilla conradi Bush.	460
Cytherea hebræa Lam.	4	Turbonilla hemphilli Bush } 235	
Cytherea conradina Dall	12	Turbonilla dalli Bush	
Cyrena floridana Conr.	75	Caecum floridanum Stimp	1
Donax variabilis Say	3	Meioceras nitidum Stimp.	
Tellina alternata Say	2		numerous
Macoma tampaënsis Conr.	4	Syrnola caloosaensis Dall.	5
Solen americana Gould	70	Pyruia papyratia Say	3
Dentalium disparile Orb.	6	Erato maugeriae Gray	1
Dentalium e boreum Conr.	4	Cerithiopsis emersoni C. B.	
Actæon punctostriatus C. B.		Ads.	1
Ads.	1	Bittium varium Pfeiffer	
Tornatina canaliculata Say.	17		numerous
Bulla occidentalis A. Ads	6	Cerithium floridanum Mörch.	140
Haminea succinea Conr.	170	Cerithium muscarum Say	210
Melampus coffeus L.	320	Cerithium minimum Gruef.	6
Melampus coffeus var. gund-		Cerithidea scalariformis Say	210
lachi Pfr.	170	Modulus floridanus Conr.	498

Terebra dislocata Say.	1	Vermicularia spirata Phil	110
Terebra protexta Conr.	20	Litorina angulifera Lam.	296
Conus pealii Green	95	Rissoina chesnelii Michaud.	338
Drillia leucocyma Dall.	10	Crepidula fornicata L.	4
Drillia thea Dall	20	Crepidula plana Say	5
Mangilia biconica C. B. Ads.	85	Crepidula aculeata Gruel	7
Mangilia stellata Stearns	65	Natica pusilla Say	120
Mangilia cerinella Dall	25	Neverita duplicata Say	2
Oliva literata Lam.	6	Sigaretus perspectivus Say.	23
Olivella mutica Say	1450	Ischnochiton papillosus C.	
Olivella floralia Ducl	12	B. Ads.	20
Olivella bullula Reeve		Acanthochites spiculosus	
(young)	60	Reeve	15
Marginella aureocincta		Polygyra cereolus Muhlf.	440
Stearns.	150	Polygyra cereolus Carpen-	
Marginella apicina Menke	630	teriana Bland	96
Marginella denticulata var.		Polygyra uvulifera Shutt.	2070
opalina Stearns	54	Succinea campestris Say.	35

NOTES ON POLYGYRA APPRESSA.

BY G. H. CHADWICK.

In Messrs. Pilsbry and Johnson's recent catalogue of North American Land Shells, *Polygyra (Triodopsis) appressa* (Say), is accredited to Scott Co., Va., among other localities. A fine series from that locality having come under my notice, I perceived a considerable difference between them and northern specimens, and a careful examination and comparison with examples of the typical form from Bernadotte, Ill., and *var. perigrapta* Pilsbry, from Tennessee, seem to fully confirm the distinction.

The Virginian variety, for which I propose the name *sculptior*, may be known by the following characters:

Surface *costulate* above, horn-colored inclining to reddish chestnut, becoming smoother and greenish beneath, entirely covered with a fine *spiral granulation*; upper lip-tooth obsolete; parietal tooth as in typical *appressa*. Diam. 14 to 18 mm.; alt. 7 to 9 mm.

While the warm color and coarse ribs are noticeable and constant features, the microscope discloses the most important diagnostic char-

acter, namely the beautiful fine granulation which covers even the ribs and shows a markedly spiral arrangement. This is quite different from the spaced spiral incised lines of *perigrapta*, which while slightly waved, cut the growth striæ so regularly as to produce a cancellated effect, the intervening surface being moreover always marked with excessively fine vertical scratches. A compound lens reveals incised spirals in typical *appressa* also, but exceedingly minute and rather irregular or punctate. Finally, in *sculptior* the whorls are generally narrower and more convex than in either of the other forms. In the tray-full examined there was but a single departure from the normal, and that was a *tridentata*!

The types are deposited with the Academy of Natural Sciences, Philadelphia.

**SUPPLEMENTAL NOTE ON THE MOLLUSCA ASSOCIATED WITH THE
MASTODON IN BERRIEN COUNTY, MICHIGAN.**

BY BRYANT WALKER.

The material which formed the basis of Mr. W. Hilles Smith's interesting paper in the July Nautilus, is the same covered by my article in the Nautilus for March, 1898 (Vol. XI., p. 121). The undetermined *Pisidia* there mentioned have been submitted to Dr. Sterki, who, with his usual good nature, has determined them as follows:

1. *Pisidium pauperculum* St.
2. *Pisidium* sp. near "*abditum*," Distinct.
3. *Pisidium* sp. "near *abditum*."
4. *Pisidium roperi* St.
5. *Pisidium medianum* St.
6. *Pisidium* sp. "Resembles most vesiculare."
7. *Pisidium ventricosum* Prime.
8. *Pisidium milium* Held.

In this connection it is interesting to note that these forms are identical with those from the marl deposits in Tuscola County, which were examined by Dr. Sterki at the same time. This not only goes to prove that these shells were contemporaneous with the mastodon, but also that the post-pleistocene fauna was substantially the same throughout the lower peninsula of Michigan.

NEW JAMAICAN FORMS OF LUCIDELLA.

BY HENRY A. PILSBRY.

There are in Jamaica three strongly marked specific stocks of *Lucidella*: *L. aureola* Fér., with the variety *undulata*; *L. depressa* Gray (placed by Pfeiffer in *Helicina*), with the aperture like *aureola*, but the shell smaller, more depressed, and weakly sculptured; and *L. lineata* C. B. Ad., of which *L. nama* Pfr., is doubtless a variety or synonym. These are quite small, with a strong, squarish tooth on the basal lip, and strong, sharp spiral liræ.

Another well marked species of the *lineata* type was collected by Messrs. Wm. J. Fox and C. W. Johnson in a cave at Port Antonio, on the northeastern coast of Jamaica.

L. Foxi, n. sp.

Shell with the depressed general form, size and color, and the acute liræ, of *L. lineata* Ad.; the liræ bearing sparse, rather long and equidistant prostrate hairs, easily rubbed off. Whorls $4\frac{1}{2}$, the last compressed but not keeled at the periphery, descending in front, excavated at the umbilical region, which is covered by a thin callus which is sparsely and very minutely asperulate or roughened by minute pointed granules. Aperture very oblique, subtriangular, the outer and *upper margins expanded, scalloped*, with four to six projecting points; the basal margin narrowly reflexed; basal lip bearing a large, squarish, projecting tooth, as in *L. lineata*; upper margin with a tubercular tooth well removed inward from the lip-edge; *outer lip with a small tubercular tooth*, distinctly developed only in fully mature specimens.

Alt. 2, diam. 3.8 mm., or smaller, diam. 3.5 mm.

Cave at Port Antonio.

L. trochiformis n. sp.

Small and distinctly trochoidal, the base flattened, smooth except for some radial wrinkles, and one or two spiral threads close to the periphery; upper surface convexly conoidal, radially undulated and spirally lirate; periphery acutely carinated and irregular or serrate; whorls $4\frac{1}{2}$, but slightly convex, the last a little deflexed, somewhat impressed in the axial region below. Aperture oblique, triangular, the lip narrowly reflexed; basal lip being a prominently projecting, squarish tubercle, upper margin with a small submarginal tubercle,

and there is another smaller one on the outer lip below the external angle.

Alt. 2, diam. 2.7 mm.

Differs from *lineata* and *Foxi* in the trochiform shape, almost complete freedom from spiral threads on the base, and in the acute periphery. It has a small tubercle on the outer lip, as in *L. Foxi*, a larger species with sculptured base, rounded periphery, scalloped upper lip and different contour.

The specimens were found associated with *L. lineata*.

NOTES ON THE MOLLUSCA OF OWASCO LAKE, N. Y.

BY FRANK C. BAKER.

Recently the Chicago Academy of Sciences has received from Dr. Howard N. Lyon, of Chicago, a fine lot of the shells of Cayuga Co., N. Y., collected for the most part by himself about Owasco Lake and River. Dr. Lyon was very precise concerning his data, and for this reason a list of the species in the collection may be of value.

For brevity I have used the following symbols for localities :

* Near Auburn, in Owasco River.

** Hayden's Mills, six miles below Auburn.

† Foot of Owasco Lake.

‡ Cascade.

†† Marsh at foot of Owasco Lake.

‡‡ North end of Owasco Lake.

1. *Alasmodonta rugosa* Barnes,*† July, 1893.

2. *Alasmodonta pressa* Lea,*† in brook four miles north of Auburn, July 1893 and 1882.

3. *Strophitus edentulus* Say.†

4. *Unio complanatus* Solander,* in South Street Brook, July, 1879.

5. *Anodontopsis subcylindræus* Lea,* in South Street Brook, various collections from 1880 to 1885.

6. *Lampsilis luteolus* Lam,* July, 1883.

7. *Sphærium simile* Say,* in South Street Brook, 1882.

8. *Vallonia pulchella* Müller, April, 1882.

9. *Polygyra albolabris* Say.‡

10. *Polygyra thyroides* Say, var. *bucculenta* Gould.‡

11. *Polygyra palliata* Say. †
12. *Polygyra tridentata* Say. †
- 12a. *Polygyra tridentata* var. *juxtidentens* Pilsbry. †
- 12b. *Polygyra tridentata* var. *bidentata* Baker. †
13. *Polygyra monodon* Rackett. †

Nos. 9 to 13 were collected on a well wooded limestone hill, well watered.

14. *Bifidaria armifera* Say.*
15. *Pupa muscorum* Linné, Auburn. Common in damp grass throughout the city, often found in private grounds.
16. *Vertigo milium* Gould,** 1880.
17. *Cochlicopa lubrica* Müller,** 1880 and 1876, on driftwood in Owasco River at Auburn.
18. *Omphalina fuliginosa* Griff. † 1883.
18. *Vitrea hammonis* Ström,** April, 1882.
20. *Conulus fulvus* Müll.,** on roots of grass near edge of river, April, 1882.
21. *Zonitoides arboreus* Say. †
22. *Zonitoides nitidus* Müller,** April, 1882.
23. *Gastrodonta ligera* Say,** April, 1882.
24. *Agriolimax campestris* Binney.
25. *Pyramidula alternata* Say,* very abundant in low meadows, under bark of trees and the under side of logs where the ground is partially shaded.
26. *Helicodiscus lineatus* Say. †
27. *Succinea retusa* Lea, †† on logs and trunks of trees near high water mark, July, 1880.
28. *Succinea avara* Say, †† July, 1880, in company with the above.
29. *Limnæa palustris* Müller, †† 1884.
30. *Limnæa emarginata* Say, †† ** also in Owasco River, at foot of lake, 1880, and April, 1882.
31. *Limnæa desidiosa* Say, †† on weeds, 1880.
33. *Planorbis bicarinatus* Say, †, 1881, Port Byron, 1883.
34. *Planorbis trivolvis* Say, † old and new outlets, 1880, Port Byron.
35. *Planorbis campanulatus* Say,* 1882, also in brook emptying into lake at Cascade.
36. *Planorbis parvus* Say,* on big dam.
37. *Physa heterostropha* Say,* Port Byron, 1879 to 1882.

38. *Physa ancillaria* Say, †† 1879 to 1885.
 39. *Aplexa hypnorum* Linne, †† 1883.
 40. *Valvata tricarinata* Say, * found in driftwood at the tail race of the "Big Run," spring of 1881.
 41. *Campeloma decisum* Say, † Owasco River near Owasco Lake, August, 1882, also in Owasco River three miles below lake.

AGASSIZ ASSOCIATION DEPARTMENT.

[Conducted in the interest of the Isaac Lea Conchological Chapter of the Agassiz Association, by its General Secretary, DR. W. S. STRODE.]

During the last year I have done all the work possible towards collecting the *Pisidia* of the northeast of Maine. About 50,000 specimens have been obtained and worked over by Dr. V. Sterki of New Philadelphia, Ohio. The material has been finely preserved in nearly every locality. The cold water of our streams is favorable for the development of this minute clam. In all about twenty species and some varieties have been obtained. Many of these species have proved new to the State, and a few have been published by Dr. Sterki as new species. A part are very difficult to identify until a larger amount of material is obtained. It sometimes results that among thousands of specimens there will be only one individual representing a certain species. *Pisidium contortum* Prime, has been found living in a small lake in the northeast of Perham. It had heretofore only been found fossil, in Maine and Massachusetts.

The little *Pisidium milium* Held, so common in the north of Europe (a straggler like myself), has been found living in the south branch of Caribou stream in Woodland. It is curious how this little creature came across the ocean.

Two years ago I found *Planorbis crista* Lin., var. *cristata* Drap., a species of Northern Europe, in Barren Brook, Caritou. This summer I have found it fossil in the marl deposit of Lovely Brook in the town of Fort Fairfield. I think this is proof that it was not imported by any accident or in the outfit of any emigrant coming to this continent. In my last report I had about 81 species collected in this region. This year I have of land shells 33 species, fresh water gastropoda 23 species, and of *Unio* 1, *Margaritana* 2, and *Anodonta* 1 species; *Sphærium* 5, and *Pisidium* 20 species and several varieties.

Total 85 species. The *Pisidia* will be published by Dr. Sterki, and the results will thus be made known to those interested in these little animals.

OLOF O. NYLANDER.

GENERAL NOTES.

We regret to record the death on August 16th of Dr. W. D. Hartman, of West Chester, Pa. Further notice will appear next month.

POMATIA ASPERSA IN CALIFORNIA.—I found a fine living specimen of *Pomatia aspersa*, Müll., this summer at Pacific Grove, California. A small colony of this European snail was established many years ago at San José, more than fifty miles from the spot where this specimen was found. The species is apparently becoming naturalized.—*Josiah Keep*.

POLYGYRA BINNEYANA.—Owing to hasty proof reading, several errors appear in the article on "New Southwestern Forms of Polygyra" in the July issue. On page 38, sixth line from top, the word *umbilicus* should be inserted between *divesta* and *narrow*. On p. 39, second line, for "county" read "country."—*H. A. P.*

THE BRITISH PLIOCENE NON-MARINE MOLLUSCA are revised by Messrs. A. S. Kennard and B. B. Woodward, in Proc. Malac. Soc., Lond. III., pt. 4, March, 1899. "It is in the Red and Norwich Craggs that the genesis of our present molluscan fauna is to be sought. It is a noteworthy fact that many of our existing species are met with for the first time in these beds, and are not known to have existed on the continent until a much later date. This may result from the imperfection of the geological record, or it may indicate that these forms have been derived from a region to the northward." Of 38 species discussed, 6 are extinct. 6 species, *Corbicula fluminalis*, *Helix lactea*, *Hygromia rubiginosa*, *H. incarnata*, *Helicodonta lens*, and *Eulota fruticum* are now extinct in England, though living on the continent; *C. fluminalis* and *Eulota fruticum* having existed to the Post-Pliocene. It is interesting to find that *Eulota* extended in the Pliocene so far to the westward. *Helix lactea* and *Helicodonta lens*, each represented by very scanty but apparently authentic material, are now restricted to the circum-Mediterranean fauna. One new species, *Paludestrina Reevei*, is described from the Norwich Crag. It is allied to the Upper Oligocene and Lower Miocene *P. obtusa* (Sandb.) of Germany.





DR. WILLIAM D. HARTMAN.

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WM. D. HARTMAN, M. D.

Dr. William Dell Hartman, whose death occurred on August 16th, at West Chester, Pennsylvania, was born in East Pikeland township, Chester county, Pa., December 24, 1817. He was the eldest son of General George Hartman. The founder of the Hartman family in Chester county was his great-great-grandfather, John Hartman, a native of Schwerin, Hesse Cassel, Germany, who came to Philadelphia in 1753.

After receiving an education in the schools of the neighborhood, William Hartman attended the famous school of Jonathan Gause and the academy of Jonathan Strode. He studied medicine with Dr. Wilmer Worthington and about that time became profoundly interested in the study of botany. Dr. William Darlington, in his "Flora Cestrica," mentioned him as "a zealous and promising young botanist." He attended the University of Pennsylvania and graduated from the Medical Department in 1839, at the age of twenty-one years. After graduation he returned to West Chester and engaged in the practice of his profession. His practice soon became very extensive and was maintained until the infirmities of advanced years compelled him to relinquish it. Even then many patients visited him at his office.

Dr. Hartman devoted all the time that could be spared from his medical practice to the study of natural science. Besides botany, he studied entomology, mineralogy and conchology, and became an

authority in each of these branches, especially as they related to Chester county. The latter science, however, finally engrossed Hartman's attention; and it is by his work on mollusca that he became most widely known. For over forty years he corresponded upon conchological topics with the leading authorities in the science in this country and abroad. Among his correspondents and co-laborers were Isaac Lea, LL. D., of Philadelphia; Charles Wheatley, of Phoenixville; George W. Tryon, Jr., J. G. Anthony, Dr. J. C. Cox, Andrew Garrett, W. H. Pease, E. L. Layard and many others.

Through Mr. Garrett he obtained what is perhaps one of the finest collections of Polynesian land shells in the world, especially of the genus *Partula*, of which he described 25 species. The critical study of the genus *Partula* particularly engaged his attention during several years; and his careful work and extensive writings on the group, have given him high rank as an authority thereon. His beautiful collection of *Achatinellidæ* was purchased by the Bremen Museum some time before his death. The last conchological work that Dr. Hartman undertook was a revision of the *Helicinidæ*. He gathered much interesting material, but failing health prevented the carrying out of his intentions. His collection of marine shells is rich in Polynesian species and contains many varieties.

One of the best known publications from the pen of Dr. Hartman was "Conchologia Cestrica," treating of the mollusca of Chester county, Pa. In its preparation he was associated with the late Dr. Ezra Michener, of New Garden township, but Dr. Hartman did the larger part of the work. It is illustrated with 207 wood-cut figures of shells described in the work. This book, published in 1874, was formerly used as a text-book in many schools in Chester and Delaware counties.

He was also the author of the following papers:

Opercula of the family Strepomatidæ. Amer. Jour. Conch. vi, 316, 1871.

Description of a *Partula* supposed to be New, from the Island of Moorea. Proc. Acad. Nat. Sci., Phila., 229, 1880.

A catalogue of the genus *Partula* Fer. (privately printed in West Chester), 1881.

Observations on the species of the genus *Partula* Fer., with a Bibliographical Catalogue of all the species. Bull. Mus. Comp. Zoöl. ix, No. 5, pp. 171-190, 1882.

Observations on the duplicates of the Genus *Partula* Fer. contained in the Museum of Comparative Zoölogy, Cambridge, Mass., formerly belonging to the collection of the late Wm. H. Pease, Bull. Mus. Comp. Zoöl. ix, pp. 91-96, 1882.

Descriptions of new species of *Partula* and a synonymic catalogue of the genus. Proc. Acad. Nat. Sci., 203-223, 1885.

New species of *Partula* from the New Hebrides and Solomon Islands. Proc. Acad. Nat. Sci., 30-35, pl. ii, 1886.

A bibliographic and synonymic catalogue of the genus *Auriculella*, Pfeiffer. Proc. Acad. Nat. Sci., 14, 1888.

A bibliographic and synonymic catalogue of the genus *Achatinella*. Proc. Acad. Nat. Sci., 16-56, 1888.

New species of shells from the New Hebrides and Sandwich Islands. Proc. Acad. Nat. Sci., 250, pl. xiii, 1888.

New species of shells from New Hebrides. Proc. Acad. Nat. Sci., 91-94, pl. v, 1888.

Descriptions of new species of shells. Proc. Acad. Nat. Sci., 284-288, pl. iii, 1890.

Catalogue of the genus *Partula*. THE NAUTILUS, vi, 73 and 97, 1892.

Melania yokohamensis, new species. THE NAUTILUS, xi, 41, 1897.

Dr. Hartman was elected a corresponding member of the Academy of Natural Sciences of Philadelphia in 1853, and the same year he was elected a corresponding member of the Lyceum of Natural History of New York city. He was a member of the West Chester Historical Society and one of its organizers; also a member of the West Chester Philosophical Society, the Geological Club of Chester County, and an honorary member of the Chester County Medical Society. He was a member of the Episcopal Church.

In 1883 Dr. Hartman went abroad, visiting the British Museum, Jardin des Plantes and other museums.

Personally Dr. Hartman was of a most kindly disposition and social so far as his busy life would allow. His kindness professionally and to his scientific friends and co-workers was unlimited. He was ever ready to assist young men in their studies in the various branches of science, and many owe their first impulse to his encouragement and kindly assistance.

Dr. Hartman married Mary Jane Kabel, a daughter of John Kabel, of Jefferson county, West Virginia, on December 3, 1841. Mrs. Hartman survives her husband, as do also five children.

MOLLUSKS COLLECTED BY R. C. MCGREGOR IN NORTHERN CALIFORNIA.

BY HENRY A. PILSBRY.

Mr. R. C. McGregor being engaged during the summer of 1898 in Fish Commission work which took him over a considerable area in northern California, interested himself in the collection of mollusks, which he sent me for study.

The region is one which has been very superficially examined hitherto, and it is not surprising that a number of very interesting species were found. But few land shells were taken, among them the extremely rare *Polygyra roperi*, and a peculiar *Circinaria*. *Pyramidula striatella* occurred in many localities, the specimens being referable, probably, to the ill-defined variety *cronkhitei*.

Among the fresh-water pulmonates, the re-discovery of *Ancylus patelloides* Lea, a species falling into Clessin's genus *Lanx*, and *A. altus* Tryon, also a *Lanx*, are the most important finds. These species will be fully treated elsewhere, with illustrations of the anatomy.

The series of *Goniobases* collected induced me to attempt a revision of the West American species, the results of which are included below.

The list of species is as follows :

Epiphragmophora mormonum (Pfr.). Redding, Shasta Co.

Polygyra loricata (Gld.). Battle Creek, s. boundary Shasta Co.

Polygyra roperi (Pils.). Redding, Shasta Co. One adult specimen.

Vallonia pulchella (Müll.). Redding, Shasta Co.

Circinaria sp. undet. Redding. I cannot refer the single fresh adult shell collected to any of the described forms.

Pyramidula striatella (Anth.). Goose Lake, Modoc Co.; Duck Lake, 20 miles west of Susanville, and Eagle Lake, Lassen Co.; Bartle's, Siskiyou Co., on McCloud River.

Vitrea hammonis (Ström). Bartle's and Duck Lake.

Vitrina pfeifferi Newe. Bartle's and Duck Lake.

Zonitoides arboreus (Say). Goose Lake, Modoc Co.

Succinea nuttalliana (Lea). Goose Lake, Modoc Co.

Succinea stretchiana (Bld.). Duck Lake and Bartle's.

Limnæa stagnalis (L.). Upper waters of Willow Creek, trib. to Susan R., Lassen Co.

Limnæa proxima (Lea). South Fork Pitt R., Modoc Co.

Limnæa desidiosa (Say). Redding (reported as *L. adelinæ* on p. 60 of vol. xii.).

Limnæa humilis (Say). Duck Lake, Lassen Co.

Pompholyx effusa (Lea). Shasta Co. in the Sacramento R. at Redding, in Battle Creek, and Pitt R. below the falls; Grasshopper Lake, Lassen Co.; also Klamath River at Klamathton, Siskiyou Co.

Curinifex newberryi (Lea). Eagle Lake; Head of Fall River, southeastern Siskiyou Co.

Planorbis trivolvis hornii Tryon. Upper waters of Willow Creek, Lassen Co.

Planorbis parvus Say. Duck Lake, Lassen Co., and a small sinking creek on Van Loan's ranch, 20 miles S. of Alturas; also Redding, Shasta Co.

Ancylus oregonensis Clessin. Redding.

Lanx patelloides (Lea). Shasta Co., at Redding, Battle Creek, and Pitt R. below falls. At the latter two localities a spotless form or variety occurs, associated with spotted specimens.

Lanx altus (Tryon). Klamath River at Klamathton, Siskiyou Co. This is probably only a variety of Lea's *Ancylus newberryi*, but it is rounder and higher, and the young are more conic and not elevated at the ends as in *L. newberryi*.

Physa triticea Lea. Battle Creek, S. border of Shasta Co.; S. Fork Pitt R. at South Fork P. O., Modoc Co.; West Fork Feather R., Morgan Spr., Plumas Co.; Duck Lake and Willow Creek, Lassen Co.; Dunsmuir, Siskiyou Co. A common species in northern California, originally described from young specimens.

Goniobasis plicifera (Lea). Klamath River at Klamathton, Siskiyou Co. A form heavily striate throughout, but folded on the earlier whorls only.

Goniobasis nigrina (Lea). Battle Creek, southern boundary of Shasta Co., 10 miles above its mouth; West Fork Feather River, Plumas Co.; small spring at Eagle Lake, Lassen Co.; headwaters of Fall R., southeastern Siskiyou Co.

Goniobasis occata (Hinds.). Battle Creek, southern boundary of Shasta Co. The upper keels are generally nodose, as in *G. acutifilosa*, which is evidently a form derived from *occata*.

Goniobasis acutifilosa (Stearns). Small creek at Eagle Lake. Sculpture less strong than in the typical form.

* *Goniobasis acutifilosa siskiyouensis* n. v. Excessively variable in

sculpture, spiral carinæ wholly absent on the last whorl or two, or reduced to two or three low angles; or when developed, more numerous and less prominent than in the type form. Contour about as in *acutiflora*. Based upon a series of 94 shells from the headwaters of Fall River, S.-E. Siskiyou Co. There is also a series of the same form in the collection labelled "*G. circumlineata* Tryon, California."

The *Goniobases* of the West Coast are fully as variable as those of the East; and far too many species have been made. The following synopsis is believed to be in accordance with the facts.

- | | | |
|------------------|--|---|
| a. | Earlier (or all) whorls longitudinally costate. | <i>plicifera</i> . |
| a ¹ . | Earlier (or all) whorls spirally keeled. | |
| | b. | Last whorl with many spiral keels. <i>occata</i> . |
| | b ¹ . | Last whorl with few spiral keels. <i>acutiflora</i> . |
| | b ² . | Last whorl rounded, not sculptured. <i>rubiginosa</i> . |
| a ² . | Earlier whorls convex, without spiral or longitudinal sculpture. | |
| | | <i>bulbosa, nigrina, circumlineata</i> . |

G. plicifera Lea includes the following synonyms or slight local races: *silicula* Gld., 1847, *shastaensis* Lea, 1856, *rudens* Reeve, 1860, *bairdiana* Lea 1862. Its range extends from the southern end of Puget Sound, Washington, to Pitt and Feather Rivers, California.

G. bulbosa Gld., 1847, described from the Columbia River, and before me from the Owyhee River, includes *newberryi* Lea, 1860, from the upper Des Chutes River, both streams being tributary to the Columbia.

It is doubtful whether *G. nigrina* Lea, 1856, should be included in *bulbosa*, but it seems to me very likely. *G. nigrina* includes *draytonii* Lea, 1862, and *Melania californica* Clessin, Malak. Blätter (n. F.) v, p. 189, pl. 4, f. 9, 9 (1882), as synonyms, and *G. circumlineata* Tryon is probably only a variety, distinguished by larger size and more or less malleated whorls, which show spiral flat faces like some forms of *Limnæa palustris*, or sparse low spiral carinæ. *G. nigrina*, in its several forms, is distributed over northern California from Sonoma and Napa counties north to Humboldt, and east to Lassen and Plumas counties. It is characteristic of the Sacramento, as *bulbosa* is of the Columbia, drainage.

The fossil *G. tayloriana* Gabb has the sculpture of *occata* and *acutiflora*, and is probably an ancestral form of these species.

Fluminicola seminatis (Hinds). Small creek at Eagle Lake; head of Fall River, Southeastern Siskiyou Co.; S. Fork Pitt R., Modoc Co.

Valvata virens Tryon. Willow Creek, tributary to Susan River, Lassen Co.

Anodonta californiensis Lea. Upper waters of Willow Creek.

Margaritana margaritifera (L.). Sacramento R. at Redding.

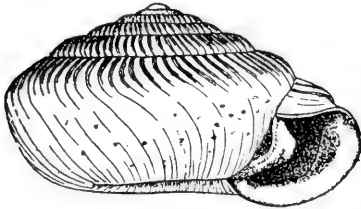
Pisidium ultramontanum Prime. Duck Lake, Lassen Co.; W. Fork Feather R. at Morgan Spr., Plumas Co. Another species of *Pisidium* occurred in Modoc and Siskiyou counties.

A NEW PLIOCENE POLYGYRA FROM FLORIDA.

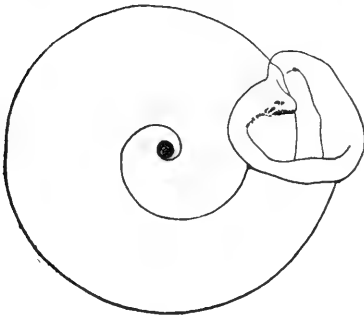
BY CHAS. W. JOHNSON.

Polygyra caloosaensis, n. sp.

Whorls six, slightly depressed, crossed on the body whorl above by about 65 coarse, oblique, subarcuate costæ, that end rather abruptly at the periphery; toward



the apex they become gradually smaller or obsolete, apical whorl smooth; below the periphery the costæ become obsolete and the surface has an indented or malleated appearance. Umbilicus wide, one entire whorl (beside the body whorl) being visible below. Aperture sublunate, narrowed above, lip broad, unevenly reflected, slightly thickened on the base, giving the appearance of an obsolete tooth, callus continuous over the parietal wall and bearing a prominent oblique process, that is subtruncate above, but extends narrowly toward the base. Alt. 6 mm., greatest diam. 11 mm.



Two specimens, (one immature) from the material collected by the late Dr. H. G. Griffith from the Pliocene beds of the Caloosahatchie River, Florida.

Type No. 9316 Collection of the Wagner Free Institute of Science. This species belongs to the typical *cereolus* section, but has the size and form of *P. uvulifera*. Dr. Dall records *P. cereolus microdonta* from the Caloosahatchie beds (Trans. Wagner Free Inst. iii, pt. 1, p. 19), but this species cannot be confounded with that.

VIVIPAROUS MIOCENE TURRITELLIDÆ.

BY FRANK BURNS.

I have lately made one of the most interesting discoveries that I have met with in all my work in the Southern Tertiary, and send you below the facts for publication.

I lately went to Plum Point, a classical spot in Maryland, to try to get a fair representation of the fauna there, as the beds and shells are so friable that it has been heretofore almost impossible to do so. I have a large amount of marl and many hundreds of the larger bivalves, collected to get the small things enclosed in the matrix between the valves, also in such gastropods as I could get out without breaking. In looking over some sand I came across a small fragment of *Turritella cumberlandia* Con., 21 mm. long and 11 mm. wide, and out of this I obtained over two hundred embryonic shells that were enclosed in the mother shell. Of all the great number of thousands of such shells that I have heretofore collected, I never saw anything like this, nor have I read of it.

These embryonic shells were never born, so to speak. Their mother died with them enclosed, and, as the animal decayed, the front of the aperture was closed with fine silt, leaving the embryonic shells intact, where they have remained for an immense period of time, as this is the lowest fossiliferous bed in the Miocene. These embryonic shells are about one millimetre in length and about as wide. I have heretofore collected very young *Turritellidæ* from fine sand where they had died, but never before saw one in the parent fossil. A fine point for investigation is whether the recent *Turritellidæ* are oviparous or viviparous. The literature that I have access to is a little hazy on the subject.

Since writing the above I have found another specimen in the same condition, but of a different species, *Turritella indenta* Con.; both from the same bed at Plum Point.

The last specimen was bored by a mollusk and, of course, died before spawning. As soon as I removed a small portion of sand the little fellows came pouring out by the hundred, so that I have duplicated the most interesting find of my life.

NEW SOUTHERN UNIOS.

BY BERLIN H. WRIGHT.

Unio unicastatus, sp. nov.

Shell thin, obovate, somewhat inflated, inequilateral. Smooth, with distant and inconspicuous growth lines; epidermis olivaceous with numerous, well separated, indistinct, broad green rays throughout the entire disk, but which are usually most distinct on the posterior half: dorsal margin short and straight, anterior margin very short and abruptly rounded, base sub-emarginate, posterior margin rounded and usually (in the male) biangulated; umbos prominent, beaks eroded, umbonal angle obsolete; posterior area with a single little rib extending from beak to the superior posterior margin; beak cavities well defined; dorsal cicatrices deep and close up under the beaks, anterior cicatrices distinct; posterior ones confluent and all smooth; lateral teeth slender, straight and prominent; cardinals lamellate, oblique and prominent; nacre pale flesh color, pink or red. Width $1\frac{7}{8}$, length 1, diameter $\frac{5}{8}$ inches.

Habitat: Spring Creek, Decatur Co., Ga.

Type in National Museum.

Remarks: Affinity, *U. lienosus*. A large lot of these shells has been in hand for two years—and some have been distributed to contributors to the collecting fund under the name of *U. nigrinus* Lea, and *U. lienosus* Con. var. Its outline is much more obovate than either species and it is smaller and thinner than the latter. The female shells of *unicastatus* show a still further departure from both of the above-named species in developing a far greater degree of expansion on the base. The little rib on the posterior area is also a distinguishing feature, though it is sometimes nearly obsolete. Its epidermis is never black like that of *U. nigrinus*.

GENERAL NOTES.

LAND SHELLS OF BERKS CO., PENNSYLVANIA.—During August of the present year I spent some days in Amity township, Berks Co., Pa. Only a few hours were given to collecting, the following species being obtained:

- Polygyra albolabris* (Say), *P. tridentata* (Say), *P. hirsuta* (Say).
Vallonia pulchella (Müll).
Bifidaria armifera (Say).
Pyramidula striatella catskillensis (Pils.).
Helicodiscus lineatus (Say).
Zonitoides arboreus (Say).
Gastrodonta suppressa (Say).
Vitrea rhoadsi Pils., *V. indentata* (Say).
Agriolimæ campestris (Binn.).

This extends the range of *Pyramidula striatella catskillensis*, not hitherto found in Pennsylvania, and adds another locality for *Vitrea rhoadsi*. The other species are of course common and widely distributed.—*H. A. Pilsbry*.

PHYSA CUBENSIS IN FLORIDA.—The small, slender, glossy *Physa* of peninsular Florida often goes under the name *P. pomilia* Conr., in collections. Recognizing that this was incorrect, I gave the MS. name "*P. heterostropha peninsulæ*" to the specimens collected at Miami by Mr. S. N. Rhoads (this journal, p. 48). On comparing with Antillean forms I find that the species is *Physa cubensis* Pfr., described from western Cuba.—*H. A. Pilsbry*.

SHELLS COLLECTED AT OAKDALE, MORGAN CO., TENN.—During a few hours stay, the following species were collected on the bluffs along the Emory River.

- Polygyra stenotrema* Fér.
Polygyra exoleta Binn. 2 dead and poor.
Polygyra wetherbyi Bld. 4 alive and poor.
Polygyra tridentata Say Var. 4 alive, one dead.
Polygyra appressa sculptior Chad. Saw many dead ones.
Polygyra appressa perigrapta Pils. 1 alive—saw a few dead.
Omphalina laevigata Pfr. 1 young alive—several dead.
Gastrodonta interna Say.

Am sending you one of the *tridentata*. You will note the teeth are

like var. *complanata* but the sculpture is like *tridentata*. My largest shell, the dead one, is $20\frac{1}{2}$ mm. diam. I thought at first they were *complanata* but on comparing with typical shells from Burnside, Ky., collected by Sargent, I saw the difference.—*Geo. H. Clapp.*

PUBLICATIONS RECEIVED.

NOTES ON THE MOLLUSCA OF THE ARABIAN SEA, PERSIAN GULF, AND GULF OF OMAN, mostly dredged by Mr. B. W. Townsend, with descriptions of twenty-seven species by Jas. Cosmo Melvill. *Ann. and Mag. of Nat. Hist.* ser. 7, Vol. iv. pp. 81-01 pls. i, ii, Aug. 1899.

REPORT ON THE MARINE MOLLUSCA OBTAINED DURING THE FIRST EXPEDITION OF PROF. A. C. HADDON TO THE TORRES STRAITS in 1888-89. By Jas. Cosmo Melvill, and Robt. Standen. *Linn. Soc. Journ. Zoöl.* Vol. xxvii, pp. 150-206, pls. 10, 11, 1899.

Review of the work done in that region with a list of the collecting stations of Prof. Haddon is followed by a catalogue of the species. 449 species are recorded, including 24 that are new. One new genus of Neritidæ, *Magadis*, and a new subgenus of *Pholadomya* Sowb., *Parilimya*, are described. The paper closes with some very interesting remarks on the few recent species of *Pholadomya*.—*C. W. J.*

WEST AMERICAN EULIMIDÆ, By Edw. G. Vanatta. *Proc. Acad. Nat. Sci.* 1899, pp. 254-257, pl. xi. Three new species are described and *Eulima compacta* Cpr., *E. micans* "Cpr." Reeve, and *E. rutilis* Cpr. are redescribed and figured.

PROCEEDINGS OF THE MALACOLOGICAL SOCIETY OF LONDON. Vol. III, no. 5, July, 1899. Lieut-Col. H. H. Godwin-Austen delivered the Presidential Address on February 10 on the subject of Indian malacology, a field which he has made peculiarly his own. The address begins with an interesting sketch of the workers on Indian mollusks, and continues with a review of the progress and present state of our knowledge of the most prominent and characteristic forms of the mollusk life of India. Particularly interesting are the paragraphs upon *Camptoceras* and the *Zonitidæ*. The development of the latter group in India is enormous in number of genera and species, and remarkable in the series of forms leading to slug-like genera such as *Girasia*. And as it is to Godwin-Austen himself that

we owe a knowledge of the anatomy of these forms, his ideas of the succession and relationships of the genera will naturally carry great weight. Godwin-Austen is emphatic in opinion that the slug-like genera trace their ancestry to forms with well-developed shells, *Macrochlamys* standing in an ancestral relation to *Austenia* and *Girasia*. This goes to confirm the doctrine that naked forms are never primitive pulmonates. The address will well repay careful reading by those interested in land snails.

Messrs Wm. Moss and W. M. Webb give the results of the dissection of *Trachycystis*, *Dorcasia* and *Isomeria*. In *Dorcasia globulus* the genital system was found to be simple, as in *Polygyra*, but the vas deferens is bound to the penis distally. *Isomeria subcastanea* is the first species of its subgenus to be dissected, and the anatomy proves it to have been rightly located in the genus *Plurodonte*. It has a special feature in having the penis retractor muscle inserted on the epiphallus, as in the allied Oriental forms. "The male organs in particular resemble those of *Chlorites porteri* more nearly than they do *Plurodonte*."

In his notes on the non-marine molluscan fauna of the Hawaiian Is., Mr. Ancey gives descriptions, notes and figures of numerous little-known and new forms; a new genus, *Thaanumia*, is proposed. In a succeeding paper, Mr. Sykes figures numerous hitherto unfigured Hawaiian land shells described by Ancey and Gulick. This is a most valuable and welcome contribution.

A new *Dinoplax*, *D. fossus*, is described by Mr. E. R. Sykes. Like the type of the genus, it is from South Africa.

Mr. Smith describes a large snail from Perak as *Hemiplecta floweri*.

Mrs. Agnes Kenyon gives the history of the seven specimens of *Voluta Roadnighte* at present known, all being from various localities on the coast of Victoria. The largest measures 8 inches in length.

The number closes with an article by Mr. H. Suter, describing six new forms of New Zealand land shells. The soft anatomy of several is figured, and in *Flammulina (Pyrria) virescens* a peculiar flat appendiculum, inserted opposite the entrance of the spermatheca, was found. This is a new structure for the *Endodontidæ*, and the examination of allied species will be looked for with interest.

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No. 7.

DONAX STULTORUM, MAWE CONRAD'S SPECIES, CYTHEREA
CRASSATELLOIDES.

BY ROBT. E. C. STEARNS.

On delving into the literature and resurrecting the little known work of some good old forgotten author, in pursuance of the law of priority, we have to rehabilitate an overlooked name at the expense of a better and more appropriate one, that has been in use for nearly two-thirds of a century. Of course this results in some confusion, and the revision of labels, catalogues, etc., which is no trifling affair. An instance of this kind is seen in the case of the well-known *Cytherea (Tivela) crassatelloides* of Conrad (1837), of Californian waters, which now, though the specific name is highly appropriate, is found to conflict with that of *stultorum* of Mawe, who figured it in 1823, from a young example, assigning it to the genus *Donax*. The late Dr. Philip Carpenter, who was inclined to be conservative in cases of this kind, while mentioning Mawe's species in the British Association Report, 1863, p. 524, and in the tabulated list of the shells of the Vancouver and Californian province, same volume (p. 640), adheres to Conrad's name and says, "jun. = *stultorum* Gray." With over a hundred juniors before me, measuring from three-fourths to an inch and a half (19 to 37 mm.) in length, it seems strange that this form, even in its adolescent stages, should have been regarded as a *Donax*. On page 526, of his report as above, Carpenter says "[the young of this *Pachydesma* is 'Trigona stult-

orum Gray,' Desh., MS., in British Museum.]” The earlier synonymy may be arranged thus:¹

1823. *Donax stultorum* Mawe. The Linn. Syst. Conch., pp. 37, 40, pl. 9, f. 7 (no description; locality “Indian Seas”).

1828. *Donax stultorum* Mawe, Gray. Index Testaceologicus, Suppl., pl. 2, *Donax*, f. 2. Also Hanley's edit., 1856 (no description).

1837. *Cytherea (Trigonella) crassatelloides* Conrad. Journ. Acad. Nat. Sci., Phila., vii. pt. 2, p. 253, pl. xix, fig. 17.

1838. *Trigona stultorum* Gray. The Analyst, viii, p. 304 (no description; refers to “*Venus stultorum* Gray, Wood, Suppl., t. 2, f. 2.” This is a false reference for *Donax stultorum*, loc. cit.).

1843. *Cytherea crassatelloides* Con., Hanley. Descript. Catal. Rec. Biv. Shells, p. 106.

1843. *Cytherea stultorum* Gray, Hanley. Descript. Catal. Rec. Biv. Shells, p. 106. (First description of *stultorum*.)

1844. *Cytherea (Trigonella) crassatelloides* Con., Hinds. Zoöl. Voy. H. M. S. “Sulphur,” Moll., p. 65, pl. 21, f. 1.

1849. *Trigonella crassatelloides* Conrad, Journ. A. N. S., Phila., i, pt. 3, p. 213.

18—(?). *Cytheræa crassatelloides* Con., Sowerby. Thes. Conch., ii, p. 612, pl. 127, f. 1–3. (*C. stultorum* placed in synonymy as the young.)

1853. *Trigona crassatelloides* Con., Desh., Catal. Conchif. Coll. B. M., pt. 1, p. 46.

1853. *Trigona stultorum* Gray, Deshayes. Catal. Conchif. Coll. B. M. pt. 1, p. 46.

1864. *Cytherea crassatelloides* Con., Reeve, Conch. Icon. Vol. xiv, pl. 1, f. 3.

1898. *Cytherea (Tivela) crassatelloides* Conrad. Stearns in Proc. U. S. Nat. Museum, vol. xxi, pp. 371–378, plates xxiii–xxv.

Conrad never actually used the combination “*Pachydesma crassatelloides*,” though it is implied in his brief note of 1854.

This species exhibits many varietal aspects, as is shown in the paper last referred to.

The generic synonymy is as follows :

Trigonella Conrad, 1837. Journ. A. N. S., Phila., vii, pt. 2, p.

¹ Dr. Pilsbry has kindly assisted me in compiling the literary history of this species.

253 (proposed as a subgenus of *Cytherea*; type and sole species *Cytherea crassatelloides* Conr.).

Trigonella Conrad, 1849. Journ. A. N. S., Phila., I, 213 (diagnosis of genus).

Pachydesma Conrad, 1854. Proc. Acad. N. S., Phila., vii, p. 31 ("note on the genus *Trigonella* Con. This name being superseded, I propose to substitute that of *Pachydesma*").

Prior to 1843 no description of *Donax stultorum* was published—not a line except the name and the locality, "Indian Seas." The specimen figured by Mawe is young, and apparently the color-var. *triserialis*.

The first description was by Hanley in 1843. Gray merely refers to the plate in Index Testac. Suppl., not even to Mawe's earlier publication.

Query: Should Mawe's figure, which is quite recognizable, but without description and with a false locality and erroneous generic reference, displace Conrad's name, which was from a known locality, was well defined, and was accompanied by a good figure of the typical many-rayed shell?

NEW SOUTHERN UNIOS.

BY BERLIN H. WRIGHT.

Unio singularis, sp. nov.

Shell uniformly and moderately solid, wide, rather inflated and very inequilateral. Surface sulcate, with distant growth lines; epidermis dark olive, rayless, finely wrinkled, and towards the base becoming fuscous; dorsal margin slightly arched, anterior margin abruptly rounded, base straight or submarginate, posterior margin bluntly rounded or biangulated; beaks not prominent, and surrounded by five or six sharp concentric ridges which gradually merge into the sulcations on the umbos; umbonal ridge bluntly rounded; lateral teeth erect, solid, straight, widely separated from the cardinals and, in the left valve, from each other, single in the right and double (?) in the left valve, the superior division possessing scarcely prominence enough to warrant calling it a tooth; cardinal teeth solid, double in the left and single in the right valves; the single one being deeply serrated on its summit; beak cavities very slight;

anterior cicatrices smooth, well-impressed and distant; posterior cicatrices slightly impressed, smooth and confluent; naere pale blue, white or coppery. Width, $2\frac{5}{8}$; length, $1\frac{3}{8}$; diameter, $\frac{9}{16}$ inches.

Habitat: Spring Creek, Decatur Co., Ga.

Type lot in National Museum.

Remarks: Affinity, *Unio scammatus* Morel. The roughness of the surface of this singular shell is the one feature that at once arrests attention. We know of no other U. S. species of this class (as to outline) that possesses such a surface. It is not, however, so conspicuously furrowed as its affinity.

AN ATTEMPT TO DEFINE THE NATURAL GROUPS OF STROMBUS.

BY GEO. HALCOTT CHADWICK.

Having recently had the privilege of studying a fine series of the living species of *Strombus*, *Pterocera* and *Terebellum*, the opportunity seemed favorable for a critical examination of the entire group. As I am not aware that any similar attempt has been made to revise the Strombi, the results obtained are respectfully submitted to the scientific world. Lacking anatomical data, I have freely used neglected and sometimes indefinable features of the shells as guides to their inter-relationships. Forced to recognize some new groups, I have left the secondary matter of names to those more skilled in nomenclature, but have indicated the probable application of the titles already in use, as to the types of which scarcely any two authors, save Tryon and Fischer, agree.

Of the species and varieties of *Strombus* recognized in Tryon's monograph, I have seen all but *S. integer*, *taurus*, *listeri*, *dilatatus*, *labiosus*, *deformis*, *septimus*, *minimus*, *sibbaldi*, *erythrinus* (true), *pulchellus*, *helli*, *scalariformis* and *bulbulus*, although *S. goliath*, *fusiformis* and *terebellatus* were not now before me. All ten of the *Pterocerae* were at hand.

The grouping of the species which seems to me most in accordance with their natural relations, as indicated by shell features and geographical distribution, is as follows:

GROUP A (*Monodactylus*).

Canal lengthened, bent abruptly dorsally; lip with margin straightened, incurled, truncated at both ends, bearing a posterior digitation

originating *above* the shoulder angle; body regularly sculptured with spiral striæ and rows of nodules; spire elegant, high, *without varices*; suture suddenly, *vertically* ascending at aperture; columellar callus thinning rapidly, or with an impressed area, posteriorly; no conspicuous periostracum.

S. auris-dianæ, melanostomus, aratrum, australis.

Distribution: Mauritius to Japan and Polynesia.

The American forms and *tricornis*, included by Tryon, differ considerably (note the italicized passages above) from this very natural little Indo-Pacific group, and are grouped elsewhere.

GROUP B (*nov.*).

Canal *bent back*, the columellar *callus terminating below in a prominent knob*, giving a bilobed appearance; lip with the antesinual lobe *directed forward*, the outer margin inrolled and thickened, *descending* from the suture and lobed in the posterior sinus; body with *spiral rows of squarish nodules*; spire moderate.

S. papilio, lentiginosus.

Distr.: Zanzibar to Polynesia.

The wide difference between these two species and the smooth ones allied to *laciniatus* is readily seen from the above definition, while many points of resemblance with Group A will be detected, suggesting community of origin.

Sub-group B 2.

Callus prominent below, hardly knobbed; lip edge sharp, "*hooded*" posteriorly, but not lobed; spire *high*, nodular.

S. granulatus.

Panama and Galapagos.

This species, which differs utterly from all other American forms, agrees too closely in many respects with the *lentiginosus* group, and seems to form a geographically isolated section.

GROUP C (*Strombus*).

Shell large and strong; canal not much lengthened, somewhat curved or *sinuous*; lip *widely expanded*, especially above, where it is sometimes lobed; suture ascending at aperture; body spirally corded; periostracum thick and coarse, *spirally wave-striolate*.

S. gallus, gigas, goliath, costatus, integer, bituberculatus, bubonius, galeatus, peruvianus.

Distr.; American, South Carolina to Brazil, Mazatlan to Peru; West African.

I can find no reliable feature by which to separate the American "monodactyl" species (the posterior lobe, which is derived *from* the shoulder-angle and is not homologous with the digitation of the Oriental forms, being incipient in *gigas* itself), and I have detected the peculiar periostracum in all but *gallus*. Moreover in the characters of spire and body *gallus* agrees with *gigas*, *bituberculatus* with *costatus* (and has a variety corresponding with *inermis*), and *peruvianus* with *galeatus*, and this accords with their geographical range.

Sub-group C 2.

Canal short, *straight*; lip *scarcely expanded*, with margin faintly incurled, *deeply receding* at the suture, and not surmounting the shoulder of the penultimate whorl; body nearly smooth; periostracum finely, densely, vertically lamellose; inner lip spreading.

S. pugilis, gracilior.

Antillean and West Mexican.

The last clause of the definition is needed to distinguish this small American group from *Conomurex luhuanus*, which it strangely parallels. Only a conservative spirit and the occasional presence of wave-striations on the periostracum induce me to give this group secondary rank under group C.

GROUP D (*Euprotomus*).

Canal very short, with the *dorsal margin produced beyond the short tip* of the straightened columella; lip with the antesinual lobe broad, *rolled upward and inward*, the outer margin broadly and *abruptly inflected*; body with a large node; spire high, whorls nodulous.

S. laciniatus, latissimus, ponderosus, taurus.

Distr.; Japan to Fiji Is.

S. tricornis. Red Sea.

The last species is aberrant in its single posterior lobe and obsolescent inflection of the lip margin, but the resemblance to *peruvianus* is evidently deceptive. *S. taurus* strikingly emphasizes the close alliance of this group to

GROUP E (*Pterocera*).

This group need not be redefined. It has the peculiar form of antesinual lobe of the preceding group, and differs mainly in the elongated canals and numerous lip-claws.

(*To be continued.*)

NOTE ON SOME NEW MEXICAN SHELLS.

BY H. A. PILSBRY.

Professor T. D. A. Cockerell recently sent a small box of fluvial debris containing shells, obtained during the past summer by Professor J. D. Tinsley at South Spring Creek, near Roswell, N. M. The list of species follows:

<i>Polygyra texasiana</i> (Moric.)	<i>Planorbis exacutus</i> Say.
<i>Bifidaria pentodon</i> (Say).	<i>Ancylus rivularis</i> Say.
<i>Zonitoides minusculus</i> (Binn.).	<i>Physa virgata</i> Gld.
<i>Carychium exiguum</i> (Say).	<i>Paludestrina seemanni</i> (Ffld.).
<i>Limnæa humilis</i> Say.	<i>Amnicola</i> sp.
<i>Planorbis bicarinatus</i> Say.	<i>Pisidium compressum</i> Prime.

There was a single dead specimen of the *Amnicola*, which is probably a new species somewhat like *A. micrococcus*, but more conic. With the shells were numerous minute bivalve crustaceans of the *Cypris* type, and some of the Valvata-like larva-cases of *Helicopsychæ*, composed of much coarser materials than are chosen by our eastern *H. arenifera*.

AMONG THE UNIOS OF THE SABINE RIVER.

BY L. S. FRIERSON.

The Sabine River forms part of the boundary between Texas and Louisiana. The Houston, East & West Texas Railroad crosses the river at Logansport, a thriving village of about one-half mile in diameter. This town derives its support from an immense saw-mill, one of the largest in the world. It is worthy of a trip to see the huge logs pulled about, and in a few minutes turned into finished lumber, loaded into cars and ready to go unto the uttermost parts of the world.

But it was not lumber for which I took my trip to the Sabine, but to describe the river and its inhabitants. This river flows through and over immense sand banks. Its walls are fifty feet high, and mainly of pure sand from top to bottom.

At the time of my visit it was so low that even a flat-bottomed skiff could not be paddled up it, except here and there in pools. As

soon as we were out of sight of the town we waded into the river. In the clear water the Unios could be seen and picked up, and in a couple of hours we had collected about 1,000 and returned to the town, and shipped our catch home. By this time the August sun was at a heat of about 92°, and we spent the rest of the day trying to keep cool. By the next train we came home, and cleaned up and assorted our booty. They were a rich lot. You lovers of Unio, read the list:

Unio multiplicatus Lea.

Unio trapezoides Lea.

Unio perplicatus Con. with several "*aliases.*"

Unio purpuratus Lam., very numerous and large.

Unio anodontoides Lea., rather scarce, and *very poor.*

Unio cornutus Barnes. Fine.

Unio sphaericus Lea.

Unio refulgens Lea.

Unio hydianus Lea.

Unio castaneus Lea.

Unio gracilis Bar., very abundant.

Unio nigerrimus Lea. A very distinct species, and *most certainly not* subrostratus Say, as has been claimed.

Unio cerinus Conrad, scarce.

Unio askewii Marsh, abundant.

Unio chunii Lea, scarce.

Unio riddellii Lea. This shell is so rare that Mr. Chas. T. Simpson writes me that these from the Sabine river are the only undoubted specimens he has ever seen (excepting the type).

Unio asper Lea.

Unio elegans Lea.

Unio satur Lea. Another "*rara avis.*" (Some uniologists think this shell to be a variant of *U. occidentis*, but, from the study of 105 specimens, I believe it a "*good*" species.)

Unio amphichænus Frierson. This is a remarkable shell, and its novelty has now "*stood fire*" without loss.

Anodonta imbecillis Say.

Anodonta edentula Say. (From a tributary of the Sabine river, and by odds the largest specimen I have ever seen.)

Anodonta virens-stewartiana, etc., etc.

Margaritana confragosa Barnes.

Besides these, there are a lot of "suspects" also, which may yield the following species:

Unio cuneus Con.

Unio hebetatus Con.

Unio ——. New species; has pink nacre.

Finally, our box yielded two large univalves, which Mr. Marsh pronounces to be *Campeloma geniculum* Conrad.

ABALONE FISHERY IN CALIFORNIA—PROTECTIVE REGULATION.

BY R. E. C. STEARNS.

The continued gathering or "fishing" of Abalones (*Haliotis*, Earshells or Ormers, as they are variously called), along the coast of California, has recently led to restrictive action by some of the county authorities. The supervisors of Monterey, and of other of the seaboard counties, have taken the necessary legal steps to regulate the fishing, which has been carried on continuously from about 1864 to the present time by the Chinese, and of late by the Japanese. The well-known species, *Haliotis rufescens* and *H. cracherodii*, so abundant between tidemarks a few years ago, have, owing to the unintermittent collecting by the Asiatic fishermen, become comparatively scarce.

An ordinance recently passed by the authorities of Monterey County, makes it unlawful to "fish" for Abalones except in deep water, and by means of diving apparatus or other deep-sea devices. A license of \$60 is also to be charged in the future for "fishing" for abalones. (This license fee is presumably for the term of a year.) The ordinance is said to be "the result of a fight" between the city of Monterey, seeking to stop the gathering and shipping out of the county (or country?) of Abalone meats and shells, and the Japanese cannery, that has carried on an extensive business at a plant on Carmel Bay, about six miles south of Monterey. Practically, the ordinance is a compromise between local parties; the fishermen being restricted to "deep water," excepting a limited portion of the littoral

zone, between a line drawn due west from Carmel river and the southern boundary of the county.

Monterey City, with its Del Monte hotel and fine surroundings, Pacific Grove with its many attractive features, the beautiful Carmel Valley and the old Mission church, make the region hereabout the most popular seaside resort in Central California, and draw great numbers of people from all parts of the state. The rambles along the shore, collecting the beautiful Abalones and other shells, by visitors, who carry them away as souvenirs, has been one of the many attractions, and has had no doubt something to do with the above action on the part of the authorities, to prevent the extermination of one of Nature's most beautiful forms. Whatever may have been the motive that has led to this restrictive regulation, it is amply justified on the broad ground of public interest, and the example of the Monterey supervisors should be followed by the officials in all of the coast counties.

R. E. C. S.

CORRESPONDENCE.

HONOLULU, HAWAIIAN ISLS., SEPT. 16, 1899.

* * * My trip to Alaska was most interesting and successful. My attention was chiefly given to geology and paleontology, so I had little time for collecting shells, still I did something and added a few points to our knowledge of geographical distribution. The most interesting was the discovery at Biorka Island, at the entrance of Sitka sound, that a number of the southern species creep up along the seaward margin of the archipelago much further north than they do among the islands. Thus I found *Leptothyra carpenteri*, *Psam-mobia californica*, *Calliostoma filosum*, etc., at Biorka, though they do not occur in Sitka Sound nor, as far as I know, much north of Vancouver Island, in the inner channels. Prof. Ritter, of Cala. State University, did the dredging that was done, but the results in mollusks were less novel than in other directions.

After our return to Portland I came down here Aug. 9th per steamer, making the passage in six days very comfortably. The sea en route was much less supplied than I had expected with pteropods

and other pelagic life, and there was hardly a trace of phosphorescence, a great contrast to the northern seas, which fairly reek with life in a myriad forms. We saw *Velella* and flying fish (once) and a few porpoises, one petrel, and away from land were attended as usual by the black-footed albatross.

Here I have been revising the catalogue of the shell collection of the Bishop Memorial Museum, a surprisingly well developed and outfitted museum of Polynesian ethnology and natural history. After Mr. Bishop, formerly of Honolulu, a wealthy banker who founded the museum in memory of his wife (who belonged to the royal family of Hawaii), the existence and flourishing condition of the museum is largely due to Dr. W. T. Brigham, the director, who has been a resident here for many years.

The shell collection is that made by Andrew Garrett, and (apart from the great collections like those of the Nat. Museum at Washington, the Academy at Philadelphia, the British Museum, etc.) is one of the best in Pacific Ocean species that exist. There are 8,000 or 9,000 species and about 22,000 specimens, mostly in excellent condition, neatly mounted on tablets with printed labels. Local collecting is poor. The land shells are found in the wet region high up on the mountains and not near the town, where irrigation alone enables anything to grow. There is little on the reefs near the town; I noticed a *Tectarius* and a *Meluraphe*. *Plecotrema striata* Phil. was the only thing at all common. The animal is much like that of *Alexia*; there is no transverse sulcus to the sole of the foot and the eyes are directly over the middle line of the tentacles at their bases.

There are one or two species of *Melania* here, very similar to the Oregonian species as regards the shells, but these are true Melanians with a fringe on the mantle edge. The muzzle is rather long, flat and tapering, the mouth is a vertical slit; the colors gray, dotted with opaque yellow and white. A singular fact appeared on trying to drown some for dissection; although there were no eggs on the shells, there appeared a lot of young Melanians with about six smooth, glassy nepionic, and one subsequent sculptured, whorls. There seems to be no escape from the deduction that these species are viviparous. The grown shells are always decollate. I shall try and bring some home. The live *Achatinellas* and *Auriculellas* look like other pulmonates (*Helicidæ*). * * *

WM. H. DALL.

GENERAL NOTES.

POLYGYRA TRIODONTOIDES IN NEW MEXICO.—Prof. J. D. Tinsley has just brought me several specimens of *P. tridontoides* Bland, which he collected this year on South Spring Creek, near Roswell, in the Pecos Valley. This adds a species to the fauna of New Mexico, and extends its range considerably to the west.—T. D. A. COCKERELL.

PUBLICATIONS RECEIVED.

THE MOLLUSCA OF FUNAFUTI. By Chas. Hedley. (Memoirs of Australian Museum, III., 1899.)

Several expeditions have recently been made to the Ellice Islands, in which is situated the Funafuti Atoll. In his introductory remarks Mr. Hedley says: "The poverty of the fauna of the atoll, compared with that of any continental area lying under corresponding latitudes; such as Queensland, New Guinea, or the Melanesian Plateau, again asserts itself. Whole groups, the Brachiopoda and the Polyplacophora, are missing, giving to the fauna an unsymmetrical aspect. Especially significant is the absence of mollusca with large eggs, such as *Nautilus*, *Melo* or *Voluta*, from this drifted fauna. In many cases the Funafuti shells are smaller than the usual stature of their respective species."

"It comes as a surprise to a naturalist to find the pelagic fauna scarce in this latitude. One Pteropod, one Heteropod, and a fragment of *Ianthina* were all of this class that came under my notice. The quiet waters of the lagoon prove a richer field for a collector than the storm-swept ledges of the ocean beach. The sole representative of a fluviatile fauna was a species of *Melania*, which occurred in some abundance in the native wells."

Part I. contains the Gasteropoda, Part II., the Pelecypoda and Brachiopoda, followed by a summary of the entire fauna, and later by a supplement.

Four new genera, *Obtortio*, *Contumax*, *Thetidos* and *Mecoliotia*, 53 new species and four new varieties of Gasteropoda; 6 new Pelecypoda, one new Scaphopoda, and one new Brachiopoda are described. Upwards of 650 species are recorded from the atoll.

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NOTE ON SIGARETUS OLDROYDII.

BY W. H. DALL.

Nearly two years ago (NAUTILUS, December, 1897, p. 86), I described, from a single specimen obtained in deep water at San Pedro by Mrs. Oldroyd, an interesting shell belonging to the Naticidæ. Although of rather naticoid shape, it showed a well-marked fine spiral striation and a flaring umbilicus, recalling *S. concavus* Lamarck, but with a much thinner and more delicate shell and larger umbilicus. Recently Mr. J. S. Arnheim, of San Francisco, dredged in Drake's Bay, Cal., a larger shell which proves to be the adult form of *S. oldroydii*. In this the Naticoid form has become more pronounced, the umbilicus smaller and narrower, and a basal zone of paler color than the rest is well marked. The shell continues to be very thin, the soft parts in life cover it almost entirely, though the thin extension of the mantle over the shell contracts greatly when the creature is placed in alcohol. The soft parts and operculum are typically Sigaretoid, but the shell when adult might almost be taken for a *Lunatia*. The dimensions of the adult are alt. 50, max. diam. 55 mm. It is almost exactly intermediate, as far as the shell goes, between *Sigaretus*, *Eunaticina* and *Lunatia*.

MODIOLA PLICATULA LAMARCK IN SAN FRANCISCO BAY.

 BY ROBERT E. C. STEARNS.

The cry is, "Still they come." In my short note in the February number of THE NAUTILUS, I suggested the probability that *Mytilus hamatus* Say, would sooner or later be detected in the San Francisco Bay region. Though not as yet reported, its near relative, *Modiola plicatula*, is there sure enough, and has been for several years.

Through the kindness of Dr. J. P. Smith, of the Leland Stanford, Jr., University, I have received an example nearly two inches long, collected on the eastern shore of the bay by Mr. N. F. Drake, in 1894, at a point "3 miles north of Stanford University." I am further indebted to Dr. Smith for specimens of *Urosalpinx cinereus*, from the oyster beds near Redwood city; these were collected by Mr. E. E. Smith in 1898.

Some time ago, Mr. Hemphill sent me several examples of *Gemma purpurea* Lea.; these were compared by Mr. Dall with specimens in the National Museum; he wrote to me, saying, they "were about midway between the typical southern form and the large flat northern var. *Totteni* Stm." The shells were all dead, and might have been brought in mud with the seed oysters, at the time the latter were planted on the Alameda flats.

Los Angeles, Cal., October, 1899.

NOTE ON THE CLAUSILÆ OF CELEBES.

 BY E. R. SYKES.

In their very valuable work¹ on the land-shells of this island, Herr P. & F. Sarasin describe (p. 218) two new species of this genus—*C. bouthainensis* and *C. menahassæ*—and list the forms known hitherto. Unfortunately, a little note by the present writer,² in which the species were listed, two new forms described, and the name of *C. balantensis* proposed for *C. celebensis*, Bttg. non Smith, appears

¹ Wiesbaden, Oct., 1899, 4to.

² J. Malac. vi, pp. 23-4, pl. iv, *pars* (Aug. 1897).

to have escaped their notice. Judging from their descriptions and figures, *C. bouthainensis* appears to be a synonym of *C. pyrrha* Sykes, and *C. minahassæ* is very close to *C. makassarensis*; indeed these last two may be identical, but their figures indicate a shell in which the whorls increase at a more even rate. In both cases the plicæ palatales seem to be similar in number, size and position.

Further, they place *C. celebensis* Bttg. (*non* Smith) as a variety of *C. moluccensis*, following Dr. Bœttger,¹ who has also proposed *Paraphædusa* as a new section for *C. subpolita* Smith.

If these conclusions be correct, then the Celebes list will stand as below:

C. alternata Moellendorff.

C. celebensis Smith.

C. cumingiana Pfr.

Var. *moluccensis* Mts.

celebensis Bttg. *non* Smith.

balantensis Sykes.

Var. *simillima* Smith.

C. makassarensis Sykes.

C. minahassæ Sarasin.

C. pyrrha Sykes.

bouthainensis Sarasin.

C. subpolita Smith.

C. usitata Smith.

I feel some doubt as to whether *C. simillima* be not a good species, distinct from *C. cumingiana*.

NOTES ON THE MOLLUSCA OF CANANDAIGUA LAKE REGION, N. Y.

BY DR. CHAS. T. MITCHELL.

During the past summer I have collected, mounted and placed in my collection in the Union Free School Building in this village the shells of the following species of mollusca found in the above mentioned region, which consists of the Lake, its inlet and outlet, and its shores, and glens opening toward the lake; most of the species are plentiful, while a few are rare:

¹ Nachrbl. deutsch. malak. Ges. 1899 (April), pp. 56-9.

1. *Unio complanatus* Sol. Outlet.
2. *Lampsilis luteolus* Lam. Lake.
3. *Lampsilis iris* Lea. Outlet.
4. *Alasmodonta rugosa* Barnes. Outlet and Lake.
5. *Alasmodonta pressa* Lea. Outlet, rare.
6. *Alasmodonta marginata*. Say. Outlet.
7. *Anodonta grandis* Say. Outlet.
8. *Anodonta excurvata* De Kay. Inlet.
9. *Anodonta fragilis* Lam. Inlet.
10. *Anodonta implicata* Say. Lake.
11. *Anodonta footiana* Lea. Outlet, rare.
12. *Anodonta salmonia* Lea. Outlet.
13. *Anodonta simpsoniana* Lea. Lake, rare.
14. *Anodonta lewisii* Lea. Lake.
15. *Anodontoides subcylindraceus* Lea. Outlet, rare.
16. *Anodontoides ferrussacianus* Lea. Outlet, rare.
17. *Sphærium striatinum* Lam. Lake.
18. *Sphærium rhomboideum* Say. Lake.
19. *Sphærium simile* Say. Lake.
20. *Polygyra albolabris* Say. Glens.
- 20a. *Polygyra albolabris* var. *dentata* Walk. Glens, rare.
21. *Polygyra thyroides* Say. Glens.
22. *Polygyra sayii* Binn. Glens.
23. *Polygyra palliata* Say. Glens.
24. *Polygyra appressa* Say. Glens, rare.
25. *Polygyra fallax* Say. Glens, rare.
26. *Polygyra tridentata* Say. Glens.
27. *Polygyra monodon* Rack. Glens, rare.
28. *Polygyra hirsuta* Say. Glens, rare.
29. *Pyramidula alternata* Say. Glens.
30. *Omphalina fuliginosa* Griff. Glens.
31. *Omphalina inornata* Say. Glens.
32. *Circinaria concava* Say. Glens.
33. *Succinea obliqua* Say. Glens.
34. *Cochlicopa lubrica* Müll. Shores.
35. *Vallonia pulchella* Müll. Shores.
36. *Limnæa stagnalis* Linn. Lake.
37. *Limnæa emarginata* Say. Lake.
38. *Limnæa palustris* Müll. Lake, rare.

39. *Limmæa ampla* Migh. Lake.
40. *Limmæa catascopium* Say. Lake.
41. *Physa ancillaria* Say. Lake.
42. *Physa sayii* Tapp. Lake.
43. *Physa heterostropha* Say. Lake.
44. *Planorbis campanulatus* Say. Lake.
45. *Planorbis trivolvis* Say. Lake.
46. *Planorbis bicarinatus* Say. Lake.
47. *Campeloma integer* Say. Lake.

NEW SOUTHERN UNIOS.

BY BERLIN H. WRIGHT.

Unio conjugans, sp. nov.

Shell thick, solid, inflated, inequilateral, quadrate; dorsal margin arched, posterior margin truncate and subemarginate, basal margin emarginate, anterior margin uniformly rounded; umbos rounded, umbonal ridge prominent, with a marked depression in front; epidermis dark chestnut; tuberculate throughout, the tuberculations being without apparent order of arrangement or uniformity of shape, except that they expand downward and each base terminates at a growth-line, and near the base of the shell they become joined into two broken ridges on the anterior half of the shell; cardinal teeth very heavy and deeply serrated, those in the left valve being tripartite and those in the right valve double; lateral teeth, which extend to the abrupt posterior dorsal angle, are solid, depressed, curved and comparatively smooth; anterior cicatrices deep, contracted and barely distinct; posterior cicatrices well impressed and widely separated; pallial line deeply impressed and the pallial margin much thickened in the anterior portion; dorsal cicatrices many, small, and arranged in a long oblique row under the cardinal teeth; beak cavity deep, wide and bluntly terminated; nacre dead white with large umbraceous spots. Width $3\frac{3}{4}$, length $2\frac{3}{4}$, diam. 2 inches.

Habitat: Hiawassa river, Polk Co., Tenn.

Type in National Museum.

Remarks: Affinity, *U. blandianus* Lea and *U. tuberculatus* Barnes. This species fills the gap between these species, and removes the latter from the isolated position it has heretofore held, uniting the

members of the group into a continuous chain, one end of which is *U. cylindricus* Say, *U. cylindricus* Say var. *strigillatus* Nobis, *U. tuberculatus* Barnes, *U. conjugans* Nobis, *U. blandianus* Lea, *U. asperrimus* Lea, etc., and at the other extreme *U. nodiferus* Con.

Anteriorly the shell reminds one of *tuberculatus*, except that it is much more inflated in that region. Posteriorly it resembles *blandianus* Lea = *rumphianus* Lea. It is wider and more inequilateral, however, than that species.

(To be Continued.)

PISIDIUM HANDWERKI, N. SP.

BY DR. V. STERKI.

Among a lot of *Pisidia* from the Lilycash Creek, Joliet, Ill., collected and sent for examination by Mr. J. H. Handwerk, in 1898, there were a few specimens of evidently a new species. Yet it needed confirmation by more materials. But all efforts of Mr. Handwerk to secure more examples were in vain until a few weeks ago, when he sent a lot of several thousand specimens from the same creek, containing *P. compressum*, *fallax*, *cruciatum*, *punctatum*, one of the *abditum* group, and a few dozen of the *Pisidium* under consideration, which is now confirmed as a n. sp. and named in honor of its discoverer.

Mussel small, rather rounded in outline, rather high, moderately inflated; beaks moderately large, somewhat papilliform; superior margin strongly, inferior moderately curved; posterior rounded or slightly truncated, anterior end rounded or with a slight indication of an angle; surface with dense, almost regular and sharp striae, and with a silky gloss, tops of beaks smooth and shining, slightly flattened; color of epiconch pale to yellowish horn; shell rather strong, nacre colorless or whitish, hinge stout, strongly curved, plate moderately broad, lateral teeth stout, rather high, short; cardinal teeth small, fine; the right one angular, with the posterior part somewhat thicker, inserted in a longitudinal groove on the hinge plate, formed by a sharp, tooth-like prominence along the lower edge of the plate; posterior cardinal tooth of the left valve rather long, longitudinal, nearly straight, its ends sloping; anterior oblique, quite small, or almost obsolete; ligament rather small.

Long. 2.4, alt. 2.2, diam. 1.7 mill.

Hab.: Lilycash creek, Joliet, Ill. Probably it has been overlooked in materials from other places, owing to its resemblance to immature specimens of some forms of *P. compressum* Pr. When once known it will always be recognized. It also resembles some forms of *P. pauperculum* Sterki in size and shape, but its comparatively coarse striation will distinguish it at once. *Pis. handwerki* is not a showy Pisidium, with striking features, but nevertheless a good species.

New Philadelphia, O., Nov., 1899.

ORIGIN OF THE MUTATIONS OF OSTREA.¹

The oysters are a proverbially difficult group, owing partly to their adherent situs and partly to the fact that they have not hitherto been studied with regard to the direct influence of the environment on individual specimens. That this is very great I have convinced myself from a prolonged study of a multitude of specimens of *O. virginica* of which the provenance was known, and of many hundred specimens of our tertiary species, which usually show from the character of the scar of attachment something of the circumstances in which they grew. The conclusions to which I have been led by this study may be regarded as in part provisional, but in the main highly probable, and as furnishing a first contribution to the sort of study which is essential if we would understand the processes of nature through which these animals acquire their most conspicuous external characters. They may be regarded as especially applicable to the *Crassostrea* group.

Leaving out of account the nepionic characters, the characteristics of the adult shell may be summarized and derived as follows: The most permanent characters of the shell, and the best, if not infallible guide to specific recognition among the puzzling mutations a large series presents, are the form of the hinge-margin, the minute sculp-

¹This interesting extract by Dr. Wm. H. Dall is taken from his review of the Tertiary *Ostreidæ* in the Transactions of the Wagner Free Institute of Science, Vol. III, Part IV, p. 675, 1898. As the original paper deals chiefly with tertiary forms, and is probably not accessible to many interested in recent oysters, we reprint it here.

ture of the superficial layer of the shell (often denuded in otherwise perfect fossils), and the sculpture of the valve-margins near the hinge and on each side of it. While not invariable in all specimens, these characters, taken together, will usually enable one to refer the individual to its proper place.

The characteristics due to situs may be partially summarized as follows: When a specimen grows in still water, it tends to assume a more rounded or broader form, like a solitary tree compared with its relatives in a crowded grove. When it grows in a tideway or strong current, the valves become narrow and elongated, usually also quite straight. Specimens which have been removed from one situs to the other will immediately alter their mode of growth, so that these facts may be taken as established. When specimens are crowded together on a reef, the elongated form is necessitated by the struggle for existence, but, instead of the shells being straight, they will be irregular, and more or less compressed laterally. When the reef is dry at low stages of the tide, the lower shell tends to become deeper, probably from the need of retaining more water during the dry period. Such oysters are the so-called "raccoon oysters," a name which they get from the visits of that animal at low water to feed upon them. The so-called "raccoon oysters" figured in Dr. C. A. White's *Review of the Ostreidæ* (Ann. Rep. U. S. Geol. Survey, 1883, pl. 81-2) are not the reef oysters which first acquired this name, but deep-water specimens which had grown in a place where they were subjected to current action. When an oyster grows in clean water on a pebble or shell, which raises it slightly above the bottom level, the lower valve is usually deep and more or less sharply radially ribbed, acquiring thus a strength which is not needed when the attachment is to a perfectly flat surface which acts as a shield on that side of the shell. Perhaps for the same reason oysters which lie on a muddy bottom with only part of the valves above the surface of the ooze are less commonly ribbed. When the oyster grows to a twig, vertical mangrove root or stem of a gorgonian, it manifests a tendency to spread laterally near the hinge, to turn in such a way as to bring the distal margins of the valves uppermost, and the attached valve is usually rather deep, the cavity often extending under and beyond the hinge margin; while the same species on a flattish surface will spread out in oval form with little depth and no cavity under the hinge.

The average life of the ordinary *O. virginica* when "planted" for sale is about four or five years. In prehistoric times, when the reefs were undisturbed, the favored individual might attain a much greater age; in which case the lower valve especially took on excessive thickness, and the cavity of the shell often became considerably elongated and somewhat hour-glass-shaped, as in *O. contracta* Conr., whose characters in typical specimens are distinctly senile, while younger specimens of the same species have the normal form.

In the hinge of the oyster the resilium occupies the central ridge, while the ligament covers the edge of the depressions on each side of that ridge. The form and relative position of the muscular scar of the adductor is, within certain limits, a useful character, but its depression below the general interior surface of the valve or its occasional elevation above it, as in *Plicatula*, is of no systematic value, being merely a corollary of the rate of growth from the various secreting surfaces. The habit of rapid growth, causing a vesicular character of the shell substance, is more pronounced in some species than in others, and in some specimens of a species than in others; it is rarely the case that this habit (as in *O. percrassa* Conr.) has attained a constancy entitling it to systematic significance.

AN ATTEMPT TO DEFINE THE NATURAL GROUPS OF STROMBUS.

BY GEO. HALCOTT CHADWICK.

(*Pterocera continued.*)

1. Lip armed with *closed spines*,
- a. Within *smooth, orange*,

(*Heptodactylus.*)

Pt. aurantia, lambis, bryonia.

Distr.: Red Sea and Mauritius to Japan, Australia and Polynesia.

- b. Within *wrinkled, violet*,

(*Millipes.*)

Pt. scorpio, pseudoscorpio, millipeda, elongata.

Distr.: Zanzibar and Mauritius to Japan and New Guinea.

2. Lip deeply cut into numerous *open lobes*, within *finely, deeply, regularly grooved.*

Pt. violacea. Indian O., Zanzibar.

The last species is certainly quite distinct, but the other two minor groups are of slight value, the apertural wrinkles being a dynamical feature incipient in *lambis* itself.

GROUP F (*Harpago*.)

Here the *antesinual lobe* gives rise to one of the great claws, a feature unique among living Strombs, and sundering it widely from the previous group, from which Dr. Gill long ago divorced it.

H. chiragra, rugosa.

Distr.: Zanzibar to Japan and Polynesia.

The six groups previously considered agree in the strong and heavy shells, usually of large size, with spreading callus. Those which follow are usually rather small and of lighter structure, and have the inner lip restricted or defined.

GROUP G (*Gallinula*.)

Shell usually light, elegant; *antesinual lobe diminished, lip expanded medially, descending rapidly* from the suture with a broad sinuation; posterior canal narrow, *hugging the spire*; body somewhat flattened in front of the aperture, usually with four or five sagittate color bands; the early whorls with small varicose ribs at intervals.

Contents as given by Tryon, with the probable addition of *S. pulchellus*, which is unknown to me autoptically.

Distribution: Red Sea and Zanzibar to Japan and Polynesia.

S. canarium, isabella.

Red Sea to Japan and Australia.

The last two species, erroneously grouped with the American forms by Tryon, but correctly placed by Chenu and others, are aberrant in their heavier growth, obscure posterior canal and undefined inner lip. These differences, however, hardly seem to warrant the institution of a sub-group.

GROUP H (*Conomurex*.)

Shell *conoid*, often distorted; lip with margin rather straight and incurled, *posterior sinus deep, anterior sinus distinct, oblique, remote* from the canal; inner lip narrow, scarcely defined; color bands sagittate.

S. luhuanus, mauritanus, fasciatus, gibberulus.

Distribution: Red Sea and Natal to Japan and Polynesia.

Forms of *fasciatus* approach closely to the variety *coniformis* of *mauritanus*, and the aperture of the former species is indifferently smooth or finely ridged. It, therefore, becomes necessary to enlarge the group. *S. luhuanus* has the epidermis thickly lamellose, almost velvety. The sagittate bands are more numerous than in the preceding group.

GROUP J (*Canarium*).

Shell small, but solid; *posterior sinus absent*, posterior canal a *slight groove in the calloused angle* at the suture; anterior sinus very near the canal; aperture finely ridged; lip margin with an *external rib*, but not expanded.

S. ustulatus, *dentatus*, *corrugatus* and *var. elegans*, *urceus* (= *floridus*), *hæmastoma*, *helli*, *scalariformis*, *maculatus*.

Distribution: Red Sea to Hawaii and Australia.

In form and sculpture, *S. elegans* is very suggestive of *Rimella*, but the exaggerated canals of the latter genus sufficiently distinguish it.

Sub-group J 2.

Surface smooth or with low vertical folds, *polished*; lip sinus almost *merged into the canal*; body *drawn out*, narrowed. *S. samar* (*bulbulus*, *terebellatus*). Distr.: Japan to Australia and Polynesia.

The last two species are not before me, but apparently they are allied to *samar* and indicate close affinity of this group with the following. The accessory sinuses developed in *samar* must not be confused with the true lip-sinus.

GROUP K (*Seraphs*).

In this group, which need not be redefined, we find the culmination of the features incipient in *samar*. The lip-sinus is broad, basal and merged in the canal. The beautiful color-forms of the single protean living species of "*Terebellum*" inhabit the Indo-Pacific region from Mauritius to Japan and the Fijis.

GROUP L (*Rimella*).

Not studied. The living forms inhabit Chinese and Philippine waters.

GROUP M (*Rostellaria*).

Not studied. Red Sea to China and Moluccas.

The groups above recognized are probably by no means all of equal

rank. Nevertheless, each appears to be clearly distinct from all the others, and no species occur which cannot be at once referred to one or another of them. Whether they may be recognized as genera is mainly a question of personal opinion, but it seems evident to me, as I have intimated in several places, that the extreme forms, such as *Pterocera* and *Terebellum*, to which the older authors have unanimately given generic rank, are in nature more closely allied to the various types gathered into the old genus *Strombus* than the latter are to each other. One more relationship should be pointed out, namely, that apparently existing between groups G, H and J. It remains for the palæontologist and anatomist to verify or correct deductions based on the recent shells alone, and I await their final judgment.

SUPPLEMENTARY NOTES.

Strombus goliath.—Ponderous and distorted specimens of *gigas* are sometimes mistaken for this species, probably because Tryon remarks: "perhaps a variety of *S. gigas*." Not long since, I had the good fortune to find a very fine example of the true *goliath* lying unknown and unhonored in a collection once famous but forgotten. So completely does it differ from all its cousins that none need ever mistake it. Through the munificence of Pres. Jesup, this king of Strombs is now enthroned at last in the American Museum, New York City.

Strombus costatus inermis.—Mr. Frederick Stearns reports "1 live mature shell" of this species from the Loo Choo Islands. Can a form so commonly reported from the West Indies be also living in Oriental waters? Or has an error crept in?

Strombus corrugatus.—I have been led to separate this (above) from *dentatus*, and to consider *elegans* a variety of it, judging by the material at hand. A few other forms, usually considered varieties, are restored to specific rank, merely as an expression of personal opinion.

Distribution: The *Strombinae* occupy two great areas: An American, centering in the West Indies and spreading to Senegal, Brazil, and West America; and an Oriental, apparently centering in the Philippines, reaching to Natal, the Red Sea, Japan, Hawaii and the South Seas, and sending a single species (*granulatus*) into American waters. Europe has no living forms, although rich in fossil ones.

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CHANGES WITH GROWTH OF LITHASIA OBOVATA (SAY).

BY BRYANT WALKER.

Having lately received from Mr. A. C. Billups, of Lawrenceburg, Ind., a package of unsorted material from the Falls of the Ohio, I have been able to trace out the various stages in the growth of this species, which are quite peculiar, and, I believe, have not been described.

The difference in shape between the mature shell and the young is very striking. In the adult, the very large, almost shouldered body, and long, narrow aperture, nearly twice as long as the short, rapidly acuminate and generally eroded spire, is characteristic of the species, and was well described by Say in his original description published in 1829; while the young shell, until it attains the sixth whorl, is almost spindle-shaped, and would be taken at first glance for a young *Goniobasis*; the spire is sharply conical, and longer than the aperture, which is broadly triangular, the long (columellar) side of the triangle being slightly concave.

The manner in which this remarkable change in shape is brought about is as follows:

The first two whorls are smooth and well rounded, and the apex rather obtuse. At about the beginning of the third whorl, a sharp carina is developed on the periphery of the body whorl, which rapidly increases in strength for the next four whorls. During this stage the

junction of the lip with the body whorl is beneath the carina, in some cases a short distance below, so that the carina is well marked on the upper whorls, but usually the lip starts from just under the edge of the carina, so that the side of the spire is almost straight, the edge of the carina projecting but very slightly, if at all, beyond the surface of the adjoining whorls; the aperture is decidedly triangular, both extremities being acutely angled, and the lip itself is sharply bent in the centre where the carina appears.

At about the beginning of the fifth whorl, the lip ascends and crosses the carina, and from thence, until it finally disappears altogether, the carina emerges from the upper part of the aperture. This change in the relative position of the lip and carina induces a radical change, not only in the shape of the lip, but of the whole shell. The lip, in order to clear the carina, becomes broadly rounded above and curves in rapidly to meet the body whorl at almost a right angle, forming a deep channelled suture, while the body whorl becomes more ventricose, more or less shouldered, and rapidly increases in size.

For about a whorl after the change takes place, the carina retains its size and position, but after the sixth whorl is reached it gradually diminishes and finally disappears entirely, although the body whorl at all subsequent stages of growth is more or less flattened in its upper part.

With the disappearance of the carina, the shell rapidly assumes its mature form and, with the usual erosion of the apical whorls, becomes the short, stout, heavy specimen customarily seen in collections.

NOTE ON THYSANOPHORA HORNII GABB.

BY HENRY A. PILSBRY.

My attention has been called by Mr. Geo. H. Clapp, of Pittsburg, to the fact that some specimens of *Thys. hornii* show very fine delicate cuticular riblets, more or less uneven at their free edges, and running much more obliquely than the growth-lines, on the surface of the last whorl.¹ This is usually obscured by the thin coat of earth which encrusts the shell, and which it is evidently the function of

¹This structure has been lucidly described by Dall, Proc. U. S. Nat. Mus. xix, 1896, p. 336.

these riblets to collect. Only a good lens reveals this sculpture, and in specimens which have been collected dead, or cleaned by ordinary methods, it is usually lost. Still, a sufficiently patient examination will generally show some trace of it somewhere on most specimens. *Thys. conspurcatella*, of eastern Mexico, the type of the genus, has similar cuticular riblets, but they are more widely spaced and rather more persistent.

In young and half-grown shells, if perfectly preserved, the riblets bear rather sparsely scattered and long hairs, very delicate and easily rubbed off. I do not know that adults ever retain them; though in several Mexican species such hairs occur on the full-grown shell, and many West Indian species bear close bristles.

The foregoing observations are based upon the entire series of specimens in the collection of Mr. E. H. Ashmun, which he most liberally sent me for examination, and those in the collection of the Academy, including Gabb's types.

The published figures and descriptions of this species leave much to be desired. Gabb gives quite a good description, though none of his specimens show $4\frac{1}{2}$ whorls, as he states. The dimensions, "height .09, greatest diam. .16, smallest diam. .13 inch" = $2\frac{1}{4}$, 4, $3\frac{1}{4}$ mm., are in a rough way accurate. The figures are bad.

Binney's figures (Man. Amer. L. Sh., p. 169, fig. 159) are too narrowly umbilicated, the spire is too conic, and the terminations of the lip do not approach enough. Moreover, they do not indicate the surface-sculpture. The whorls are described as "scarcely convex" whereas they are unusually so; the ends of the peristome are said to be "hardly approaching" while they actually converge so as to nearly meet in adult shells. The dimensions, "greater diam. 4, lesser $3\frac{1}{3}$, height 1 mm." are erroneous, the largest in Gabb's type lot measuring 4 mm. in greatest, 3.5 in least diameter, with a height of 2.6 mm. An adult specimen from Jerome, Arizona, collected by Mr. Ashmun, measures: diam. 3.5, alt. 2.3 mm.

Gabb's types were from "Fort Grant, at the junction of the Arivapa and San Pedro rivers," in Graham Co., southeastern Arizona.

Mr. Ashmun has collected specimens in the following localities: Jerome, Patagonia Mts., Crittenden, Prescott and Nogales, Arizona, and Cook's, New Mexico. The International Boundary Commission collected *hornii* at the summit of Hachita Grande Mt., Grant Co., N. M., and Dall mentions seeing the species from the drift of the Yaqui River, Mexico. No other localities are known for the species.

A NEW SPECIES OF CAPULUS FROM CALIFORNIA.

BY W. H. DALL.

Mrs. T. S. Oldroyd, of Los Angeles, Cal., recently sent me a species of *Capulus* which appears to be new, and which adds to the fauna of California a genus not hitherto known to belong to it.

***Capulus californicus* n. sp.**

Shell only moderately elevated, oval or more or less conformable with the object upon which it roosts, the apex small, somewhat laterally compressed, incurved almost symmetrically, nearly concealing the smooth, one-whorled nucleus, situated near the posterior margin; surface nearly smooth, somewhat irregular, mesially with small faint radial not very close-set ridges, covered with an imbricated dense soft glistening periostracum which projects beyond the margins; interior polished, white, with faint rosy rays extending from the apex to the anterior margin; Alt. 10, lon. before the apex 30, behind it 5.5, total basal length 36.5, average width 29 mm.

This fine shell was found on the flat valve of *Pecten diegensis* Dall (*floridus* Hinds non Gmelin), in 20 to 25 fathoms off San Pedro, California.

Carpenter reported some fragments of *Capulus* from Mazatlan, but these were not really sufficient to establish the presence of the genus. The present species is related to *C. calyptra* Martyn, of Japan, and *C. hungaricus* of the northeast Atlantic. It is less elevated than either, the sculpture is much fainter than in *C. hungaricus* and the apex is less conspicuous, more posterior and less coiled.

I have several times received a small shell collected among kelp roots and variously mottled or tinted with purple or reddish-brown and yellow. A very young specimen of this kind was described by Carpenter under the name of *Psephis tellinialis*. It is not a *Psephis* but has the characters of *Petricola*. I have suspected for a long time it was the young of *P. carditoides*, but have not yet seen enough material to make this certain, and therefore suggest that Pacific coast students should endeavor to solve the problem.

MOLLUSCA ASSOCIATED WITH MASTODON REMAINS.

I have received from Dr. Arthur Mead Edwards, the well-known microscopist of Newark, N. J., certain Molluscan forms for deter-

mination. It will be noticed, they are all common fresh-water species. The first lot includes *Planorbis parvus*, *P. campanulatus*, *Linnæa humilis*, *Physa heterostropha*, *Valvata carinata* and *V. sincera*; all of the above Say's species. The foregoing are from the "fossiliferous sands overlying the clays of Essex county," Ontario, Canada ("Pleistocene"), and are associated with Mastodon remains.

They were collected in 1897 by Dr. Henry M. Ami, of the Canadian Geological Survey, and sent to Dr. Edwards by the collector, presumably with microscopic material.

In the second lot, there is only the single species *Planorbis parvus* Say; this was found associated with Mastodon remains at Newburgh, N. Y., by F. W. Schaffler (in 1899), who sent the examples to Dr. Edwards. Of the species named herein, *P. parvus* and *L. humilis* exhibit a wide distribution in the past as well as in the present times. Both of these are reported as occurring living, and fossil, in the Lahontan and Bonneville areas of the Great Basin; *P. heterostropha*, living in both, but semi-fossil only in Bonneville. *V. sincera* credited to Salt Lake, living, by its collector Henry Hemphill, is represented as a semi-fossil in the Bonneville area by Call's var. *Utahensis*. The occurrence of living examples in either of the areas mentioned, is not noted in Call's list of Great Basin mollusca.¹ While *L. humilis* is everywhere, east and west, north, and pretty widely dispersed towards the south, *P. campanulatus* has a much more restricted range and has yet to be reported west of the Rocky Mountains.

I have to thank Mr. C. W. Johnson of the Wagner Free Institute for kind attention connected with the above.

ROBT. E. C. STEARNS.

Los Angeles, Cal., October, 1899.

DREDGING IN SAN DIEGO BAY.

BY F. W. KELSEY.

The use of the dredge has afforded me a great deal of pleasure, while furnishing me with a goodly amount of wholesome physical exercise so much needed by those following sedentary occupations, and the specimens thus obtained add largely to my local collection.

While working in the bay I use a dredge cutting but 14 inches,

¹ Bulletin No. 11., U. S. Geographical Survey.

operated from a roomy, flat-bottomed skiff propelled by oars, and I do most of my work alone, during the early morning hours while the water is quiet. The dredgings are carefully worked over while resting between "pulls," and when I am ready to return home the results of my day's work are, so to speak, "all in a nutshell."

In from 2 to 5 fathoms on mud bottom I find *Marginella pyriformis*, *Marginella regularis*, *Myurella simplex*, *Drillia hemphilli*, *Eulima micans*, *Eulima rutila*, *Thracia curta*, *Mactra californica* (young), *Olivella boetica*, *Angulus modestus*, *Angulus variegatus*, *Angulus obtusus*, *Dentalium neoheptagonum*, *Lyonsia californica*, *Mangelia angulata* and *Cadulus nitentior*.

As we go toward the channel the depth increases and the bottom is a mixture of sand and mud. Here in from 5 to 8 fathoms we find *Yoldia cooperi* (young) and *Leda taphira*.

The channel proper ranges from 8 to 14 fathoms and the bottom generally consists of coarse, yellow sand and decomposed and broken shells, among which we find both live and dead specimens of *Semele pulchra*, *Corbula luteola*, *Isapis fenestrata*, *Isapis obtusa*, *Caecum californicum*, *Caecum crebricostatum*, *Scala hindsii* and *Aesopus chrysalloideus*.

Scattered among the above species, we find many stray specimens of such shells as *Nassa perpinguis*, *Nassa cooperi*, *Nassa mendica*, *Nassa tegula*, *Calliostoma tricolor*, *Calliostoma gemmulatum*, *Calliostoma canaliculatum*, and many other species which are generally found upon the low flats at low tides and which are scarcely worth mentioning as dredge species. I find that for dredging in shallow waters a dredge made of galvanized iron without any net but having a screen bottom produces as good results as any, and is much more easily manipulated.

A LIST OF SHELLS FROM NORTHEASTERN MAINE.

BY OLOF O. NYLANDER, CARIBOU, MAINE.

The following is a list of land and fresh water shells collected in the northeastern part of Maine, principally along the Aroostook and Fish Rivers.

Valuable assistance has been received from Prof. H. A. Pilsbry and Mr. Bryant Walker.

All the Pisidia, and nearly all the minute land shells have been

critically examined by Dr. V. Sterki, without whose generous assistance it would have been impossible to determine the many small species.

There is some additional material in the hands of Dr. Sterki, which when straightened out will probably add a number to the list. Most of the species are distributed over the whole area, and the names of localities are only cited in referring to species that are very local in their distribution.

In this list are included a number of species that have been cited as doubtful in Maine, and the new species recently collected by me.

LIST OF SPECIES.

- Acanthinula hurpa* Say. One specimen at Fort Kent.
Vallonia pulchella Müll. Gardens in Caribou and Presque Isle.
Vallonia excentrica Sterki. Rare, Caribou.
Polygyra albolabris Say. Not common.
Polygyra Sagii Binn. Well distributed.
Polygyra dentifera Binn. Rather common.
Polygyra monodon Rackett. Common in some localities.
Strobilops labyrinthica Say. Plentiful in this region.
Strobilops virgo Pils. Rare (identified by Dr. V. Sterki).
Bifidaria pentodon Say. "Resemble *curvidens* more than any others I have seen" (Sterki). Near Caribou stream, Woodland.
Vertigo ventricosa Morse. Plentiful in some localities.
Vertigo ventricosa elatior Sterki. Common along streams, in Woodland, Caribou and New Sweden.
Vertigo bollesiana Morse. Rare; collected in woodland.
Vertigo Gouldii Binn. Not very abundant.
Vertigo Gouldii paradoxa Sterki. "Fine examples with the two palatal folds continuous and one angular" (Sterki). Woodland, rare.
Cochicopa lubrica Müll. Houlton, Presque Isle, Caribou, Fort Kent and Portage Lake, abundant in these localities.
Vitrina limpida Gld. Caribou and Presque Isle, found in large numbers this summer at Fort Kent.
Vitrea hammonis Strom. Fairly distributed.
Vitrea Binneyana Morse. Little Madawaska Lake and along Caribou stream in Woodland and Caribou.
Vitrea ferrea Morse. In company with *V. Binneyana*. These species are rarely found.
Comulus fulvus Mull. Everywhere.

Zonitoides arboreus Say. Common everywhere.

Zonitoides exiguus Stimp. Fairly common.

Zonitoides milium Morse. Quite rare. Woodland.

Pyramidula alternata Say. Common.

Pyramidula alternata alba. One living specimen obtained in the north of Woodland.

Pyramidula striatella Anth. Plentiful.

Pyramidula striatella? var. Shell greenish-white, animal nearly white. Can this be *Patula cronkhitei* Newc.? It is about the same size as *P. striatella*.

Pyramidula asteriscus Morse. Caribou, Woodland and Madawaska Lake. Rare.

Helicodiscus lineatus Say. Widely distributed, nowhere abundant.

Punctum pygmaeum Drap. Rare.

Sphyradium edentulum Drap. Well-distributed.

Succinea obliqua Say. Common everywhere.

Succinea ovalis Gld.

Succinea avara Say. Common in wet places on lake shores and river flats, together with *S. ovalis*.

Carychium exiguum Say. Very abundant in wet places everywhere.

Carychium exile Lea. Not common; found with *C. exiguum*.

Aplexa hypnorum Linne. In ditches along the roads in three different places in Woodland; specimens abundant.

Physa heterostropha Say. Common in all streams.

Physa ancillaria Say. Only seen at Square Lake Inlet.

Limnaea emarginata Say = *ampla* Mighels and *Limnaea emarginata* Mighels, Binn. From Cross Lake, Square Lake, Portage Lake, Fish River, Saint John River, at Fort Kent and Aroostook River.

This is an extremely variable species, Caribou individuals differ greatly in every locality.

Limnaea desidiiosa Say. Aroostook River, Caribou stream, Salmon Brook.

Limnaea humilis Say. Common in damp places and ditches along the roads.

Planorbis trivolvis Say. Common in Barren Brook, Caribou. In Caribou Lake, Washburn, and in nearly every small lake I have seen in Aroostook county, fine specimens can be obtained.

Planorbis campanulatus Say. Cross Lake, Square Lake, Eagle Lake and Portage Lake.

Planorbis bicarinatus Say. Aroostook River, Fish River and Saint John River.

Planorbis bicarinatus aroostookensis Pils. East branch of Salmon Brook, Woodland, and Caribou stream, in Caribou.

Planorbis hirsutus Gld. Common and widely distributed.

Planorbis deflectus Say. Salmon Brook Woodland, rare; Portage Lake.

Planorbis parvus Say. Common in brooks and lakes.

Planorbis exacutus Say. Portage and Square Lakes; rare.

Planorbis crista Linné, var. *cristata* Drap. Barren Brook, Caribou. This species was recorded in THE NAUTILUS, Vol. X, page 117, by Mr. Bryant Walker as *P. nautileus* Linne. Mr. A. W. Hanham, on page 130, and Geo. W. Taylor, on page 139 of the same volume use the name of *P. nautileus*. Dr. v. Sterki and Prof. H. A. Pilsbry say "it is *Planorbis crista* Linné, var. *cristatus* Drap. It occurs in northern Europe."

Ancylus rivularis Say. Caribou stream, Collin's Millpond, very large specimens.

Ancylus parallelus Hald. Cross Lake and many smaller lakes and streams.

Ancylus ? Madawaska River, New Sweden.

Ancylus tardus Say. Aroostook River, Caribou.

Ancylus borealis ? Morse. Saint John River, Fort Kent. Mr. Bryant Walker says it is identical with this rare form.

Valvata tricarinata Say. Little Madawaska River, New Sweden and the Fish River Lakes.

Valvata sincera Say. Dredged in the Fish River Lakes.

Campeloma decisum Say. Widely distributed throughout Aroostook and Fish Rivers. Four young *sinistral* shells were taken from a normal dextral female from Portage Lake.

Ammicola limosa Say. Common everywhere, and very variable in form. In my former article in THE NAUTILUS, Vol. xi., p. 10, it is called *Pomatiopsis*.

A. Cincinnatiensis Lea.

Unio complanatus Sol. Lakes and streams; common.

Margaritana margaritifera Linné. Aroostook River.

Margaritana undulata Say. Lakes and rivers.

Anodonta fragilis Lam. Generally distributed, some very large specimens in the muddy bottom of Salmon Brook Lake. Perham.

Sphærium simile Say. Generally distributed.

Sphærium striatinum Lam. Fish River and Saint John River at Fort Kent.

Sphærium rhomboidum Say. Fine specimen in *Gelot Lake*, New Sweden, and all the smaller lakes of the Little Madawoska river system.

Calypulina securis Prime. Aroostook River.

Calypulina securis cardissa Prime. Square Lake and other localities.

Pisidium abdutum Hald. Common.

Pisidium adamsi Prime. Cross Lake Inlet.

Pisidium æquilaterale Prime. Portage Lake. Little Madawaska River.

Pisidium contortum Prime. Rear Mud Lake, Perham and Westmoreland.

Pisidium compressum Prime. Generally abundant.

Pisidium ferrugineum Prime. Fogelin Lake, New Sweden and many other localities.

Pisidium fallax Sterki. Aroostook River.

Pisidium fallax boreale Sterki. Aroostook River at Caribou and Little Madawaska River, New Sweden.

Pisidium milium Held. South branch Caribou Stream, Woodland and Sawyer's Brook, Castle Hill.

Pisidium medianum minutum Sterki. Hacket's Mill Brook, a tributary of Caribou Stream in the northern part of Woodland.

Pisidium pauperculum Sterki. Little Madawaska River.

Pisidium pauperculum nylanderi Sterki. Dredged in Portage Lake.

Pisidium politum Sterki. Portage Lake and Cross Lake.

Pisidium punctatum Sterki. Portage Lake, Little Madawaska River.

Pisidium roperi Sterki. Johnson Brook on the Fort Kent road and north of Perham.

Pisidium splendidulum Sterki. Barren Brook, Caribou and many other localities.

Pisidium ventricosum Prime. Barren Brook, Caribou.

Pisidium variabile Prime. Common everywhere.

Pisidium walkeri Sterki. Barren Brook, Caribou.

Pisidium walkeri mainense Sterki. Hacket's Mill Brook, Woodland and many other localities.

SOME ZONITIDÆ COLLECTED BY J. H. FERRISS IN ARKANSAS AND
THE CHOCTAW NATION.

BY HENRY A. PILSBRY.

Some account of shells collected by Mr. J. H. Ferriss in Arkansas and Choctaw Nation was published in THE NAUTILUS for August of this year. A series of *Zonitidæ* collected at the same time affords some interesting data. *Vitrea simpsoni* (Pils.) was taken at Poteau, in the eastern part of the Choctaw nation on Poteau river, near the State of Arkansas. It resembles *V. capsella*, but differs in the triangular form of the aperture.

Gastrodonta demissa, typical, was taken in Arkansas near Texarkana, and at Tushkahomma and Poteau in the Choctaw Nation.

At both Tushkahomma and Poteau a form having the characteristic lens-shaped contour, brilliant gloss and basal striation of *demissa* occurred, differing from *demissa* in having a long and strong lamella within, like the outer lamella of *G. gularis*. There is no trace of an inner or columellar lamella, such as *gularis* and *suppressa* generally show, and the general form of the shell is entirely that of *demissa*, quite unlike *suppressa*. The umbilicus is a small round puncture, as of a pin stuck through a sheet of paper, quite as in typical *demissa*; and the periphery is subangular. In *G. suppressa* the periphery is well rounded and the umbilicus larger. This variety may be called var. *lamellata*. It is most interesting as connecting the *gularis* group with the *ligera* group of *Gastrodonta*.

The form I described some years ago as *Zonites brittsii*, from Hot Springs, Ark., belongs also to *demissa*, from which it differs in the imperforate axis, and very slight excavation of the base in the center.

A NEW AMERICAN LAND SHELL.

BY HENRY A. PILSBRY.

Polygyra uvulifera bicornuta n. v.

Shell differing from the typical *P. uvulifera* (the type locality of which is Long Key, above mouth of Sarasota Bay), in being less depressed, the last whorl strongly grooved within the umbilicus, the aperture everywhere more contracted; parietal margin of the peristome strongly elevated, produced in *two erect processes* or "horns," one at the junction of outer lip and parietal lip, *another upon the parietal lip near its inner termination*, situated like the corresponding lobe

of *P. auriculata*; a conspicuous pit penetrates under the parietal fold. Striation fine but regular and equally developed above and below. Size about that of typical *uvulifera*.

Alt. $6\frac{3}{4}$, greatest diameter $14\frac{1}{2}$ mm.

Alt. 6, greatest diameter 14 mm.

Alt. $6\frac{1}{3}$, greatest diameter 13 mm.

Aripeka, Hernando Co., Fla. (Mr. Geo. Pine); Hernando Co. and Longwood, Fla. (Mr. Van Hyning's coll.).

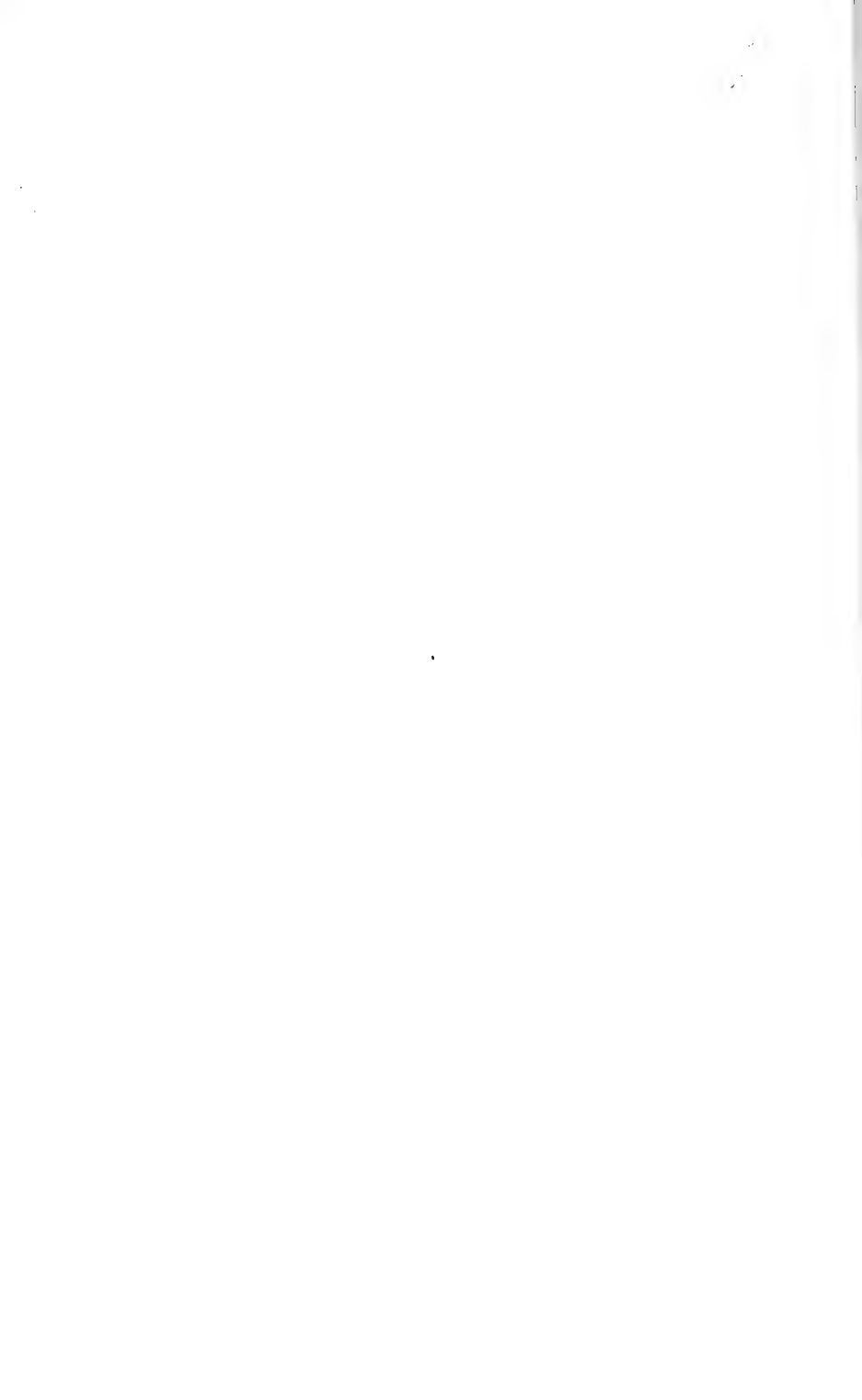
This form resembles *P. auriculata* at first sight, but the deep notch in the basal lip near its inner end, and the peculiar, flat, forward-running inner end of that lip, as well as the strong semicircular ridge on the parietal margin, one end of which enters the deep notch mentioned, the other forming the lower border of the main parietal fold—all ally it rather to *P. uvulifera*. In *P. auriculata* there is no such notch in the basal lip, and the inner end of the latter is attenuated, not flattened and bent forward. It is an interesting intermediate form.

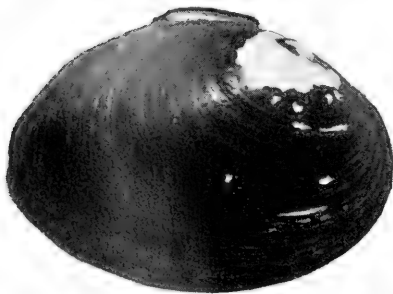
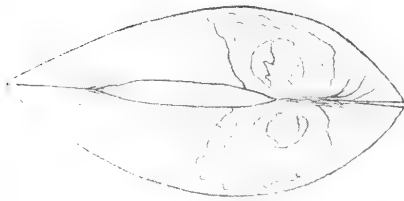
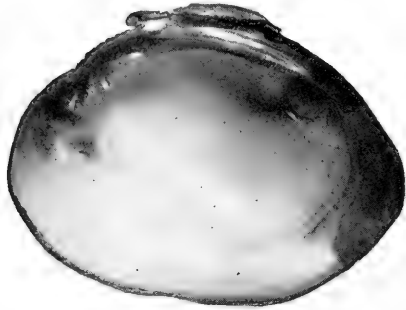
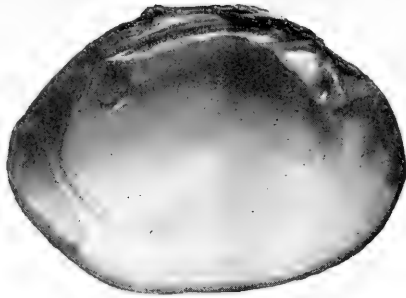
P. uvulifera varies a good deal in texture, color, size and striation, the largest and most solid shells before me being from Long Key, the type locality, where they are nearly smooth, the striation obsolete; diam. 13–14 mm. I have seen a great many specimens from both sides of the peninsula and the keys, but saw no variation toward the variety described above.

In most localities *P. uvulifera* diverges from the "historic type," as found on Long Key, in being less chalky, and decidedly more strongly striate, the striae thread-like. The size varies with locality. Thus at Miami, where it is numerous about a mile up the river on the south side, they measure 9 to $10\frac{1}{2}$ mm. diameter. They occur here under stones (limestone) in a hot, sparsely-wooded plain exposed to the sun, in company with *P. cereolus carpenteriana*, *Urocoptis*, *Macroceramus* and *Chondropoma* with an occasional *Vaginulus*, and moderate numbers of large black scorpions and tarantulas. At Palm Beach they are much larger, diam. $12\frac{1}{2}$ –13 mm., and here the soil is sandy, and the forest luxuriant.

Mr. Pine sent numerous specimens of *uvulifera* from Hernando Co. which differ from the Long Key types in being strongly striate and smaller. They are more narrowly umbilicated than *P. uvulifera bicornuta*, with the opening rather less contracted, the umbilical groove on the last whorl generally less strong, and they want the accessory "horn" of the parietal margin. They are also more coarsely striate, and may be separated from young or immature *bicornuta* by the narrower umbilicus. I do not know whether these occur with the variety or at separate stations. The largest sent measures 12 mm. diameter.

P. auriculata extends some distance down the east coast, and over to the middle of the State in the lake region. I have never seen it from the west coast counties, and would be glad to have data on its occurrence there if it has been found.





UNIO HAGLERI FRIERSON.

THE NAUTILUS.

VOL. XIII.

FEBRUARY, 1900.

No. 10.

A NEW ALABAMA UNIO.

BY LORRAINE S. FRIERSON.

Plate II.

Unio (Leurobema) Hagleri.

Shell smooth, elliptical, unequilateral. Length, 2.1. Height, 1.6. Diameter, 1 (inches). (Dimensions are of a medium-sized shell; they are sometimes larger.)

Beaks low; umbos somewhat inflated; umbonal slope rounded. Epidermis dark reddish brown, striate, rayless. Lines of growth numerous and well impressed. Nacre white, rarely rose, frequently spotted with green, iridescent in posterior. Teeth double in left valve, single in the right. The anterior sinistral cardinal tooth is wedge-shaped, and nearly squarely cut off on top. Its axis is inclined at an angle of about 75° with that of its fellow, which is low, thick and triangular. The laterals are stout and slightly curved. Dorsal plate rather large. Muscle scars frequently confluent in front. Distinct behind and well impressed. Pallial scar well impressed in front, fainter behind.

Cavity of the beaks shallow. Cavity of the shell excavated from the region of the beaks toward the posterior margin. The shell varies in form from an almost perfect ellipse (lower figure) to a form swollen in the post-basal region (upper figs.) similar to the females of *Lampsilis*. But there is no good reason to suppose this a sexual character.

Habitat, North River, Alabama, near Tynes. Examples may be seen in the National Museum and in the cabinet of Mr. W. A. Marsh, of Aledo, Illinois, and in my own. Thirty specimens received. The shell is allied distinctly to *instructus* Lea, and also to *rubellus* Conrad, and to *trochelianus* Lea. Some of them remind one of *fassinans* Lea.

From *rubellus* Conrad it may be distinguished by being longer, not so stout or inflated. It need not be confounded with the other shells named, as it differs from them entirely, although allied. It is named for the collector. Figured specimens are deposited in coll. Acad. Nat. Sci., Phila.

SPECIES OF CHLOROSTOMA OF SOUTHERN AND EASTERN PATAGONIA.

BY HENRY A. PILSBRY.

The genus *Chlorostoma* is essentially Pacific, being chiefly developed upon the Pacific shores of Asia and North and South America. The former open strait between the Americas allowed it to spread to the Antillean region and eastern shores of the United States, where a number of species have existed from the tertiaries to the present time. A few forms also found their way around Cape Horn. The species have been generally divided between two genera, *Omphalius*, including the umbilicate forms; but this division is purely artificial and unnatural, very closely allied species being separated by it. It would be better to drop *Omphalius* into the rubbish-heap of synonymy. The etymology of *Chlorostoma*, "green mouth," is not very appropriate to most of the species.

There are no species of the genus known from European or African seas. On the eastern coast of South America, south of Brazil, the following occur:

Chlorostoma patagonicum (Orbigny).

Trochus patagonicus Orb., Voy. dans l'Amér. Mérid., Mollusques, p. 408, pl. 55, f. 1-4 (1835-1846).

Trochus corrugatus Koch in Philippi, Abbild. u. Beschreib, etc., I, *Trochus*, pl. 2, f. 7 (Nov., 1843).

This species was found by d'Orbigny in the Bay of San Blas, Patagonia; Philippi gives the locality Brazil. Dr. Wm. H. Rush collected a few specimens in Maldonado Bay, Uruguay. The sculp-

ture is very fine grained, the suture narrow but deeply plowed, and the columella armed with two or three small denticles at the base, as in the genus generally. The outer lip is weakly grooved within on the thick part near the margin. The deep umbilicus readily separates this species from the following form.

The exact date of d'Orbigny's publication of this species is not known to me.

Chlorostoma Hidalgoi n. sp.

Shell very similar to *Chlorostoma patagonicum* Orb., (*Trochus corrugatus* Koch), but wholly imperforate, the umbilical region covered with a white callus. Fleshly-cinereous, with the apex eroded, white. Sculpture of crowded spiral series of small, irregular granules, similar to those of *C. patagonicum*. Spire conic, periphery rounded, the base flattened. Aperture very oblique, somewhat triangular; columella armed with two small teeth at its junction with the basal lip.

Alt. 15, diam. 17 mm.

“Rio Negro, Patagonia,” coll. A. N. S. P.

This form differs conspicuously from *C. patagonicum* Orb. (*corrugatus* Koch) in the completely imperforate axis, the other species being conspicuously umbilicated at all stages of growth. *C. Hidalgoi* is also more conical. In color, sculpture, and the deeply scored suture, the two species are extremely similar.

It is named in honor of the author of the *Moluscos del Viaje al Pacifico*, a meritorious work on the South American fauna.

Chlorostoma Orbignyanum, n. sp.

Shell imperforate, conic, with flattened base; purplish-gray, with blackish spirals above, black below. Surface dull, sculptured with numerous low spiral liræ, several below the suture obscurely beaded, the others nearly smooth; the liræ near the suture separated by narrow intervals, those toward the periphery more widely spaced, with one or several interstitial threads in each interval. There are about 10 liræ on the penultimate whorl, and 10 below the periphery on the base. Whorls 5, very convex, separated by deep sutures, the last whorl flattened below the suture, obtusely angular at the periphery; the base free from spiral sculpture in the center, eroded and brilliantly pearly in front of the aperture. Aperture very oblique, pearly within, with a rather wide dull border within the thin outer lip, acute; columella short, concave, porcellanous, terminating in a small tubercle below, adjacent to which there is a minute denticle;

umbilical region somewhat calloused, the place of the umbilicus marked by a moderately sunken pit, surrounded by a weak spiral rib which terminates in a faint denticle at the junction of the columellar and basal margins of the peristome. Alt. 14, diam. $16\frac{1}{2}$ mm.

Beagle Channel, Patagonia (Dr. H. von Ihering).

This species (No. 1020 of von Ihering's register) is obviously unlike the forms of eastern Patagonia, and there is nothing like it in Mabilie and Rochebrune's work on Cape Horn mollusks. Of the Chilian species, it is allied only to *C. fuscescens* Phil.,* but in *C. Orbignyana* the whorls are more convex, the prevailing color black, and it is imperforate.

ON A COLLECTION OF FRESH-WATER SHELLS FROM RHODE ISLAND.

BY FRANK C. BAKER.

During the month of July, 1899, the writer made a collection of marine and fresh-water shells in the state of Rhode Island, and a list of the fresh-water species may be of interest. Collections were made at the following places:

1. Nayatt, R. I. A small pond between the railroad depot and the bay. The bottom is made up of soft, black, carbonaceous mud, and the shores are lined with dead leaves and twigs.

2. Newport, R. I. Bailey's Pond, near Bailey's Beach. A pond of good size and considerable depth, bordered by cat-tails.

3. Providence, R. I. Cat Swamp. A small clear stream, flowing through a flag-swamp. The numbers after the species indicate the above localities.

Calyculina partumeia Say. 1, 2. Common.

Calyculina truncata Linsley. 1. Common.

Calyculina securis Prime. 2. Not common.

Pisidium, near *abditum*, but possibly *P. lens* Sterki. 1. Common.

Pisidium splendidulum Sterki. 1, 2. Not common.

Limnæa palustris Müller. 3. Common.

Planorbis trivolvis Say. 2, 3. Common.

Planorbis deflectus Say. 1. Common.

Planorbis parvus Say. 1, 2, 3. Common.

* Conchylien Cabinet, *Trochus*, p. 182; Man. of Conch., XI., *Trochidæ*, p. 181.

Segmentina armigera Say. 1, 2. Common.

Physa heterostropha Say. 1, 2, 3. Common.

Aplexa hypnorum Linné. 2. Common.

Campeloma decisum Say. 1. Apparently not common.

My thanks are due to Dr. V. Sterki for determining the *Pisidia*.

JOHN H. THOMSON, PH. D.

The subject of this memoir was born in Westport in 1824, and died in the city of New Bedford, Mass. (but a few miles from his birth-place), July, 1896, aged 71. He had the usual public school and academic education of the time. In early life, like so many New England coast town boys, he took to the sea, and soon reached the post of master. He spent some years in California and South America, and returning to New Bedford, he settled there for life. He developed an early fondness for natural history, and in this, finally narrowed down to the science of conchology. He at once became fascinated with the subject, and spared no time, pains, or money in his enthusiastic determination to master his subject. He was fortunate at this juncture to fall into the hands of so capable and sympathetic an instructor as Dr. Augustus A. Gould, to whom he ever felt grateful for giving him a fuller and clearer insight into the delicate minutiae, so essential in describing many species and varieties of shells. By this association he was greatly aided and stimulated in his subsequent pursuit and study. He soon became known as a most conscientious and reliable student of conchology, and soon made many friends; his correspondents were among the most noted of his time, in both hemispheres. He obtained and carefully studied the works of the leading conchological authorities, without regard to price, although he was never a rich man.

As a collector, his success in securing species from remote parts was really phenomenal. He sold his earliest and largest collection, during the Franco-Prussian war, to an institution, I think, in Belgium, but through the misfortunes of war it was in some manner confiscated, and so the purchaser lost his prize. His later and last collection is owned by the writer of this article. Among the many societies of which Dr. Thomson was a member, two stand pre-eminently conspicuous, The Zoölogical Society of London and the Academy of Natural Sciences of Philadelphia. I am credibly in-

formed the degree of Ph. D. was bestowed upon him by Columbia College of New York City.

Among his published articles is a monograph on the Terrestrial Mollusca of his native county. He was a most careful and painstaking worker in his chosen field, and was an acknowledged authority among his peers. The doctor was a most delightful companion, and the many hours he spent in my family are remembered and cherished with keenest pleasure. To that noble band of pioneers in conchological study and labors in the United States (of whom, alas, so few survive) we offer our most grateful thanks, and to the departed write, *Requiescat in pace.*

A. B. KENDIG.

Brookline, Mass., Dec. 19, 1899.

NEW SPECIES AND SUBSPECIES OF AMERICAN LAND SNAILS.

BY HENRY A. PILSBRY.

Pyramidula alternata rarinotata n. v.

Similar to the typical form in size, form and sculpture, but very sparsely marked with comparatively small chestnut spots on a pale brownish-corneous or dirty buff ground; streaks on the base nearly obsolete.

Caldwell, Fayette and Jackson counties, Texas.

Mr. Bryant Walker called my attention to this form, sending specimens from Caldwell and Fayette counties, collected by Mr. J. A. Singley; and I find in the collection of the Academy some specimens sent me by Hon. J. D. Mitchell, from the Navidad River bottom, Jackson co.

Zonitoides neomexicanus Cockerell & Pilsbry, n. sp.

Shell minute, depressed, in form similar to *Zonitoides minusculus*; whitish corneous, somewhat translucent, fragile, the umbilicus wide, its width contained $2\frac{1}{2}$ times in the greatest diameter of the shell. Surface marked with very fine but rather sharp growth striæ, and crowded, microscopic spirals throughout, the spirals conspicuous to the apex. Whorls $3\frac{1}{2}$, quite convex, the last everywhere well rounded. Aperture round-lunate, the penultimate whorl excising about one fourth the circumference of the peristome; lip thin and acute, a little dilated at the columellar margin.

Alt. nearly 0.8, greatest diameter 1.7 mm. Another specimen is slightly larger, diam. about 2 mm.

Dripping Spring, Organ Mts., New Mexico, about 5,700 feet alt., Sept., 1899, coll. by T. D. A. Cockerell.

This species differs from all the *minusculus* group in being conspicuously though very minutely striate spirally, the striae extending to the very apex, as in the southern race of *Zonitoides milium*. It differs from *milium* in wanting the peculiar wrinkle-sculpture so characteristic of that form. *Z. exiguus* is evidently a nearer cousin of the new form, having a similar system of spirals, likewise extending upon the nepionic whorl, but it is larger, with less broad umbilicus, and a conspicuously different coarser sculpture of oblique laminae. *Zonitoides neomexicanus* may well go between *exiguus* and *milium* in the list of species.

FIELD NOTES AND REMINISCENCES.

Mr. Simpson's entertaining account of *Helicina Dysoni* under difficulties, in the June, 1897, NAUTILUS, is exceedingly entertaining; the shower of Helicinas that followed the stirring up with a pole was decidedly unique, the first of the kind on record, for though "raining cats and dogs" is an old story, a shower of snails, like *snailing with a pole*, is a new departure. As an humble disciple of Izaak Walton, I have in years gone by done considerable in the way of *fishing with a pole*; the man that goes snailing with a pole will bear watching—by the snails. The special habitat or station of *H. Dysoni*, roosting in the palms, brought to mind what my friend, the late Henry Edwards, well known as a good entomologist, good actor and a good fellow, told me about the habits and habitat of the curious *Helix (Paryphanta) Busbyi* collected by him in New Zealand. (The specimens he gave to me are now in the U. S. National Museum.) *Helix Busbyi* lives in the tops of the tall Kauri pines, hiding in the axils where the birds "go for him." In order to separate the soft parts, which they want, from the shell, which they do not want, they seize the animal when protruded from the shell and whack away to the right and left against the twig or branch they are perching on until their purpose is accomplished, when the shell drops to the ground, and is found generally in a battered condition. The Maoris have a name for these shells which signifies that they come from heaven, which is probably a mistake.

When in Florida, in 1869, on Long Key, one pleasant morning I noticed several specimens of *Polygyra septemvolva* here and there on the sand. "All dead," I said to *myself*, lest the snails might hear me, "there must be fire where there is so much smoke, there must be live snails where there are so many dead ones," so I started in to hunt close. After a while I detected them snugly lurking in the axils of some very large thistles. I did not gather them in, as Simpson did, when on the war path for his *Helicinas*, by charging on 'em with a pole. My legs being well protected by high-cut hunting boots, I kicked out vigorously *a la mustang* in an underthrust way against the butt of the thistle plants, and the result was a jerking of numerous snails hither and yon in a somewhat promiscuous way; the success of the performance, judged by the result, caused me to second the motion, and I gathered in a goodly number, enough for my own collection and for distribution among my friends. What the snails thought of the performance I have never learned, and Simpson, it will be noticed, is reticent on this point touching his *Helicinas*.

As to my prowess as a collector, it would be unwise to say anything as long as my friend Henry Hemphill is on the face of the earth, but I dare to say that dear old Doctor Newcomb, of blessed memory, was so generally successful in that line as to justify my placing him near the head of the class. Well, the good Doctor and myself once on a time, away back in June, 1867, went conchologizing up the coast of California to Bodega Bay. We found the collecting ground very limited in extent, though we got about 90 species; we also gathered in nearly 500 dead shells of *Helix Nickliniana*, grouped formerly with *Arionta*, but now Doctor Pilsbry, expert, editor, etc., comes to the front and unblushingly says these west coasters must tumble to the name of *Epiphragmophora*, which is hard on the poor snails, and a rather long word to write. Well, there were hundreds of 'em on the surface of the sand, but *not one living one* could we find. That is what we didn't get, *one live Nickliniana*. Where they kept themselves we couldn't discover. We hunted high, we hunted low, dug into the sand around the roots of the stunted shrubs that manage to live in this cold, windy, exposed locality, and rummaged about generally, without success, and when the sun went down we retired from the field in good order with our flags at half mast, somewhat the worse for the rough day and bad luck in the snail business, though we had the pleasure of each other's company, and that counts

for a good deal as the world goes. Probably the snails had stepped out through fear of being called *Epiphragmophora*; who knows? perhaps, Dr. Pilsbry can tell, *he* ought to know. R. E. C. S.

[But I don't.—H. P.]

SOME NOTES ON *RUMINA DECOLLATA* LINN.

BY C. W. JOHNSON.

In March, 1897, Mr. T. L. Montgomery, Librarian of the Wagner Free Institute of Science, brought from Bermuda some live specimens of *Rumina decollata*. Some of these were given to my young friend, Mr. H. S. Viereck, while the others were placed among some plants kept in the museum of the Institute. Mr. Viereck placed them in his yard in Philadelphia. They flourished and increased greatly in numbers during the summer and survived the winter of 1897-98. During the summer of 1898 they again thrived, but in the following spring only dead shells could be found; the blizzard of February, 1899, was probably too severe for them.

The specimens kept at the Institute are still vigorous, but produced only one brood. Through the kindness of Mr. Viereck, I obtained, in September, some live European *Helices*, including *Helicella ericetorum*, collected by his sister in Germany. An old aquarium was quickly turned into a snailery; thinking that the *Rumina* would enjoy new quarters, a few were also placed in the snailery. A day or so afterwards, when giving the *Helices* some cabbage leaves, I noticed that the *Rumina* seemed very close to the *Helicella*. On picking up a specimen, I was greatly surprised to find the former greedily devouring the poor *ericetorum*. I could not blame the carnivorous fellow, for it was probably the first "square meal" it had had since it was taken from its island home. The lesson to be learned is, do not put your carnivorous and herbivorous shells in the same quarters, if you want to keep both alive.

GENERAL NOTES.

LIMAX COCCINEUS, Gistel.—Through the kindness of Dr. T. S. Palmer, I have been able to see the hitherto overlooked description of *Limax coccineus*, Gistel, Naturgeschichte des Thierreichs, 1848,

p. 168. This slug is said to be 9'' long, bright red (hochroth) in front, with blackish stripes behind the head, tentacles red-granular, mouth, white. Is it not surely the common red *Arion* of Central Europe, now known as *A. rufus* (or *empiricorum*), var. *lamarckii*, Kal., 1851? If so, Gistel's name *coccineus* has priority for the variety, and must be adopted.

This work of Gistel's has in it several other new names for mollusca. On p. 173, *Eugira* is proposed for *Iridina*, Lam. This appears to be needless, but some may hold that it interferes with the later *Eugyra*, Ald., 1870. The following are supposed new species: *Helix platychela* from Sicily, p. 167; *H. erycina* from Sicily, p. 167; *H. jenisoniana* from Montenegro, p. 167; *Clausilia grossa* from Croatia, p. 167; *Bulimus meridionalis*, p. 167; *B. pellucidus* from S. Russia, p. 167; *Linnaeus flavescens* from Spain, p. 168. The *H. platychela* and *erycina* are probably the Sicilian forms already in the literature, otherwise credited. *Clausilia grossa* may be the species of Ziegler. The other names seemed to have been overlooked.—T. D. A. COCKERELL.

POLYGYRA AURICULATA IN WESTERN FLORIDA.—MR. L. E. Daniels, of La Porte, Indiana, has recently sent me typical specimens of *P. auriculata* collected by him in a hammock one mile south of Tampa, Florida, thus supplying an authentic gulf coast locality for the species. Since they were received, I thought to look in Mr. C. T. Simpson's "Contributions to the Mollusca of Florida," Proc. Davenport Acad. Nat. Sci., V., 1889, p. 65, where he reports *P. auriculata* as common in Manatee county. There is a possibility that some locality records for *auriculata* may have been based on specimens of *P. uvulifera bicornuta*.—H. A. P.

CORRECTION TO LIST OF SHELLS FROM NORTHEASTERN MAINE IN JANUARY NUMBER.—Page 103, line 12, for *hurpa* read *harpa*.

Page 103, line 16, for *Sagii* read *Sayii*.

Page 103, line 28, for fine read five.

Page 104, lines 27, 28, read *Limnaea emarginata mighelsi* Binn.

Page 104, line 30, omit *Caribou*.

Page 105, line 33, read *Pomatiopsis cincinmatiensis* Lea, and line 34 omit *A. cincinmatiensis*.

Page 106, line 13, for rear read rare, and for Westmoreland read Westmanland.—OLOF O. NYLANDER.

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE SOLENIDÆ OF NORTH AMERICA AND THE ANTILLES. By Wm. H. Dall. (Proc. U. S. Nat. Museum, Vol. XXII, pp. 107-112, 1899.)—In monographing the fossil species, Dr. Dall has found it necessary to make many changes in nomenclature involving many of the recent species. The following is a list of the recent species as revised by Dr. Dall:

East American Species.

Solen viridis Say. Rhode Island to Georgia.

Solen (Solena) obliqua Spengler. Cuba, Porto Rico, St. Thomas. (*S. rudis* Sowb. not C. B. Ads. + *philippinarum* Sowb. not Hanley are synonyms.)

Ensis directus Conrad. Labrador to Indian Key, Florida, Pliocene to recent.

(“*E. americana* Beck,” of H. & A. Ads., is probably a manuscript name. *Solen siliqua* Chickering, not Linn, is a synonym. This species was generally confounded with *Solen magnus* Schumacker, under the name of *Solen ensis* Linn., by the earlier American authors.

In this connection Dr. Dall seems to have overlooked as a synonym *S. americana* Gould. (Invertebrates of Mass., Binney ed., p. 42, 1870), a name used by most American conchologists. *Solen directus* was described by Conrad (Proc. Acad. Nat. Sci., p. 325, 1843) as a fossil, from what he considered a miocene deposit fifteen miles below New Berne, N. C. This formation is now known as the Croatan beds of the Pliocene.

Ensis minor Dall. Cape May to Florida and Texas. “This is *Solen ensis* var. minor of some of the earlier writers, and bears to *E. directus* the same relation the *Ensis ensis* Linn., of Europe, does to the North European *E. magnus* Schum. It differs from the young of *E. directus* in having the valves wider behind than in front and relatively narrower as a whole.

Siliqua squama Blainville, Grand Banks of Newfoundland and Gulf of St. Lawrence.

“This is *Machæra nitida* Gould, and *Cultellus melius* Sowb. (not Gray).”

Siliqua costata Say. Gulf of St. Lawrence south to Cape Hatteras, N. C.

“The following are synonymous names: *Solecurtoides nahantensis* Desmoulins; *S. sayi* Gray; *S. radiatus* Ravenel (not Linnæus);

Cultellus grayanus Sowb. (not Dunker?); *Cultellus subsulcatus* Sowb.; *Cultellus belcheri* (as of Gray manuscript) Sowb.; not *C. costatus* Middendorf nor Sowerby.

Psammosolen sanctæ-marthæ (Chemn.) Orbigny. N. Carolina, Bermuda, the Antilles and south to Rio Janeiro.

Psammosolen cumingiatus Dunker. N. Carolina to Texas and São Paulo, Brazil.

West American Species.

Solen sicarius Gould. Vancouver Island to San Pedro, California.

Solen rosaceus Carpenter. Santa Barbara, Cal., south to the Gulf of California.

Solen mexicanus Dall. West coast of Tehuantepec, Mexico.

Solen (Solena) rubis C. B. Adams. Panama.

“Confounded with *S. obliquus* Spengl. of the Antilles, by Carpenter and Sowerby.”

Ensis californicus Dall. Monterey, Cal., south to the Gulf of California.

Siliqua lucida Conrad. Monterey to San Diego, Cal.

Confounded with the young of *S. nuttallii* by Carpenter and Gabb.

Siliqua media Gray. Okhotsk and Bering Seas northward to the Arctic Ocean at Cape Lisburne.

Syn. *Machæra costata* Midd. (not Say); *S. borealis* Conrad.

Siliqua patula Dixon. Okhotsk Sea, the southern border of Bering Sea and the Gulf of Alaska to Sitka.

Syn. *Solen maximus* Wood (not Gmel.); *S. gigas* Dillw.; *S. grandis* (Hinds' manuscript, as of Gmelin) Dunker; Carpenter; *S. splendens* Chenu.

Siliqua (patula var.) alta Brod. and Sowb. Bering Sea and Strait.

Syn. *Cultellus costatus* Sowb. (not Say).

Siliqua (patula var.) nuttallii Conrad. Lituya Bay, Alaska, south to Oregon and Monterey, California.

Syn. *S. californica* Conrad, and *S. nuttali* Sowb.

The following new species are described:

Solen mexicanus. Gulf of Tehuantepec.

Ensis californicus. From 14 fathoms sand, off the Island of San Pedro Martir, Gulf of California.

Tagelus poeyi. Cuba; mouth of Old River, Belize; Greytown, Nicaragua, and Rio Grande do Sul, Brazil. Some scattered notes on *Tagelus gibbus* Spengler, are also given.

THE NAUTILUS.

VOL. XIII.

MARCH, 1900.

No. 11.

NOTE ON PETRICOLA DENTICULATA Sby.

BY W. H. DALL.

The enquiry suggested by me in the NAUTILUS for January (p. 100) has been quickly answered. Mrs. Oldroyd has kindly forwarded to me three specimens of *Petricola* from Long Beach, Cal., collected by Mrs. Blood, which solve the problem as to the adult form of Carpenter's *Psephis tellinialis* beyond all shadow of a doubt. The little brown radiated nepionic shells appear with astonishing distinctness against the white shell of the adult *Petricola*. What is still more curious is that these dark-colored tips must fade, as in all the museum series extending from San Pedro to Peru not a single one retains the color, and one of Mrs. Blood's specimens has very little. There are two species of *Petricola*, belonging to the section *Petricolaria* Stoliczka, on the coast of California, neither of which goes much north of San Pedro. One is the elongate *P. cognata* C. B. Adams (the analogue of the east coast *P. pholadiformis*), also named *gracilis* by Deshayes. The other has the following synonymy, and very likely more.

PETRICOLA DENTICULATA Sowerby.

P. denticulata Sby. P. Z. S., 1834, p. 47.

P. ventricosa (Deshayes Ms.) Sowerby, Thes. Conch., p. 773, pl. 166, figs. 6, 7, 1854 (in synonymy).

P. nivea Sowerby op. cit., p. 773, *pro parte*, not of Gmelin, 1792.

P. tenuis Sowerby 1834, C. B. Adams and others, *pro parte*.

Psephis tellinialis Cpr. B. A. Rep. Moll. Western N. Am., p. 641, 1864; Journ. de Conchyl. xii, p. 135, 1865 (larval shell).

This species belongs to the middle American or Panamic fauna and is known to extend as far north as San Pedro and south to the Peruvian coast. The *P. cognata* is somewhat more restricted and seems most abundant in the Gulf of California. It has been found as far north as San Diego. The *P. nivea* (*Mytilus niveus* Chemn.) Gmelin, is an Indo-Pacific species, very similar to *P. denticulata* and confounded with it by most of the early writers.

DESCRIPTION OF A NEW CALIFORNIAN LAND SHELL.

BY F. W. BRYANT.

Epiphragmophora Bowersi, n. sp.

Shell umbilicated, convex; epidermis olivaceous; spire slightly elevated; whorls between 4 and 5, convex, gradually increasing; suture well defined; aperture transverse, nearly circular; peristome whitish, thin, very slightly expanded at the basal portion, at the columella broadly reflected, yet leaving the umbilicus entirely open, showing within the whorls to the apex; base convex.

A well-defined, moderately broad, light-chestnut band revolves above the centre of the body whorl, and is visible above the suture on the whorl preceding the last; lines of growth close and distinctly marked.

Greater diameter 13, lesser 10, height 6 mm.

Location, San Jacinto Mts., Riverside County, California.

THE CORROSION OF SHELLS IN CABINETS.¹

The above is the title of a paper of the greatest importance to all collectors of shells, and especially to those having charge of museums where the shells are usually glued to cards or tablets. Although no corrosion of shells has been noticed in the collections of this country, it is well to be on the lookout, and to guard against all apparent causes.

¹ The Corrosion of Shells in Cabinets. By L. St. G. Byne, M. Sc. With a prefatory note by T. Cosmo Melvill, M. A., F. L. S. The Journal of Conchology, Vol. ix., pp. 172-178, and pp. 253-254, 1899.

Mr. Melvill says: I first noticed the deterioration of a *Mitra* (*Zierliana*) *ziervogeliana* in our National Collection, now many years ago, and a year or two afterwards the disease had spread to another example on the same tablet. I have never had any specimens in my own collection thus attacked, excepting one, and that I fancy must have come into my possession diseased, and it was forthwith destroyed. But none of these are glued or affixed in any way to tablets, as is the case in most museums, but are either placed loose on cotton wool, or in glass-topped boxes. I may add that I have seen too frequently in the almost hermetically-sealed drawers under the cases in the British Museum a dulness first pervading the exterior of certain *smooth* species more markedly *e. g.*, *Conus*, *Cypræa*, and especially *Naticidæ*. Then grey acid efflorescence, both tasting and smelling strongly of vinegar, covers the whole surface like a powder, rising doubtless from the interior, and the specimens are soon almost irretrievably ruined. This evil being, therefore, of most serious significance, the sooner one is able to cope with it satisfactorily the better, and I am sure our best thanks are due to Mr. Byne for having been the first to take the matter in hand.

From Mr. Byne's exhaustive paper we extract the following :

"The shells which formed the subject of my experiments were from the National Collection at South Kensington, furnished me through the courtesy and kindness of Mr. E. A. Smith. These alone are referred to unless where otherwise distinctly stated. The shells in the cabinet drawers are in many instances either partially or entirely destroyed, the surface being corroded and covered with a fine white powder substance, which can be easily scraped off with a knife. This caused them to resemble Eocene mollusca.

Many species are quite unrecognizable on account of the surface being eaten away so deeply. The destruction has traveled from shell to shell and drawer to drawer, like a disease, several valuable specimens being spoilt.

The mischief has assumed large proportions, and being still on the increase causes the greatest anxiety.

The most remarkable facts are—

1. Only marine species are attacked.
2. Highly polished shells, such as those of *Cypræa*, are the most liable to be affected.
3. It does not extend to every specimen in a drawer, and of several mounted on the same tablet, perhaps one only is attacked.

4. Loose shells are also destroyed, but there are comparatively few of these compared with the number of those mounted on cards.

5. The shells affected are from twenty to fifty years old, but the corrosion does not appear until after the lapse of about ten years. The process is thus an extremely slow one.

6. It occurs principally amongst the shells kept in drawers in the dark, where the air is confined and seldom changed.

7. If the tongue be placed against one of the shells, an astringent alum-like taste will be observed.

We now come to the consideration of possible causes of corrosion. They appear to me to be four in number.

I. *Damp.*—If the shells were placed in a room or gallery that was not properly warmed, a very probable reason would be that a fungus had been formed, eating away the surface of the shell. The shell gallery of the Natural History Museum is, I am assured, excessively dry. This cause is, therefore, excluded.

II. *The action of sulphuric acid.*—It is well known that the atmosphere of cities contains free sulphuric acid (in addition to other sulphur compounds) derived from household fires and the burning of coal-gas. This acting over a period of years would slowly eat away the calcium carbonate of the shell, forming calcium sulphate. If this were the explanation, then the whole of the white powdery substance on the surface of the shell would consist of calcium sulphate. Analysis, however, showed that none was present.

III. *Presence of salt.*—Shells that had not been soaked in fresh water before being placed in the cabinets would contain salt, not only in the epidermis, but also held mechanically amongst the particles of calcium carbonate. It is highly probable that its presence would exert a deleterious influence.

Chemical tests showed that it was practically absent in the shells examined, a fact that occasioned some surprise.

IV. *Action of an acid substance.*—After carefully considering all the facts in my possession, I have come to the conclusion that the corrosion is due to the action of butyric acid.

Upon opening the box of shells sent me by Mr. E. A. Smith, I at once noticed a pungent vinegar-like odor, which pervaded the fingers and everything that came in contact with them. This pointed to the presence of acids of the acetic series. Analysis showed that every shell contained butyric acid, as calcium butyrate. A few contained

calcium acetate. Butyric acid is a product of the fermentation of animal matter, and its original source was found in the following manner; A specimen of *Strombus tricornis* was soaked in distilled water for a week. A piece about the size of a pea, of a grayish gelatinous substance was found at the bottom of the glass vessel. This had come from the interior of the shell, and chemical tests showed it to be organic matter. The shell had probably been more than twenty years in the Museum.

This at once furnished the explanation which I now bring forward, namely: That the pieces of the animal left in the shell, through insufficient cleaning or otherwise, ferment, setting free butyric acid. This substance is extremely volatile, and pervades the whole of the drawers and cabinets. The amount present can only be extremely small, but acting as it does for so many years, it slowly eats away the surface to a considerable extent, converting the calcium carbonate into calcium butyrate.

The reason that land and fresh-water species are not attacked is that their epidermis acts, so to speak, as a coat of mail. Hence, highly-polished species of *Cypræa*, etc., are the most liable to corrosion through lack of such protection.

The fact that the shells exposed to daily public inspection in the top cases are less attacked is explained on the hypothesis that the light acts as a deterrent. I have also come to the conclusion that the gum used in attaching the shells to the tablets has something to do with the corrosion. The majority of the shells affected in the National Collection are gummed to tablets. As far as can be ascertained, the corrosion has never occurred in private collections where the shells are and always have been loose. The gum ferments, acetic acid being formed. This eats away the calcium carbonate, forming calcium acetate; this latter substance was found in several of the shells examined, in addition to the calcium butyrate.

V. *Prevention.*—In the case of those shells which are badly affected, nothing can be done, and their instant removal is absolutely essential, for if left, they only increase the mischief with those just beginning to show signs of corrosion. I recommend that they be soaked for twenty-four hours in a solution of corrosive sublimate (1 part in 1,000 water) and then thoroughly dried.

As an experiment, all shells should be subjected to such treatment, in the hope that it may prove effectual. It is quite impossible to say

beforehand whether this will be an infallible remedy. Time only can prove its efficacy.

On page 235 of the same volume Mr. Byne gives the following supplementary notes to his former observations :

“At the time of writing my former paper I did not possess any knowledge of bacteriology, but I had come to the conclusion some months before that the corrosion was due originally to the action of bacteria. I am now enabled, through the kindness of Dr. Ewart, to adduce a considerable amount of evidence in support of this. I still adhere to the five items of my previous summary.

The white powdery substance upon the surface of the shells was found to consist of calcium butyrate, in some instances mixed with calcium acetate. It was formed by the action of butyric and acetic acids upon the calcium carbonate of the shell structure.

Since butyric acid does not occur in the atmosphere, it can hardly have had an external origin. It must, therefore, have been derived from fermentative processes occurring in the organic material of the shell, or of adhering portions of the molluscan inhabitant. Both aërobic and anaërobic bacteria are known which can cause various carbohydrates to ferment, producing butyric and acetic acids. It is very often the case that a portion of the liver is left attached to the shell, especially to the apex. This might easily undergo butyric fermentation, and, moreover, the same might occur with the adhesive substance used to fix the specimen to its card. Both aërobic and anaërobic butyric bacteria exist, but the common forms are anaërobic. Hence we should expect to find the danger of spoiling increased with imperfect aëration in closed or hermetically sealed cases, in which at the same time there would be no possibility of the acid products escaping. A little moisture is required to start the fermentation ; hence, dry cases should escape, and even in damp air the process can only take place with great slowness, for so soon as the products accumulate to a certain extent, fermentation ceases until they have been removed.

That the mischief is of bacterial origin is supported by the following facts :

1. *Butyric acid has been found.*

This could only be produced by the butyric fermentation of carbohydrates, or even proteid substances. Acetic acid is amongst the fermentative products of butyric bacteria, and calcium acetate has been found in some of the shells.

2. *The shells in the top cases that are exposed to light are practically unaffected.*

This points strongly to bacteria. The deadly action of direct sunlight on bacteria is well known, and may produce death in from five minutes to an hour when they are in the vegetative condition. Even strong diffuse daylight suffices to retard or even inhibit the development of many bacteria.

3. *The shells in the drawers kept in the dark are the worst attacked.*

This necessarily follows from the above statement. Darkness is favorable to the development of these fermentative organisms. Within the shell the bacteria would even in the top cases be protected from the inimical effect of light.

I stated in my former paper that the corrosion had not occurred in private collections. Since its publication I have been informed that some shells in a large private collection at Birmingham have been badly corroded, and have caused anxiety for some time past.

PREVENTION.

It must surely be conceded that an infallible remedy cannot be given. My critics have either overlooked or paid no attention to the fact that the corrosion does not appear until after the lapse of about ten years.

The suggestions received are :

1. Boiling in oil.
2. Rubbing over the surface with such substances as oil of turpentine oil of cloves, and formalin.

I am of the opinion that these may be dismissed as ineffectual. Now that we know that the corrosion is caused by bacteria, I am more than ever convinced that soaking in corrosive sublimate solution, combined with previous thorough cleaning, will prove effectual. It must be remembered that corrosive sublimate is an *extremely poisonous* substance. The drawers should be thoroughly aerated at intervals, to remove accumulated acid vapors, which will never be present in more than minute traces.

The drawers should also be kept well dried.

NOTE ON THE VARIETIES OF *EPIPHRAGMOPHORA MORMONUM*.

BY H. A. PILSBRY.

In treating of this species both Binney and Stearns have commented on its variability. In examining the series in our collection it appears to me that three well-marked races or subspecies exist, which may be readily distinguished.

Typical *mormonum* is large and depressed, pale reddish corneous, often fading to a paler tint on the base; the brown girdle is conspicuously darker, and broadly bordered with white above and below. Surface glossy, sculptured with growth-wrinkles only, or if spiral striæ are present they are very faint; apex minutely granulose. Diam. 29-31, alt. 14-15 mm., sometimes smaller. Whorls 6.

Mormon Island, in the American River, Sacramento Co., Cal. (type locality); Tuolumne Co. (Hemphill).

Binney's figures represent Pfeiffer's type.

Var. *cala*, n. v. Smaller and less depressed; dark reddish-brown, the peripheral girdle not conspicuously darker, yellow-bordered; surface sculptured with dense minute spiral striæ; whorls $5\frac{1}{2}$; diam. 22, alt. 14 mm., or diam. 26, alt. 15 mm. Types from Big Trees, Calaveras co., Cal.; Fred. L. Button, H. Hemphill.

Much commoner in collections than the pale, glossy typical form.

Var. *buttoni*, n. v. Color as in var. *cala*, but shell more depressed, periphery more or less carinated in front, the surface studded with minute prominences which bear rather long golden-brown hairs when unrubbed; granulation of the apex more strongly developed. Whorls $5\frac{1}{2}$. Diam. 22-24, alt. $11\frac{1}{2}$ -12 mm.

Nassau Valley, Calaveras Co., Button. Redding, Shasta Co.; McGregor. Probably some larger shells collected by Hemphill at Cave City, Tuolumne Co., belong to this variety, but the specimens before me are in poor condition. The largest measures 29 mm. diam.

This variety forms a transition to *E. hillebrandi*, which is only another term in the variation series, as Stearns has already remarked.

A NEW *CALLIOSTOMA* FROM FLORIDA.

BY HENRY A. PILSBRY.

Calliostoma Vellei n. sp.

Shell imperforate, high-conic, moderately solid, white, with a series of small, reddish maculae at the periphery of each whorl. Whorls

nearly 7, the first one smooth and rounded, the rest lightly concave above and sculptured with four equal beaded spirals (and some interstitial threads on the last whorl or two), with a much broader, more prominent spiral rib at the periphery and projecting above each suture, where a narrower spiral shows below it; the last whorl quite convex just below the prominent rib, the base moderately convex, and sculptured with 14 beaded spirals, contiguous toward the periphery, but more separated and with interstitial threads in the intervals on the rest of the base, which is further sculptured by fine, curved, radial grooves. Three or four of the spirals are rather sparsely dotted with red. Aperture trapezoidal, white and pearly within; columella pearly, white and concave above, ending below in a slight tooth. Alt. $10\frac{1}{2}$, diam. $9\frac{3}{4}$ mm.

Caxambas Pass, S.-W. Florida, collected in 1898 by Dr. J. W. Velie, in whose honor it is named.

GENERAL NOTES.

ONLY A ONE-TENTH OYSTER CROP.—This has been the poorest year in ten in the oyster industry of Maryland. In years past from 5,000,000 to 10,000,000 bushels of oysters have been taken from the bay. This year the yield will be about 1,000,000 bushels.

The question of legislation for the protection of the oysters has agitated the state for years, but in the meantime the bivalve is disappearing. Notwithstanding the diminishing supply, however, there have been sufficient oysters to keep going all the packing houses in Baltimore, which employ about 5000 people. Nearly 500 dredging boats are sailing out of Baltimore.—*Phila. Record, Dec. 30.*

BIVALVE SHELLS USED IN MANILA FOR WINDOW PANES.—In Manila, where there is an interesting field open to the naturalist, the natives have an odd substitute for glass. It is a bivalve shell of about nine inches of surface, so transparent that print can be readily seen through it, and admitting a mellow light in a room where it is used as window glass. The shell is an attractive object, flat, and in appearance resembles isinglass. One could almost imagine that it was some skillful invention of the natives, could not the growth rings be readily observed. The outer side of the shell is perceptibly rough, while the interior is perfectly glazed over and in the light has the pearly lustre found in many of the thin-shelled, oyster-like mollusks

of the tropics. The shell is the *Placuna placenta* of science, and is well known in China, the common name being the Chinese window oyster. It is employed there also for windows and used in lanterns. The Chinese grind up the shell and make from it the silver paint so common in their water colors. The bivalve is very common in the Philippines, and forms a very good and cheap substitute for glass.—*The Phila. Record.*

UNIONIDÆ IN A TUNNEL.—I am interested in two examples of *Margaritana margaritifera* var. *falcata*, taken in a water tunnel near Santa Cruz, in this state (California), 700 feet from the mouth of the tunnel, and 300 feet underground. They differ from the normal specimens in being both unusually large and thin, the nacre being very richly colored.—FRED L. BUTTON.

PURPURA CORONATA LAM. IN AMÉRICA.—This well-known West African species has been reported from Demerara and Trinidad by the Rev. A. H. Cooke. Living specimens were collected at Livingston, Guatemala, in the spring of 1899, by Mr. Silas L. Schumo, and are now in the collection of the Academy.—H. A. PILSBRY.

ADDITIONAL CHITONS FROM THE PLIOCENE OF THE CALOOSA-HATCHIE RIVER, FLORIDA.—In recently working over (with the assistance of Mr. E. G. Vanatta) a lot of fine material, mostly obtained in cleaning the larger mollusca, collected by the late Dr. H. E. Griffith, ten valves of Chitons were found. These were kindly studied by Dr. Pilsbry, with the following results:

Chatopleura apiculata Say. One head and two central valves.

Ischnochiton papillosus C. B. Ads. Two central valves.

Ischnochiton striolatus Gray. One head and one central valve.

Acanthochites pygmaeus Pilsbry. One central valve.

The two other central valves were too imperfect for determination.

Isch. striolatus has only been recorded recent from St. Thomas and Barbados.

Dr. Dall, in his work on the "Tertiary Fauna of Florida" (Trans. Wagner Free Inst. Sci., Vol. III, pt. 2, p. 435), records but one species, *Acanthochites spiculosus* Reeve; "A fragment of a central valve," "too imperfect to make the identification certain."—C. W. JOHNSON.

NOTES ON VERONICELLA.—In Journ. Institute of Jamaica, Vol. 2, p. 601 (1899), Mr. H. Vendryes publishes without descriptions the names of two varieties of *V. sloanii* credited to me. I had not intended to publish these names, as they seem to represent mutations only, but since they are published, it may be well to explain that *v. maculata* is F, No. 24, and *v. subpallida* is G, No. 20, of Ckll. & Larkin's paper on the Jamaican species of *Veronicella* in Journ. of Malacology, Vol. 3, pt. 2, 1894. Mr. Vendryes lists *Limacellus lactescens* from Jamaica, but it belongs to North America, and has not been found in the West Indies. When the locality of it was unknown, I guessed that it might possibly have come from Jamaica, along with the *Veronicella* described at the same time by Blainville. Dr. Simroth has lately (cf. Zool. Record for 1898, Mollusca, p. 62) applied the name *decipiens* to an African *Veronicella*. This must be changed, as Semper has used the same name for a South American species.—T. D. A. COCKERELL.

My friend, F. W. Kelsey, of San Diego, Cal., recently sent me a peculiar Lithophagus, taken near that city, which I at once recognized as a *Myoforceps*, and Dr. Dall afterwards kindly determined the species as *M. aristatus* Dillwyn. The finding of this interesting species, with its elongate, crossed ends, in shell ground which has been well worked for so many years, is worthy of note and to the credit of the enthusiastic collector named. The fact that mature specimens are found imbedded in hard rock is proof that it is not of very recent introduction.—FRED. L. BUTTON.

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE RECENT AND TERTIARY LEPTONACEA OF NORTH AMERICA AND THE WEST INDIES. By WM. H. DALL. (Proc. U. S. Nat. Mus., vol. xxi., pp. 873-897, plates 87 and 88, 1899.)

“The Leptonacea form a very interesting and puzzling group. Their characters combine features characteristic in other Teleodonts of immaturity, with such as are more probably due to environmental modifications. Without being in themselves prototypes, they exhibit features which we may readily suppose might have been characteristic of prototypic Teleodonts. Groups which are really

starting points for numerous subsequently developed genera, are usually notable for their tendency to vary and interchange characters. In the present case, perhaps, the very general habit of commensalism or parasitism, has produced degeneration, accompanied by a revival of atavistic primary characters."

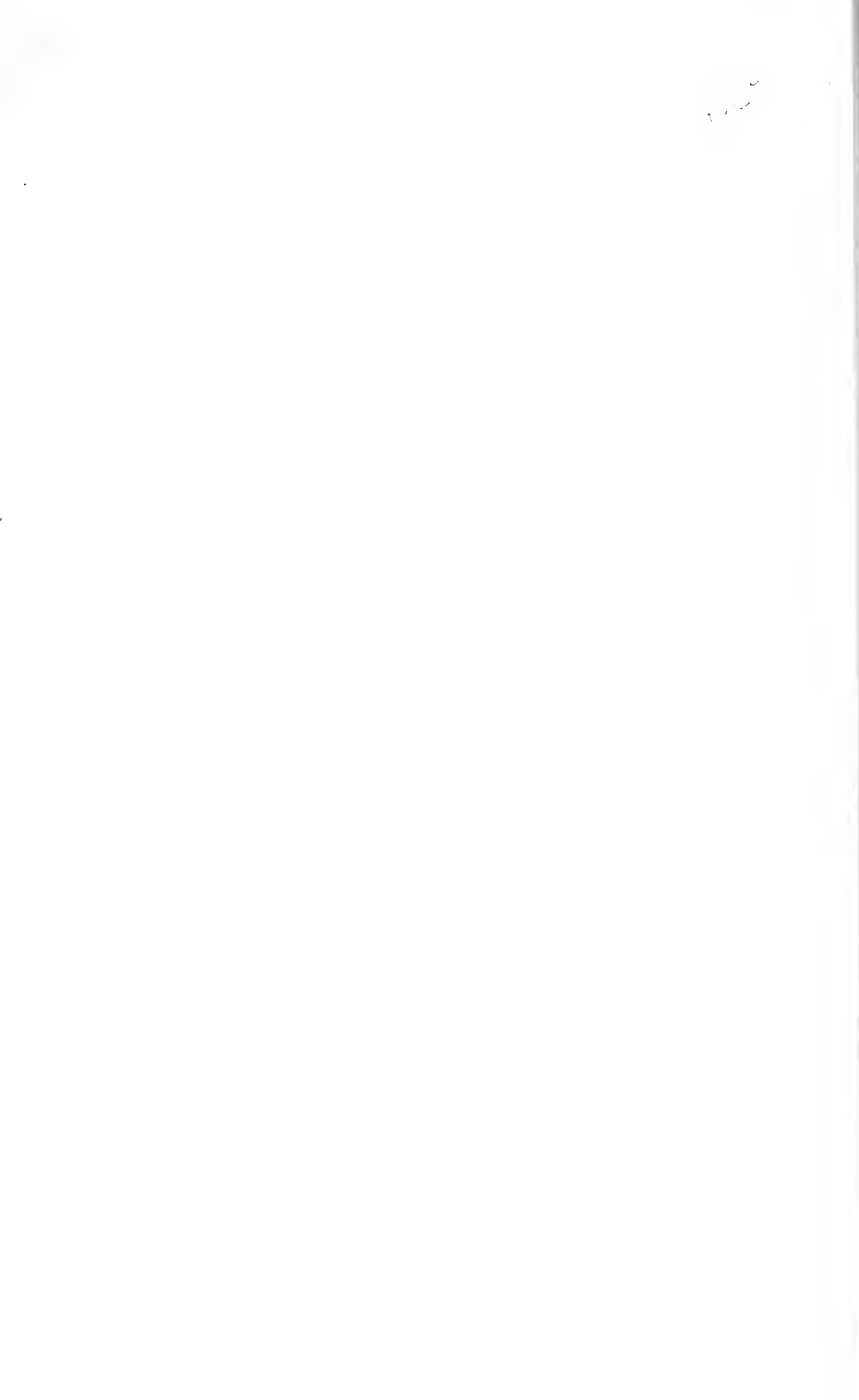
Other introductory remarks are followed by a list of species from the east and west coasts of North America, with synonymy and distribution. From the east coast there are recorded 13 genera, 34 species and one variety; from the west coast 12 genera, 33 species are listed.

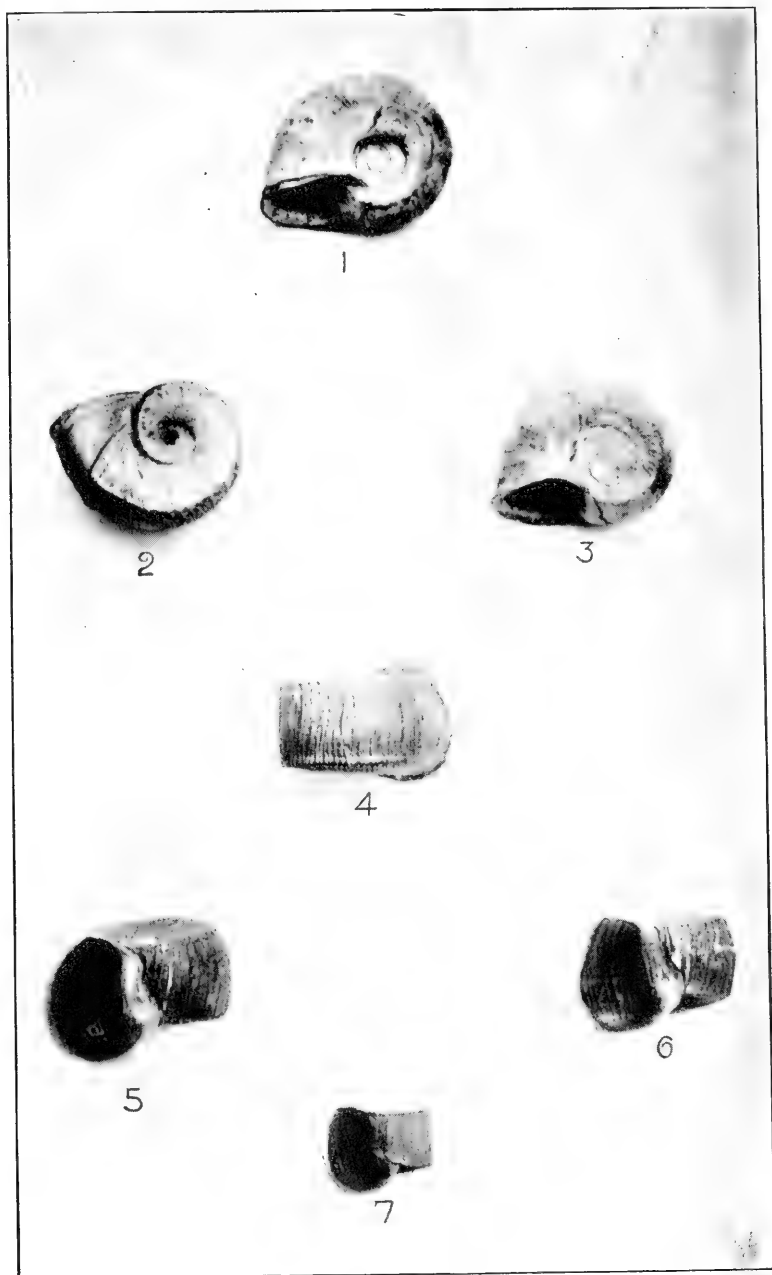
A list of the tertiary species of the United States is also given, containing 73 species, divided among 13 genera, followed by "descriptions of new species and remarks on others imperfectly known." 18 new recent species are described, all of the new species are included in preceding lists. On plate 87 is shown a crab (*Gebia pugetensis*, Dana), with *Erycina rugifera*, Carp., attached by its byssus to the underside of the abdomen of the crab. C. W. J.

THE MOLLUSK FAUNA OF THE PRIBILOF ISLANDS.—By Wm. H. Dall. (Extracted from *The Seals and Fur-Seal Islands of the North Pacific Ocean*, Pt. III, pp. 539-546, 1899.)

A very interesting paper on the geographical distribution of species and the physical characteristics of the region. The faunal summary gives a total of 86 forms. Only three land shells are known from the group: *Succinea chrysis*, *Vitriua exilis* and *Pupa decora* var.? A faunal summary of the Commander Islands given for comparison, shows a total of 74 species from those islands, including six land and three fresh-water forms: *Limax hyperboreus*, *V. exilis*, *H. radiatula*, *Conulus fulvus*, *Patula ruderata* var. *pauper*, *P. decora*, *Linnæa ovata*, *L. humilis* and *Pisidium æquilaterale*. Fossil mollusks were found only on St. Paul Island.

DESCRIPTION OF A NEW GENUS, AUSTROSAREPTA, AND NOTES ON OTHER MOLLUSCA FROM NEW SOUTH WALES. By Charles Hedley. (Proc. Linn. Soc. N. S. W., pt. 3, pp. 429-434, Dec. 1899.) Following Dr. Dall's classification, Mr. Hedley places this interesting genus in the subfamily *Sareptinæ*; the type is a new species *A. picta*. A new species, *Teinostoma starkeyæ*, is described and figured. *Solen sloanii* Gray, *Neritula lucida*, *Cassis nana* T. Woods, *Cantharus waterhousiæ* Braz., are also figured.—C. W. J.





PLANORBIS CORPULENTUS SAY.

THE NAUTILUS.

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No. 12.

THE GENUINE PLANORBIS CORPULENTUS, SAY.

BY BRYANT WALKER.

The sound judgment and critical acumen of that great naturalist, Thomas Say, has been exemplified not only in the large proportion of his species which have withstood the scrutiny of the "higher criticism" of the modern school of conchologists, but also by the number which in recent years have been rescued from the synonymical boneward, to which they had been relegated by his immediate successors, and restored to their original integrity.

The fine species which he described in 1824 as *Planorbis corpulentus* has been one of the most unfortunate of these forgotten species in its scientific history. Owing, no doubt, in a large measure to its extreme rarity, it has been constantly misapprehended, not only by all the descriptive writers, but by nearly every one who has had occasion to refer to it.

The earlier American conchologists were unanimous in referring to it unusually large specimens of *P. trivolvis*, and generally considered it a form of that species and doubtful, even, of varietal rank.

In 1841, Haldeman referred to it a large *Planorbis* collected by Nuttall, in the Lewis river, Oregon, and his example was followed by Gould, Chenu, Clessin, Tristram and Sowerby. W. G. Binney (1865) was "inclined to believe that Say had before him a form of *P. trivolvis* when he drew his description of *P. corpulentus*," and considered the west coast species referred to that form by Haldeman,

Gould and others, to be a distinct species. It is evident from the museum register given by Binney, that he had no Canadian examples of the species before him, although he remarks that he "had seen no specimens from the localities visited by Mr. Say while on Long's expedition that were not forms of *P. trivolvis*."

Tryon, in his supplement to Haldeman, affirmed Binney's opinion, referred *corpulentus* to *trivolvis*, and described the western form as *P. binneyi*.

This decision, so far as it differentiates the west coast form from Say's *corpulentus*, is undoubtedly correct, and all the west coast citations of that species must be eliminated.

Following the lead of eastern naturalists, the species has been cited either specifically, or as a variety of *trivolvis* in many of the eastern local lists, but without description or remarks. Such are Anthony, "Cincinnati;" Wheatley, "New York to Ohio;" Hubbard, "Ohio," and Lewis, "Little Lakes, N. Y."

Jay is the only one of the eastern cataloguers who appears to have had a specimen from near the original locality, and which possibly may have been true. He gives the locality of his example as "Winnepeck river."¹

It follows therefore that all the citations of this species from the eastern and central states must also be rejected.

There thus remain for consideration only the few citations from the Manitoba region of Canada and the northern central part of the United States. Say's original description cites the Winnepeck river, Winnepeck Lake, Lake of the Woods and Rainy Lake. Dawson in the "Report of the British North American Boundary Commission," quotes it from Flag Island, Lake of the Woods, and remarks that "the specimens are from Say's typical locality and agree perfectly with his description. If *P. corpulentus* is a variety of *trivolvis*, as has been suggested, it is a very well marked one, and is characteristic of the open reaches of the lake."

¹ Part of Say's collection is now in the American Museum of Natural History of New York. Mr. R. P. Whitfield, the Curator, writes: "We have in the Say collection one shell from the Winnepeck river, but it is not the one figured by Say in Long's Expedition, but is smaller, lacking the outer volution as compared with that figure. We have one *quite large* specimen from the J. J. Cooke collection from Lake Superior, and four specimens from the W. A. Haines' collection, which are labelled Winnepeck river. But I can find no evidence as to who collected them or where."

Grant in the "Sixteenth (1887) Annual Report of the Geological and Natural History Survey of Minnesota," cites it from "Vermilion Lake and all over St. Louis and Lake Counties," and says: "it is found clinging to rocky shores and reefs, and seems to seek places where the water is quite rough."

Hanham in his recent "List of the Land and Fresh-water Shells of Manitoba," published in *THE NAUTILUS*, quotes simply Dawson's original citation of the Lake of the Woods.

These references, with Jay's citation in his Catalogue, which possibly may be one of the original lot collected by Long's expedition, are the only ones, which I have been able to find, that can with any probability be referred to Say's species.

Having before me four different lots, aggregating sixteen specimens, of what is undoubtedly the genuine *corpulentus* of Say, I can confidently affirm that the species is entirely distinct from *P. trivolvis*, and must be accorded specific rank.

Say's description is very exact, and when read so as to apply to a sinistral species, as this undoubtedly is, as shown by the young shell (fig. 7), leaves but little to be added.

The characteristic features of the species are the high, narrow, bicarinate, rugosely striate whorls, with widely separated raised growth lines and large expanded aperture, which is higher than wide. The superior surface is either almost perfectly flat, or more or less concave, sometimes deeply so, varying as the shell is coiled horizontally or somewhat obliquely to the axis; the superior carina, until the last half of the last whorl is reached, is almost a right angle, the sides of the whorl being but little convex, with the greater convexity below the middle; the body-whorl enlarges very rapidly during the last half of its growth, and become more ventricose, and both carinæ become less prominent; the superior, however, retains its position and sensibly modifies the shape of the aperture, while the lower one from the rounding out of the base of the shell, becomes subobsolete and does not affect the convexity of the lower part of the lip; the umbilicus is large and crateriform, the base of the shell until the body-whorl begins to enlarge towards the mouth being flat, and slopes sharply from the carina into the umbilicus, so that the lower carina, during that period of growth, is much more acute than the superior one; the whorls of the young shell are very narrow and high, and owing to the rapid increase in height in proportion to width, the col-

umellar insertion of the lip is on the base of the preceeding whorl between the umbilicus and the lower carina (fig. 7), which thus forms a strong spirally entering fold slightly below the centre of the inner margin. Compared with this species, *P. trivolvis* is distinguished by its greater width in proportion to its height, wider and more convex whorls, finer and closer striæ, wider and more oblique aperture, less prominent superior carina, which is nearly central on the penultimate whorl, the constantly rounded base of the whorls in all stages of growth, never sharply and acutely carinate as in *corpulentus*; and smaller umbilicus, not exhibiting the apical whorls.

The specimens before me are from the following localities:

1. Michigan. Coll. University of Michigan (figs. 1, 2 and 3).

Exact locality and collector unknown. These specimens have been in the University museum for many years, and no further information in regard to them is attainable. They are much heavier and thicker than those from the other localities represented, but are otherwise very similar. In all probability they were part of the material turned into the museum from one of the early geological surveys, and quite likely are from the western part of the Upper Peninsula, as nothing like them has been found in the upper part of the Lower Peninsula, or in the eastern portion of the upper. They were originally catalogued as *P. trivolvis* Say.

2. Rat Portage, Keewatin, Manitoba.

Coll. Fred'k Stearns. Collected by A. C. Lawson in 1884.

3. Vermillion Lake, Minn., (fig. 4, 5 and 6):

Received from H. F. Nachtrieb of the Geol. and Nat. Hist. Survey of Minn.

4. Vermillion Lake, Hudson Bay Territory (fig. 7.)

From the collection of the late Dr. James Lewis. Collector unknown.

Mr. J. F. Whiteaves, of the Geological Survey of Canada, has kindly furnished the following data in regard to the material belonging to the Survey:

"In the Museum of the Geological Survey of Canada, there are five typical examples of *Planorbis corpulentus* collected by Dr. James Fletcher, in 1882, at the Lake of the Woods; by A. C. Lawson in 1884, at Rat Portage, above the Falls, and by W. McInnes in 1890, at Greenwater Lake, Thunder Bay District. There are also specimens which are at least very similar to *P. corpulentus* in the same

museum, collected by J. B. Tyrrell, in 1879, at McLeod Lake and by Dr. G. M. Dawson, in 1889, at Nicola Lake, both in British Columbia.

"I have never seen any of the land or fresh water shells referred to by Dr. Dawson in his Brit. N. Am. Bound. Report, and believe that they went to the British Museum."

Rev. George W. Taylor of Nanaimo, B. C., writes that a pair of the shells collected by Lawson are the only ones in his collection and that "the large *Planorbis* occurring on this (western) side of the Rockies is *P. ammon*."

In conclusion, therefore, it may be said that *P. corpulentus* Say, is a valid species and entirely distinct from either the eastern *P. trivolvis* on the one hand, or the western *P. ammon* or *binneyi* on the other; that it is a characteristic form of the Manitoba lake region, and extends from there into northern Minnesota and Michigan. Nothing is known in regard to the animal.

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NEW SOUTHERN UNIOS.

BY BERLIN H. WRIGHT.

Unio Kingii, sp. nov.

Shell small, moderately thin, plicate behind, inflated, elliptical and very inequilateral. Epidermis dark yellow and covered throughout with fasciculated rays, which are more or less interrupted, forming arrow-shaped markings. Sides rounded, and with a slight enlargement from umbo to base, causing a slight emargination behind it. Beaks quite prominent and surrounded by ten or twelve fine, irregular, broken concentric folds. Umbonal ridge well defined and the terminus of all the knotty plications that thickly cover the posterior area. Lateral teeth slender, straight and quite smooth; cardinals erect and well roughened. Anterior cicatrices scarcely distinct and often confluent; a deep extension running well under the cardinals. Beak cavity slight; cavity of shell profound and uniform. Naere variable, from greenish gray to rose. Width, $1\frac{5}{8}$ in.; length, $\frac{3}{4}$ in.; diam. $\frac{5}{8}$ in.

Habitat. A branch of the Flint R. in Baker Co., Ga.

Type lot in National Museum.

Remarks: Affinity, *Unio Walkeri*, Wrt. and *U. penicillatus* Lea. From the former they are easily distinguished by their greater inflation and rounded sides, and more rounded umbonal angle, the finer and rougher plications and diminished length; from the latter it is also more inflated, darker and coarser, and has a sharper umbonal angle. In some specimens the rays almost disappear, and again are so dense as to give a green appearance to the shell.

Mr. Charles T. Simpson has compared the type lot with the Lea types and considers it nearer to *U. penicillatus* Lea than to *Walkeri*, but sufficiently distinct from both to warrant the standing we here give it. Mr. Simpson also suggests a generic name, by which this group will be distinguished in his forthcoming Synopsis of the family.

It affords me pleasure to name this species for the discoverers,

Messrs. G. F. and B. H. King, who take great interest in natural history, and who are about to engage upon a thorough exploration of S. W. Ga. and W. Fla. in the interest of science. Their address is Mimsville, Ga.

NOTES ON SOME SOUTHERN MEXICAN SHELLS.

BY HENRY A. PILSBRY.

A small collection of shells from the state of Tabasco, Mexico, received from Prof. José N. Roviroso, is interesting as supplying a new species of the genus *Chondropoma*, a genus common to southern Mexico and the West Indies, but far more fully developed in the latter region.

A new *Unio* of the *Lampsilis* group also occurred. The following is a list of the species:

Polygyra Yucateana Mor. var. *helictomphala* Pfr. San Juan Bautista.

Thysanophora conspurcatella Morel. San Juan Bautista.

Oxystyla princeps Brod.

Subulina trochlea (Pfr.). San Juan Bautista.

Opeas micra (Orb.). San Juan Bautista.

Glandina Ghiesbreghtii Pfr.

Succinea Guatemalensis Morel.

Planorbis tenuis Phil.? (Young.)

Planorbula obstructa Morel. Margin of the Grijaloa R.

Aplexa aurantia Cpr. Macajuca.

Aplexa Tapanensis Cr. & Fisch. San Juan Bautista.

Chondropoma Martensianum Pilsbry. Montañas de Poaná. See below.

Helicina lirata Pfr. Garden of the Juarez Institute, San Juan Bautista.

Neritina virginea L. Pueblo "La Ceiba."

Pachychilus vulneratus Crosse & Fischer. Upper Puyacatengo R. near Teapa. This is the form referred by Morelet (in coll.) to *P. Helleri*, and made by Crosse & Fischer a variety of *P. chrysalis* Brot., under the above name. The form seems to offer considerable differences from *P. chrysalis*, typical specimens of which were collected by Sr. Roviroso at Ixtacomitan, Chiapas, and it may prove specifically independent. The specimens are old, more truncated

than any other *Pachychilus* I have seen, one with a greatest diameter of 24 mm., measuring 39 mm. in height, and having less than two whorls remaining, the suture describing only one spiral turn. The shells from Morelet's collection before me are much smaller, though doubtless this exact form.

Unio Rovirosai Pilsbry. Laguna de Atasta, near San Juan Bautista. See below.

Descriptions of New Species.

Chondropoma Martensianum n. sp.

Shell perforate, turreted, truncate, thin, corneous, with many faint reddish-brown narrow spiral bands interrupted into dots. $4\frac{1}{2}$ to $5\frac{1}{2}$ whorls remaining in adults, very convex, separated by very deeply impressed sutures, the last whorl well rounded below. Sculpture of numerous very low spiral cords, a median one often larger, giving the upper whorls a subangular appearance, crossed by very numerous vertical lamellæ with scalloped edges, about 4 or 5 lamellæ in the space of a millimeter, on the latter half of the last whorl. Aperture circular; peristome broadly and equally reflexed on the outer, basal and columellar margins, its face somewhat lamellose, nearly 1 mm. wide.

Alt. 13, diam. 6.6, internal diam. of aperture 3.2 mm. ($5\frac{1}{2}$ whorls.)

Alt. 11.3, diam. 6.5, internal diam. of aperture, 3.3 mm. ($4\frac{1}{2}$ whorls.)

Montañas de Poaná, Tabasco, Mexico (José N. Rovirosa).

This species is most nearly allied to *C. radiosum* Morelet, but differs as follows: It is smaller and more slender; the lamellæ are not produced into short spines where they cross the spiral cords; the peristome is decidedly narrower, recurved instead of flat or flaring forward; finally, the aperture itself is as large as in *C. radiosum*, though the shell is smaller.

It is named in honor of Dr. E. von Martens, who is now publishing an extensive work on the non-marine mollusks of Mexico.

Unio (Lampsilis) Rovirosai n. sp.

Shell large, ovate, rather thin (about as in *U. luteolus*), inflated, nowhere gaping, covered with a rather thin black cuticle, sculptured with coarse and irregular growth-wrinkles, lamellose toward the basal margin; beaks rather small, situated a little behind the anterior

fourth of the length; hinge margin slightly curved, anterior end narrowly rounded, posterior end much wider. Interior white, faintly pink tinted in the cavity, hardly iridescent. Right valve with one strong wedge-shaped cardinal tooth standing nearly at a right angle to the larger axis of shell, slight rudiments of accessory teeth in front of and behind it on the hinge-line; the lateral single, stout and high, separated by nearly its own length from the cardinal. Left valve with two stout, subequal, oblique, crenulated cardinal teeth and two strong laterals. Anterior adductor and pedal scars deep, posterior scars very shallow, the adductor and foot retractor completely united. Dorsal scars well within the cavity of the beaks, the major row (of about 6-8 small deep scars) extending obliquely across the cavity from below the cardinal to the lower side of the hinge-plate; some smaller, shallower scars below the main series. Pallial line deep anteriorly and below, shallow posteriorly. Length 111, height 71, diam. 43 mm.

Laguna de Atasta, near San Juan Bautista, Tabasco, Mexico.

Type is a ♀ specimen. It is allied to *U. umbrosus* Lea, differing in the narrower anterior end and consequently triangularly oblong form, the hinge-line and basal margin converging strongly forward; the lateral teeth are also shorter. The female is much more swollen posteriorly than in *U. umbrosus*.

It is named in honor of Prof. José N. Rovirosa, known for his botanical explorations in southern Mexico.

This species falls into the genus *Lampsilis* as understood by Simpson. Pending the publication of his classification of the group, it is here placed under *Unio*.

SOME NOTES ON THE LAND SHELLS OF WESTERN FLORIDA.

BY C. W. JOHNSON.

The following notes on the land mollusca are based on a few obtained incidentally while collecting fossils in Western Florida during the latter half of February and the first week in March.

These notes give a more southern and western distribution for a number of species than has heretofore been recorded.

The more southern distribution is undoubtedly due to the direct southerly course of all the rivers, which during freshets carry down great quantities of drift-wood to which a number of the land shells

usually cling for preservation. A more western range for a number of the eastern species would be expected, and more thorough and extended researches would probably show a much greater distribution westward.

In the woods just east of Tallahassee, among the leaves around the foot of some large magnolias and oaks, a number of *Polygyra pustula* and *P. hopetonensis* and a few *Omphalina lævigata* and *Strobilops labyrinthica* were found. Near by in an old decayed log were found *Glandina truncata* (young), *Vitrea indentata*, *Zonitoides arboreus*, *Z. milium* and *Philomyces carolinensis*.

At Jackson's Bluff on the Ocklocknee river, 24 miles west of Tallahassee, is a fine exposure of the Chesapeake miocene. Here a few favorable logs and stones were hastily turned over; under the limestone was found *Helicina orbiculata* and *Glandina truncata*, while from the logs were taken *Omphalina lævigata*, *Gastrodonta suppressa*, a form in which the umbilicus is but slightly perforate, *G. demissa*, *Vitrea indentata*, *Helicodiscus lineatus* and *Polygyra inflecta*; for the latter species this is a more southern locality than has previously been given.

Two miles below Jackson's Bluff is Larkin's Bluff; under some boards and wood near the Bluff only *Polygyra hopetonensis* was found; this is the most western locality from which I obtained this species.

About half a mile below Bailey's Ferry, on the west side of the Chipola river, 11 miles west of Blountstown, is the farm of Mr. J. P. McClellan; here the Chipola bed comes to the surface and the shells are ploughed out in the field. After obtaining a fine lot of the Chipola fossils and several boxes of the marl from which the clay and sand had been washed through a seive, I turned over an old log, just as I was leaving, and found *Gastrodonta intertexta*, the strongly carinated form, but with the usual internal callus. *G. demissa*, the most southern locality from which this species has been recorded. *Polygyra appressa* var. *perigrapta*, formerly recorded only from the mountainous portions of Tennessee and adjacent States, *P. inflecta*, and *P. pustula*, which has not before been reported west of Cedar Keys. In crossing the field near by I found an immature specimen of *P. albolabris*.

While waiting for the steamboat at Blountstown a short stroll was taken through the woods; a search beneath the oak logs disclosed a number of *Polygyra fallax*. It seemed strange how these were confined exclusively to the oak; numerous pine logs were turned over, close by the oak, and all conditions seemed equally favorable, but not a single shell was obtained. *P. fallax* has not to my knowledge been recorded south of northern Georgia. Under the bark of logs, in the drift along the Apalachicola river, was the ever present *Zonitoides arboreus*.

As the steamboat did not connect with the east-bound train, I was obliged to go to Marianna for the night. I had noticed from the car

window the week before an outcrop of limestone at the railroad bridge across the Chipola river, one mile east of town, that I wanted very much to examine, so before train time, the next morning, I made a grand rush for the river. The nummulitic limestone contained but one mollusk, *Pecten perplanus*, but what it lacked paleontologically, it made up malacologically in furnishing a suitable environment for numerous species of snails. A glance showed it to be an ideal collecting ground; limestone, moisture, a varied vegetation, a cave and an old quarry with moss-covered rocks in all directions, is just what the snails want, and visions of a new species or variety formed an active stimulant; for I felt sure that Hemphill, Ferriss or Sargent had not been there. But alas, while the snails were thick, a *nov. sp.* was not to be found by "dis chile." Ferriss would no doubt have found one, for I still believe it's there. *Pyramidula alternata* was very abundant, a coarsely sculptured and beautifully marked form, among which I found a sinistral specimen. *P. perspectiva* was also plentiful; neither of these have previously been recorded from Florida. Among the leaves in front of the cave were numerous fine specimens of *Gastrodonta demissa*, the majority of which are slightly more depressed than the typical form. *Omphalina laevigata* chiefly frequented an old log, while *Helicina orbiculata* were found among the rocks in the drier portions of the quarry. A few specimens of the following species were also obtained: *Glandina truncata*, *Zonitoides arboreus*, *Vitrea indentata*, *Strobilops labyrinthica*, *Bifidaria armifera*, *Polygyra inflecta*, *P. appressa* var. *perigrapta*, and *P. stenotrema*. The latter species have not before been recorded from Florida. In the river drift near the bridge were numerous specimens of *Polygyra auriformis* and a few *Succinea luteola*. As this drift was not the direct wash of the river, but was formed by the water backing up over the low ground along the railroad, I am inclined to think that the two species could be found living among the grass and sedge along the high-water mark.

EPIPHRAGMOPHORA HARPERI, N. SP.

BY F. W. BRYANT.

Shell unbilicate, translucent, white; suture well defined; spire a depressed cone composed of five regularly increasing convex whorls, the first three smooth, the remainder marked by obscure, closely-crowded, oblique lines of growth; base convex; aperture nearly circular, oblique; peristome thin, broadly expanded, and reflexed at lower third of baso-columellar portion, its extremities joined by an elevated ridge, bordering which is a somewhat triangular callus bounded on the inner side by a ridge extending from the middle of the base of the reflected portion of the peristome obliquely to the

upper part of the basal whorl; width of umbilicus about one-fifth greater diameter of shell.

Numerous dark microscopical lines extend from the peristome over the body whorl nearly perpendicular to the lines of growth.

Greatest diam. 17, least diam. 14, alt. 9 mm.

Locality, San Jacinto Mts., California.

A NEW N.-E. AUSTRALIAN AMNICOLOID.

BY HENRY A. PILSBRY.

The species described below was received from Mr. D. Thaanum. It is evidently referable to the genus *Petterdiella*, the synonymy of which is as follows:

Ampullaria sp., Tenison-Woods, Proc. Roy. Soc. Tasmania 1876, p. 117.

Amnicola sp. of various authors.

Brazieria Petterd, Proc. Roy. Soc. Tasm. 1888, p. 76. Not *Brazieria* Ancey, 1887 (see Man. Conch. IX, p. 29).

Petterdiana Brazier, Proc. Roy. Soc. Tasm. 1896, p. 105.

Pseudampullaria Ancey, Ann. Mus. d'Hist. Nat. Marseille I, 1898, p. 148.

All of the above names are based upon *Ampullaria tasmanica* Ten.-Woods.

***Petterdiana Thaanumi* n. sp.**

Shell small, globose, *Ampullaria*-shaped, narrowly perforate; light brown; smooth except for slight growth-lines. Spire short. Whorls 4, quite convex, the last perceptibly flattened below the suture, globose, not angular at the periphery; narrowly excavated around the perforation. Aperture oblique, roundly ovate, narrowly rounded above; outer lip simple; columella concave, wide and flattened; parietal callus short and rather heavy, though very much less thick than in *P. tasmanica*. Alt. 3.3, diam. 2.8 mm.

Near Cairns, Queensland, Australia.

This species differs from *P. tasmanica* in having the last whorl much less dilated towards the aperture, this difference being particularly noticeable when the shell is viewed in the line of the axis from above; the aperture is consequently less ample, and the outline of the shell in a front view is more regular. There is also a fraction of a whorl more than in *P. tasmanica*, the columella is not so wide, and the callus across the parietal margin is comparatively thinner, while in *P. tasmanica* the heavy columellar callus continues across the parietal wall.

This is the second species of the genus, and so far as I know the first to be recorded from Australia.

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No. 1.

NOTES ON THE DISTRIBUTION OF AND CERTAIN CHARACTERS IN THE SAXIDOMI OF THE WEST COAST.

BY ROBT. E. C. STEARNS.

Four species of *Saxidomus* have been described from the West coast of North America and one from Japan. On the American shores its distribution extends from the Gulf of Alaska to San Diego, a range of about 2500 miles. It is remarkably prolific, being found in great abundance in the waters of Puget Sound and in many places between the points above named.

The foregoing applies particularly to the two species *S. aratus* Gould (= *S. gracilis* Gld.), and *S. Nuttallii* Conrad. The other forms, *S. squalidus* Desh., and *S. brevisiphonatus* Cpr., may prove to be only varietal. With our present knowledge, the latter appear to be quite local, or of infrequent occurrence, apparently restricted to Vancouver Island and the shores around the Strait of Juan de Fuca, though Carpenter credits *squalidus* to Oregon and the neighborhood of San Francisco bay. *S. Nuttallii* appears to be more generally distributed and more abundant throughout the region named than *S. aratus*, though in one instance as many as a hundred bushels of the latter were included in a single consignment in 1867 to a San Francisco commission merchant. Notwithstanding its superior quality from an edible point of view, there was no sale for them; it was not a familiar form and the greater part was dumped into the bay.

These were obtained from some point on the shore of Soloma county in the neighborhood of Bodega, the exact locality unknown.

The Indians, Wintuns and Pomos, who formerly inhabited the general region bordering this part of the coast, collected and dried great quantities of the meats of this species, which formed an important part of their food supply, and they also made their disk-shaped beads and money, *hawock*, out of the shells.

Harford's¹ Alaska collection contained examples of *S. Nuttallii*, from Kodiak Island, Sitka, Carter's Bay, and Port Simpson. Dall's voluminous Alaskan notes when published will, probably, show that it is generally distributed throughout the Alaskan region. At San Pedro in the south, it occurs in gravelly mud and sand, associated with *Tapes laciniata*, a sharply sculptured species belonging to a genus that like *Saxidomus* is without a representative on the Atlantic coast. *S. Nuttallii* is ordinarily a much coarser sculptured shell than *S. aratus*, and as would be inferred when its wide distribution and great abundance are considered, varies greatly in proportion of length to breadth and both of these to thickness. The sculpture varies according to the local character of the ground it inhabits.

There are other features worthy of notice; among these the hinge cartilage, etc., and the adductors, the mechanism by which the valves are opened and closed, which is exceedingly conspicuous in *Saxidomus* as compared with *Tivela crassatelloides*, as will be seen at a glance when individuals of the two forms, of the same size, are placed side by side.

Following Dall's analysis of the so-called cartilage,² which he says "is not a cartilage, and which is frequently spoken of as 'ligament,' or 'internal ligament,' [there is] a great need of a distinctive name, and I propose that of 'resilium,' which clearly indicates its function;" the term ligament being used for the upper or external portion or member, which operates *by pulling*, while the resilium or inner portion may be said to operate by causing a *rebound* when pressed, so *resisting the closing of the valves* when they are open; thus these two parts or members act reciprocally, each assisting in its special way in opening the valves. The function of the adductor

¹ Shells collected by the U. S. Coast Survey Expedition to Alaska in the year 1867; Proc. Cal. Acad., Dec. 2, 1867.

² Trans. Wagner Free Institute of Science, Vol. 3, Part III, March, 1895.

muscles is, on the contrary, that of *closing the valves*, and the position of these as related to the position of the compound ligament facilitates exactness in the inter-locking of the hinge teeth. Now these organs or devices for opening and closing the shells are of exceeding prominence in *S. Nuttallii*, and the opportunity for examining a fine series has recently been afforded me, by the gift of a large number for culinary purposes,¹ by Mr. and Mrs. Oldroyd.

The adductors are exceedingly large for shells of the size and weight, and the ligament being in proportionate size to these muscles, makes this form particularly desirable for the study of these characters. When alive and gaping, the least disturbance will be followed by an energetic closing of the shell, with a snap so vigorous as to cause a chipping or fracture of the vertical edges of the valves. The strength and tenacity of the grip, when the powerful adductors are brought into action, may be easily proven by the insertion of the finger-tips into a partially open shell.

The texture or substance of the shells in the *Saxidomi* is less compact or solid than in *Tivela crassatelloides*, and the comparative weight of examples of the same dimensions is as 10 to 13; while the mass of the adductors and ligaments are fully twice as large in *Saxidomus* as in *Tivela*, examples of the same size being compared.

The differences exhibited by these forms, both belonging to the *Veneridæ*, indicate differences in habits and environmental conditions, and no doubt others not readily perceived.

A NEW SPECIES OF SISTRUM.

BY HENRY A. PILSBRY.

Sistrum nicocheanum, n. sp.

Shell imperforate or rimate, fusiform, thick and strong, brownish flesh-colored, the spiral liræ brown. Sculpture of strong, rounded, longitudinal waves equal to their intervals, 8 or 7 in number on the last whorl; these waves crossed by rather strong spiral cords, which widen into transversely oblong low tubercles upon the summits of the waves. Between these cords there are several spiral threads in most or all of the intervals. Whorls about $5\frac{1}{2}$, convex, the last one with concave outlines below, produced in a rather long anterior

¹ This "clam" makes an exceedingly delicious soup or broth.

canal. Aperture oval, flesh-colored within; peristome thick or beveled, armed with six subequal teeth within; columellar margin angular at the origin of the anterior canal, bearing a single small transverse fold above the angle; canal rather straight and long for this genus.

Length $21\frac{1}{2}$, diam. 11, length of aperture and canal 12 mm.

Nicochea, Argentina, Dr. H. von Ihering. Types no. 72640 coll. A. N. S. P.

This species is no. 877 of Dr. von Ihering's register. It has much the general appearance of *Urosalpinx cinereus* (Say), which has about the same contour. The common Antillean *Sistrum nodulosum* is more abbreviated, with far stronger tuberculation and a short anterior canal. It extends southward to Rio Janeiro and Cabo Frio, Brazil (*Cf.* Hidalgo, Mol. Viaje al Pacifico, p. 67, as *R. tuberculata* Blv. var.?).

A NEW GUATEMALAN GLANDINA.

BY HENRY A. PILSBRY.

Glandina Iheringi n. sp.

Shell obesely fusiform or biconic, the diameter half the altitude; pale brown, with occasional dark chestnut or purplish-brown variceal stripes, inconspicuously bordered on the left side with whitish. Surface shining, finely and evenly striated throughout, excepting the smooth apical whorls; spire conic, with nearly straight lateral outlines, the apex rather acute. Whorls $7\frac{1}{3}$, a little convex, the earlier $2\frac{1}{2}$ smooth, separated by a simple suture, the rest very distinctly margined below the suture by an impressed line which defines a narrow band of bead-like tubercles. Last whorl obese, its latter half not rapidly descending, the last suture being consequently nearly parallel with the others, in a dorsal view. Aperture somewhat over half the shell's length, narrow; outer lip regularly arcuate; columella subvertical, concave above, then sinuous and abruptly truncated and excised. Alt. 25, diam. $12\frac{1}{2}$; longest axis of aperture $14\frac{1}{2}$, greatest width $5\frac{2}{3}$ mm.

Alta Vera Paz, Guatemala. Type no. 78036 Mus. Acad. Nat. Sci. (no. 413 of Dr. H. von Ihering's register).

This elegantly marked species is somewhat allied to *G. cordovana*

and *G. speciosa*, both of which, on comparison of specimens, are seen to be much more cylindrical. The latter differs in being decidedly smoother below, even glabrous, while *G. Iheringi* is striated to the base. The body-whorl is strongly swollen and convex, and the narrow moniliferous subsutural border is particularly distinct and elegant.

NEW PISIDIA, AND SOME GENERAL NOTES.

BY DR. V. STERKI.

PIS. IMBECILLE n. sp. Mussel minute, ovoid-oblong in outline, rather inflated; superior and inferior margins moderately curved, posterior slightly truncated obliquely outward, rounded below, antero-superior slightly curved or almost straight (oblique), anterior end rounded; beaks somewhat posterior, broad and low, slightly raised above the hinge margin in the adult; color pale yellowish horn to whitish; surface with very fine striation and a few slightly marked lines of growth, and with a slight waxy gloss; shell thin, hinge very fine and plate quite narrow; cardinal teeth very small, thin, or almost obsolete, lateral teeth small, the outer ones of the right valve scarcely visible; ligament fine.

Size: long. 2.3, alt. 1.8, diam. 1.3 mill.

Habitat: Byer's Trout Pond, and Button Lake, Kent Co., Mich., collected by Dr. R. J. Kirkland.

This is a well characterized species, not nearly related with any other, and can not be mistaken for mature specimens of any one. But it has much resemblance with very young examples of *Pis. variabile* Pr., of the same size, and it takes good care to discern them.—Our species will doubtless be found in other places; in Byer's Pond Dr. K. collected over four hundred specimens, and twenty-five in Button Lake. The name has been derived from its small size, thin shell, low, broad beaks, and some similarity in shape with *Anodonta imbecillis* Say.

Pis. peraltum, n. sp. Mussel of moderate size, somewhat oblique, very high, much inflated, beaks large, full and prominent; hinge margin strongly curved; posterior part, behind the beaks, very short, the margin high, slightly to distinctly truncated, passing into the well rounded inferior, with a wide, regular curve; antero-superior

margin slightly curved in a steep slope to the slightly angular, rounded anterior end; color light yellowish horn in the young and a zone along the margins in older species, in which the upper parts usually are grayish; surface slightly shining, finely and irregularly striated, with some deeper lines of growth usually of darker color; shell rather strong, nacre whitish to grayish, muscle insertions distinct; hinge stout, strongly curved, plate moderately broad; cardinal teeth short, the one in the right valve curved, its posterior part thick, and usually grooved; the anterior of the left valve short, stout, triangular, abrupt, with a deep groove, posterior short, oblique, curved; lateral teeth short, stout, high, pointed, the outer ones in the right valve quite small; ligament short, moderately strong.

Size: long. 3.8 alt. 3.8 diam. 2.8 mill.

Habitat: Crystal Lake, Benzie Co., Mich., collected (over 600 specimens) by Dr. R. J. Kirkland; also in Illinois, Iowa and Kentucky.

Typical specimens are easily distinguished from all other species—except an extreme form of *P. compressum* Pr., from the same place, having rounded beaks without ridges. Yet they are quite distinct. *P. peraltum* is somewhat variable: in some specimens, there are small but distinct projecting angles at the scutum, or scutellum, or both. Others are less high, and the beaks are not so full and prominent.

A few specimens (dead valves) from Havana, Ill., had been received from the Illinois State Laboratory of Nat. Hist. (Mr. Kofoid), in 1895; a few valves from Iowa City, Ia., were sent, in 1896, by Mr. Jas. H. Ferriss, and a few good specimens from Bowling Green, Ky., by Miss S. F. Price in 1899. While all these evidently were of the same *Pisidium*, they seemed not sufficient for establishing a new species upon them, but now proved identical with the Michigan form, and are valuable in showing a wide geographical distribution of our species.

Pisidia are becoming an important factor of our molluscan fauna. Owing to the efforts and the kindness of many conchologists in the United States and Canada, the writer had chances to examine a large number of specimens—over two hundred thousand, during the last five or six years, besides ten thousands of *Sphaeria* and *Calycu-*

linæ. Yet they still represent only a small part of the country, and diligent, careful collecting in many more places and sections is badly needed.

That among such materials there should be many new forms was to be anticipated, but the results were beyond all expectations. This is partly proved by the many species already published. It seems to be necessary to add that the greatest care has been taken in establishing new species. All of them have been seen in every stage of growth; most are represented by hundreds and thousands of specimens, and, in fact, the geographical range of almost all is a wide one. And numerous new forms are in hand, partly have been for years, awaiting new materials for their confirmation. Not only the species in themselves are of interest and value, but also the study of their geographical distribution and their variations. Some of the *Pisidia* are extremely variable, and the same can be said of some of our *Sphaeria* and *Calyculinae*, and their study is very difficult.

This is not the place for an account of the work done by all contributors, a summary of which will be given in a revision to be published. Yet two conchologists have done such work and their success is so unparalleled, the example given by them so suggestive and encouraging, that we can not pass them over in silence.

Mr. Olaf O. Nylander has, since '95, worked up Aroostook Co., Me., and, beside other mollusca, collected and sent for examination about 32,000 recent specimens and large numbers of fossil *Pisidia*. His careful collecting, under great difficulties, in many places over an extensive area of that northeastern part of our country, has added very materially to our knowledge of the molluscan fauna.¹

During the last four years also, Dr. R. J. Kirkland, of Grand Rapids, Mich., has collected and sent for examination about 123,000 *Pisidia* (over 70,000 in '99), and many thousand *Sphæria* and *Pisidia*, most from Kent and some other counties of Michigan. And it is of importance that both these enthusiastic collectors, like some others also, have paid special attention to even the smallest specimens. Thus we became acquainted with some minute species, while the study of the young of all was greatly facilitated. On the other hand, it is very desirable, or rather indispensable, to have as large numbers of specimens as possible at disposition, from every locality.

¹ See Mr. Nylander's list in THE NAUTILUS XIII, p. 102. (Jan., 1900.)

considering the enormous variability of some species, in order to ascertain whether certain forms are really species, or varieties, or local variations.

J. B. QUINTARD.

It is with great regret that we learn of the death of our old correspondent, Mr. J. B. Quintard, which occurred at his home near Silver Lake, Shawnee county, Kansas, on December 17, 1899.

Born at Norwalk, Connecticut, October 21, 1839, he moved with his parents to Knox county, Ohio, in 1847. In December, 1859, he married Miss Madeline I. Watkins, and in May, 1860, they moved to Kansas, where he selected a site on the open prairie and made a home, which he occupied until his death.

He was a great lover and careful observer of nature, and early took up the study of Conchology. By his own labor in collecting and exchanging, he got together a large collection of shells, and especially of the land and fresh-water species. Mr. Quintard was known by correspondence to most western collectors of fresh-water shells, especially the *Unionidæ*.

GENERAL NOTES.

NOTE ON *VITREA RHOADSI* Pils.—The distribution of this species would seem to be much more extended than was indicated when first described (NAUT. XII, 101). I have specimens from Traverse City and Charlevoix in this State, and Dr. R. J. Kirkland has recently discovered it in Ottawa county, which would indicate a general distribution through the western part of Michigan. It has not as yet been noticed in any of the eastern counties. I have also specimens from County Carlton, Ontario; Amherst, Mass., and Orange county, Va., which extend the range much further to the north and east than indicated by Mr. Pilsbry.—BRYANT WALKER.

NOTE ON THE HABITS OF *LIMNÆA MIGHELSI* W. G. Binn.—Extract from a letter of Dr. R. J. Kirkland: "I made a visit to Crystal Lake, Benzie county, Mich., in July and again in October. Along the shores are thousands of dead *Limnæa mighelsi* W. G. Binn.,

and though many hours were spent in July in searching for living ones, not one was found, until an improvised dredge brought them to view from a depth of about twelve feet. Hiring a couple of men to row, about two hundred were taken in half a day's work. This fall, however, I was surprised to see them in shallow water (one to three feet), and I collected over a thousand by wading and picking them up one by one. They were not in groups at all, but scattered irregularly in patches over the bottom. Some of them were half buried in the sand and the greater part resting with the head toward the shore, and where a track was visible, it was a line from deeper to shallower water. During the few days under observation, not a single individual was seen floating on the surface."—BRYANT WALKER.

THE GROWTH OF LAND SNAILS.—Two years ago, nearly, I had sent me two *Helix albolabris* which I put in my wardian case, and have had some thirty or more young from them in two annual crops; the first are about 21 mouths old. One of these perfected the white lip last year. Whether from being so often handled and being in the room where people are moving has made a difference in their habits I cannot say, but this year a portion of their "growing" has been done in full view, and they often do not go into their shells when I take them up.

One snail put an addition to his house of a full half inch at once. I happened to see him as he was finishing; he had built from the umbilicus on one side, then from the farther side which we call the top, and was connecting the two sides when I found him. The connections seemed like tiny crystals thrown from each side, as ice forms in a pail of water, then it was covered with a jelly-like substance, and in a few days after he had added the first thin gelatine-like wall of lip, and now he has the finished hard white lip.

I have often seen one which has the new addition as much like gelatine as possible, then so brittle that the merest touch will break, then like the old shell.—JENNIE M. H. MORRELL, *Gardener, Maine*.

LAND SHELLS FROM REJECTAMENTA OF THE RIO GRANDE AT MESILLA, NEW MEXICO, AND OF THE GALLINAS R. AT LAS VEGAS, N. M.—Prof. T. D. A. Cockerell sent the following species from the localities named. A previous Mesilla list has been given in NAUTILUS X, p. 42.

Shells from flood-debris of the Rio Grande, Mesilla.

Vallonia cyclophorella Anc.	Pyramidula striatella Anth.
Pupoides marginatus Say.	Helicodiscus lineatus Say.
“ “ variety.	Zonitoides minusculus Binn.
Bifidaria procera Gld.	“ singleyanus Pils.
“ hordeacella Pils.	Limnæa humilis Say.
“ hebes mexicanorum Ckll.	Planorbis parvus Say.
Pupa blandi Morse.	“ umbilicatellus Ckll.
Vertigo ovata Say.	Physa, undet. Young shell.

Gallinas River at Las Vegas.

Vallonia cyclophorella Anc.	Vertigo ovata Say.
Bifidaria armifera Say.	Helicodiscus lineatus Say.
“ procera Gld.	Zonitoides minusculus Binn.
“ hordeacella Pils.	

The species of principal interest is *Planorbis umbilicatellus*, not hitherto known from the Rocky Mountain region south of Montana to my knowledge.

H. A. PILSBRY.

TO WEST COAST CONCHOLOGISTS.

Kind Friends: Nearly thirteen years have passed since I published my little book entitled “West Coast Shells.” It was issued with a double purpose; first, to increase the interest of young people in the study of conchology; and secondly, to assist collectors in the work of identifying their specimens. It is believed that both objects have to some extent been realized.

During these years students of conchology have not been idle. Numerous new species have been brought to light, especially on the southern coast, while the scores of intelligent collectors all over the Pacific Slope have learned much concerning the haunts and habits of well-known species. Eastern and foreign investigators and publishers have been busy also, and there has been more or less change of names and classification.

Repeated requests have been coming to me for a revised edition of “West Coast Shells.” I have delayed undertaking the work of revision, partly from the pressure of other duties, and partly from a desire to secure the latest and most complete information concerning the shells themselves, and the most approved names by which they

should be known. While I am strongly opposed to changing old names except for the best of reasons, it is necessary to know what the authorities are doing in these particulars.

My object in sending out this circular is to invite all who are interested in this matter to assist in the work of revision. I shall be grateful to all who have found difficulties in using "West Coast Shells" if they will write to me concerning their difficulties and make suggestions as to improvements.

I wish also to be informed of any errors, either in names or descriptions, that have been discovered, and shall be thankful to receive suggestions that would be helpful in writing new descriptions. Information concerning new species is especially desired; also any recently discovered facts concerning well-known species.

I would be especially grateful to those who have specimens of new species if they would loan me such as I do not already possess, and give me information as to the names, localities, etc., of any species which are not already mentioned in "West Coast Shells," or of any unusual varieties that should be noticed.

JOSIAH KEEP.

Mills College P. O., Alameda Co., Calif., March 21, 1900.

NOTICES OF SOME NEW JAPANESE MOLLUSKS.

BY H. A. PILSBRY.

The following species were mostly sent by Mr. Y. Hirase. They will be illustrated in the Proceedings of the Academy of Natural Science.

Eulota horrida n. sp. Shell broadly and perspectively umbilicated, depressed, the spire very low conoid, nearly flat, periphery angulated, the angle situated high, base convex, inflated. Surface dull, yellowish-brown, shaggy with epidermal flattened processes and filaments, which are arrayed in six or eight concentric series, on the base, and at the periphery; the upper surface smoother. Whorls $5\frac{1}{2}$. Aperture oblique, subcircular, a little excised by the preceding whorl; peristome thin, slightly expanded on the outer and basal margins. Alt. 6, diam. 14, umbilicus 4 mm. Allied to *H. ciliosa* Pfr. and probably to *H. setocincta* A. Ad., but the spire is lower.

Eulota (Trishoplita?) mesogonia n. sp. Shell umbilicate, with

moderately raised, conoidal spire, distinctly angular periphery and convex base. Uniform chestnut colored. Striatulate and densely though indistinctly granulate, the granules elongated in the direction of growth-lines. Whorls $5\frac{1}{2}$, slowly increasing, the last angular at the periphery, slightly descending in front. Aperture oblique, rounded-lunate, the peristome slightly expanded. Alt. $7\frac{1}{2}$, diam. $10\frac{1}{2}$ mm. Prov. Tonga (Gaines).

Ganeselli Jacobii n. sp. Shell rather narrowly umbilicate, semi-globose, thin, pale yellowish corneous; surface striatulate, decussated with incised spiral lines; spire convexly conoidal; whorls $5\frac{1}{2}$, slowly increasing, the last one very indistinctly angular at the periphery in front, becoming rounded on the latter half, convex beneath, excavated around the narrow umbilicus. Aperture oblique, lunate, the peristome narrowly expanded, white, base-columellar margin reflexed. Alt. $13\frac{1}{2}$, diam. $18\frac{1}{3}$ mm.; umbilicus slightly over 1 mm. wide.

Cyclotus (?) *micron*, n. sp. Shell very minute, somewhat discoidal, with low conoid spire and widely open umbilicus; composed of $3\frac{1}{3}$ tubular whorls, separated by deep sutures, the last one barely in contact with the preceding at the aperture; pale corneous, subtranslucent, with delicate growth-striae. Aperture circular, vertical, the peristome simple and thin, continuous. Operculum lodged at the edge, presenting a densely concentrically lamellose external face, the center deeply sunken. Alt. $\frac{3}{4}$, diam. 1.6 mm.

Pomatiopsis Hirasei, n. sp. Shell perforate, turreted, in shape resembling *Pomatiopsis californicus* Pils.; general color pale yellowish green, produced by buff streaks and lines on a light green ground; surface nearly smooth. Whorls remaining 5 (the earlier being eroded or decollate), quite convex, separated by deep sutures. The last third of the last gyration of the suture does not descend as much as the preceding turns, giving the effect of a slightly ascending whorl toward the mouth. Aperture ovate, subangular above, the outline a little flattened on the parietal margin; peristome simple, continuous, black-edged; the columellar margin arcuate, a little thickened and perceptibly dilated. Alt. 9, diam. 4.8, longest axis of aperture 3.6 mm. Operculum ovate, brown, the cicatrix oblong, large, occupying the inner half of the inside face, its edge raised.

I at first thought to place this species in the *Realiidae*; but on examining the radula, I found it could belong neither to that family nor to the *Assiminiidae*, the dentition being far nearer that of *Pomatiopsis*. The formula of denticles is $\frac{3}{2-2}$, 5, 6, 6. The median denticle in the central and admedian teeth is larger than its fellows. This radula differs from that of the American *Pomatiopses* in having two, instead of one, basal denticles on each side of the central tooth. See NAUTILUS XII, 127; X, 37, for information on the American species.

THE NAUTILUS.

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No. 2.

ÆSTIVATION OF EPIPHRAGMOPHORA TRASKII IN SOUTHERN CALIFORNIA.

BY MRS. M. BURTON WILLIAMSON.

When the frost is on the ground and autumn leaves lie scattered over orchards and forests, it is no surprise to find that land snails (*Helices*) have begun their period of hibernation, and lie sheltered under the layers of dead leaves or hidden in decaying trunks of trees. The annual sleep of the snail in winter corresponds well with the enforced rest of the vegetable world; but in a tropical or semi-tropical climate the atmospheric conditions are different, and in place of a winter rest, snails take their annual sleep in summer. The hibernation of snails in colder countries is reversed, and in its stead æstivation of snails is the result. In the eastern states *helices* take their annual siesta in winter, but in southern California snails differ from their congeners, presenting an illustration of the power of environment in modifying instincts. Instead of going into winter quarters in October and remaining from four to six months without food and motionless, the greatest activity of the southern California *Helix* is during the winter months. The reason for this is that the food supply is plentiful in the winter when the warm rains prevail; and during the summer months the arid condition of the foot-hills, the habitat of these quiet creatures, made the æstivation of snails a necessity, a question of economy, an adjustment of demand and supply. In process of time the necessity for æstivation rather than hibernation became a habit.

When snails require rest in southern California they attach themselves to the under surface of dead cacti, pieces of wood, stones, or

burrow in the soil; in every case the aperture of the shell is upward, with the apex below. With its mucus the *Helix* securely glues this aperture to the under surface of any substance to which it attaches itself. These land snails, being non-operculated pulmonates, their apertures are covered by an epiphragm. (In experimenting on a number of *Helix tudiculata* and *Helix traski*, my experience has been that if the epiphragm has been badly punctured, or broken, the snail will die unless circulation is started by applying moisture.) This covering is composed of several layers of hardened mucus which resembles the tough white skin that lines a hen's egg.

In experimenting with helices in a snailery, a wooden box covered with a wire screen and partly filled with soil, I have found that while one species of snail (*Epiphragmophora traskii* Newc.) would fasten themselves to the strip of wood that braced the lid of the snailery, the other species (*Glyptostoma newberryanum* W. G. B.) would burrow in the soil, their black shells almost hidden from sight. In order to test them I have repeatedly interrupted their æstivation by placing their shells in luke-warm water until the helices could crawl about, but they would eventually be found in separate places, *E. traski* suspended above and *G. newberryanum* below in the soil.

During æstivation the snail's functions are in a state of coma, respiration is nearly suspended, and having retired as far as possible within the shell the mollusk is the embodiment of rest. Its waking is not a voluntary action. Without humidity the snail will æstivate for months and continue in a state of torpor for years if the atmosphere is dry around it. Conchologists frequently quote the example given by Dr. R. E. C. Stearns, of the U. S. National Museum, of a Lower Californian *Helix* that rested, or rather remained in a state of torpor for six years! Other cases of prolonged relaxation of the vital functions of snails are recorded.

Some years ago, in March, 1890, I collected a few land snails (*E. traski* Newc.) from some of the low foot-hills in Los Angeles, and on reaching home, finding them glued to the glass jar, they were left on a stand. In the morning two snails had crawled out of the jar and up the wall and were snugly ensconced in one corner of the ceiling, another one had traveled far in the night and had pre-empted his claim in one corner of the hall ceiling. In order to study developments they were allowed to remain *in situ*. One soon fell down upon the carpet but the other two remained intact. The

household orders were that the helices were to be left undisturbed by brush or broom. The summer came and went, autumn followed, winter came on and still our hermaphrodites "held the fort." No sound of mirth nor music aroused them.

But the rains came on, heavy drenching showers that rushed down the mountains, washed the foot-hills, overflowed the ozanjas, and all nature was in a dripping condition. During one of these storms in January, 1891, the rain came down with such force that it made invidious incursions into the hall during the night, and the snail was found on the floor. In an hour it was as willing as ever to struggle for existence. It ate heartily of celery with its little rasping tongue (radula) beset with multitudes of tiny siliceous teeth.

It was not until February 23 that the other *Helix* had been sufficiently overcome by the forces of nature to loosen its epiphragm enough to descend to the floor. It was placed in a shallow saucer of water, and it assumed its functions as though they had not been arrested.

While these house snails were glued to the ceilings, their relatives in the snailery in the garden had been aroused to activity by the first rain as it pattered through the screen cover; and on January 2, 1891, I found a number of tiny pellucid-looking balls carefully hidden in the moist earth in the snailery. These were the eggs of the snails. In less than three weeks there were young snails. Time had been lost by the house snails, their æstivation extending beyond the requirements of nature had gained them nothing.

It was my intention to study all these forms, and while giving a rest to the "house snails," compare their longevity with the garden helices. But, alas, for the rapacity of the animal kingdom, sowbugs, ants and insects from the rose bushes made war upon the whole snail colony, adults, babies and eggs, and by summer time the houses were empty, the tenants were gone!

A NEW SPECIES OF LIMA.

BY W. H. DALL.

Recent excavations involved in the construction of a tunnel through a hill at Los Angeles, California, on the line of Third street, have developed the presence of fossils, probably Pliocene, in the blue clay through which the tunnel is being cut.

Several specimens, more or less crushed, of a large *Lima* are among the forms collected. This species belongs to the general type of *Lima excavata* Fabr., *L. goliath* Sby, etc., and reaches to a length of four and a half inches. The valves are brilliantly polished, and in the middle part unsculptured, the anterior and posterior thirds are finely radially grooved with shallow grooves of which the outer slopes are less steep than the inner; the incremental lines, obsolete elsewhere, appear in the channel of the grooves and cross striate it here and there, giving the effect of obsolete punctation. I may add that close to the impressed area of the shell there are two or three coarser, deeper radial grooves. The species differs from the South Pacific and all other forms of its group known to me in its much finer and more delicate sculpture and brilliant polish. I await more perfect specimens before trying to figure it, but would propose the name of *Lima Hamlini* for the species in honor of Mr. Homer Hamlin C. E., Asst. City Engineer of Los Angeles, who is much interested in the geology and paleontology of the region, and has made valuable studies of the southern California Tertiary. The specimen in hand was kindly forwarded for examination by Dr. R. E. C. Stearns.

A REVISION OF THE PHYSÆ OF NORTHEASTERN ILLINOIS.

BY FRANK C. BAKER.

While working up the fresh-water mollusks of the Chicago area for a report on the Mollusca, the genus *Physa* came up for consideration, and the chaotic condition of the group, judging by the conflicting opinions of conchologists, seemed to warrant a somewhat critical revision of the species found in northeastern Illinois, and incidentally of northern Illinois. The best-known species, *heterostropha*, is little understood, and seems to be more frequently confounded with *gyrina* than with any other form, excepting, perhaps, *integra*.

A large collection of Physidæ, from different parts of the United States as well as from northern Illinois, has been examined, and the writer believes that all of the species found within the area have been elucidated. It is very probable that there are but ten or fifteen valid species of *Physa* in the United States, six or seven of which are to be found in the northern part of this region east of the Rocky Mountains.

During a visit to the Philadelphia Academy of Sciences some time ago, Mr. Pilsbry called the writer's attention to the fact that *heterostropha* had a smooth shell, while *gyrina* and some others had a shell with impressed spiral lines. Following up this suggestion a large number of Physæ have been examined, with the result that instead of there being two species in northern Illinois, there are at least four species and one variety.

The following notes have been made from fully adult specimens, and the figures are outline drawings of photographs, and are therefore accurate.

Key to Northern Illinois Physæ.

- A. Shell smooth, broad, spire short. *heterostropha.*
 B. Shell with impressed spiral lines.
 a. Shell rather broad, ovate, spire short, acute; aperture wide and spreading; whorl $4\frac{1}{2}$ -5; shell thinner than b and c; peristome callus bordered by red. *sayii.*
 b. Shell elongated or cylindrical, narrow, spire generally long; aperture very narrow; whorl 5-6; peristome callus bordered by red. *gyrina.*
 c. Shell broad, inclining to be shouldered; spire sharply conic; aperture roundly oval; whorls $4\frac{1}{2}$ -5; peristome callus white without red border. *integra.*

Physa heterostropha Say. Fig. 1.

Limnæ heterostropha SAY, Nich. Encycl., Amer. ed., pl. 1, fig. 6, 1817. *Physa fontana* HALDEMAN, Mon. pt. 2, p. 3 of cover; Physa, p. 26, 1841.

Shell polished, subovate; whorls $4-4\frac{1}{2}$; spire moderately elevated, acute, the whorls slightly convex; color varying from light horn to greenish; sculpture consisting only of fine growth lines; sutures impressed, margined by a white line which is frequently bordered by a dark chestnut line; protoconch consisting of

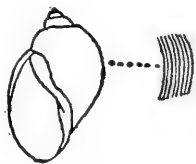


FIG. 1.

one whorl, which is smooth, and varies from porcelain-white to rather dark horn color; aperture rather large, oval, occupying from two-thirds to three-quarters of the length of the entire shell; peristome thin, acute, thickened on the inside by a whitish or bluish callus, which is bordered on the inside with red; columella almost straight, with a whitish callus which is sometimes lined with red.

Length 14.00; width 8.50; aperture length 10.00; width 4.00 mill. (Rochester, N. Y.)

Length 13.00; width 8.50; aperture length 10.00; width 4.50 mill. (Rochester, N. Y.)

Length 13.50; width 9.00; aperture length 10.50; width 4.50 mill. (La Porte, Ind.)

Length 9.00; width 6.00; aperture length 6.50; width 3.00 mill. (Chicago.)

Animal similar to that of *gyrina*. Jaw and radula in all respects like those of *gyrina*. Distribution: eastern and southern states from Maine to Georgia and west to Michigan and Illinois; Southern Canada. Geological distribution: Pleistocene; Loess. Habitat: in ponds and streams, adhering to sticks and stones, and crawling over the muddy bottom.

Only a single lot of shells has been found which could be referred to this species and that was collected in the drift along the shore of Lake Michigan at Miller's, Indiana. The nearest typical *heterostropha* have been found living in Pine Lake, La Porte Co., Indiana. It is very probable that this species is not found in any abundance west of Indiana, its place being taken by *gyrina*, *sayii* and *integra*. Under distribution above, only those states are given from which the writer has seen authentic specimens.

Physa Sayii Tappan. Fig. 2.

Physa sayii TAPPAN, Amer. Journ. Sci. (1), vol. xxxv, p. 369, pl. iii, fig. 3, 1839. *Physa warreniana* LEA, Proc. Phil. Acad. Sci., p. 115, 1864.

Shell polished, ovate, whorl $5-5\frac{1}{2}$; spire elevated, very acute, the whorls moderately convex; color light horn to light chestnut; sculpture consisting of rather coarse growth lines, crossed by numerous fine, impressed spiral lines, giving the surface of the shell rather a wavy appearance, as figured for *gyrina*; sutures slightly impressed, bordered as in *heterostropha*; protoconch consisting of one and a half

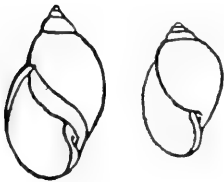


FIG. 2.

smooth, glossy whorls of a dark chestnut color; aperture very large, long oval, three-fourths to four-fifths the length of the whole shell; peristome thin, generally not much thickened within, whitish sometimes bordered with reddish; columella slightly twisted and cov-

ered with a spreading callus; the lower part of the aperture is somewhat produced.

Length 22.00; width 13.50; aperture length 16.00; width 7.50 mill. (Chicago.)

Length 19.00; width 12.00; aperture length 14.00; width 6.00 mill. (Chicago.)

Length 16.00; width 11.00; aperture length 12.00; width 6.00 mill. (Chicago.)

Animal similar in external appearance to all Physidæ. Jaw and radula as in *gyrina*. Distribution: Ohio, Indiana, Michigan, Illinois, Missouri. Geological distribution: Pleistocene; Loess. Habitat: In stations similar to *heterostropha* and *gyrina*.

Remarks: This species was at first identical as *ancillaria* Say, but that species, while having the same surface sculpture as *sayii*, is more inflated, the outer lip more spreading and the body whorl more gibbous, the spire being always much shorter and the whorls more convex. The surface sculpture is very beautiful and precisely as described for *gyrina*. This species is not common, and has been found at Joliet, Maywood, Lake Calumet and Lake Michigan near the foot of Oak Street. *Sayii* is apparently closely related to *ampullacea* Gould, a Pacific coast species.

Physa gyrina Say. Fig. 3.

Physa gyrina SAY, Journ. Acad. Nat. Sci. Phil., vol. 2, p. 171, 1821. *Physa striata* MENKE, Syn. Math., ed. 2, p. 32, 1830. *Physa hildrethiana* LEA, Proc. Amer. Phil. Soc., vol. 2, p. 32, 1841. *Physa cylindrica* NEWCOMB, in DeKAY, N. Y. Moll., p. 77, pl. V, fig. 82, 1843. *Physa plicata* DEKAY, l. c., p. 78, pl. V, fig. 85, 1843. *Physa saffordii* LEA, Proc. Phil. Acad. Sci., p. 115, 1864. *Physa hawnii* LEA, l. c., p. 115, 1864. *Physa parva* LEA, l. c., p. 115, 1864.

Shell elongated, generally polished, whorls 5-6; spire always very long (as compared with the last two species), acute, the whorls in some cases almost flat, and at best but slightly convex, color varying between light-greenish horn and brick-red; sculpture consisting of well-marked growth lines, crossed by numerous fine impressed spiral lines, giving the shell a wrinkled appearance (see figure of sculpture); these lines appear at first to be raised, but when viewed through the microscope are seen to be impressed between two wrinkled ridges, as seen in the cut; sutures scarcely impressed, but

bordered by a porcelain-white line which is rarely edged with chestnut; aperture rather long, long-oval in form, much narrowed at the upper part, more than a half and less than two-thirds the length of



FIG. 3.

the entire shell; peristome thin, thickened within by a callus which is either bordered by a dark chestnut band or else is itself of that color; columella thickened with a decided white callus or plait; the lower part of the aperture is produced; the periods of winter hibernation are frequently marked by a whitish band in the body of the shell; protoconch consisting of a trifle more than one smooth, rounded, dark chestnut-colored whorl.

Length 17.00; width 9.00; aperture length 11.00; width 4.50 mill. (Chicago.)

Length 26.00; width 12.00; aperture length 14.00; width 5.50 mill. (Chicago.)

Length 24.00; width 11.50; aperture length 13.00; width 5.50 mill. (Chicago.)

Length 19.00; width 10.00; aperture length 12.00; width 5.00 mill. (Chicago.)

Length 22.00; width 10.00; aperture length 12.50; width 5.00 mill. (Chicago.)

Animal with a long and rather narrow foot, acutely pointed behind and rounded before, where it is produced into lateral lobes; the foot does not extend much beyond the edge of the shell; color blackish or yellowish gray, dotted or flecked with whitish or yellowish, the dots being distinctly seen through the transparent shell; the front of the head is ornamented by two yellowish spots of good size, composed of numerous minute dots; the mantle is brown, spotted with yellowish, is reflected over a portion of the shell on the right side, and produced into four filiform digitations; tentacles very long and slender, tapering to a point; head distinct, separated from

the foot by a short neck; mouth large, in the lower plane of the head, showing plainly the jaw and radula while the animal is grazing along the side of an aquarium; eyes placed on swellings at the inner base of the tentacles; respiratory cavity on left side of the shell at the lower point where the peristome meets the body whorl. Length of foot 15.00; width 4 mill. extended (Fig. 4).

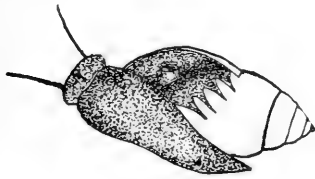


FIG. 4.

Jaw in one piece, arched, striated, provided with a central fibrous projection from the superior surface; ends rounded (Fig. 5, J).

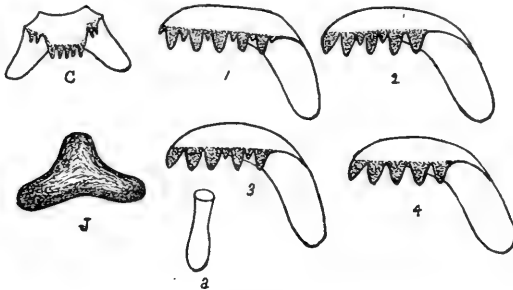


FIG. 5.

Radula: Formula $\frac{95}{13} + \frac{95}{1} + \frac{1}{2.5.2} + \frac{95}{1} + \frac{95}{13}$ (190-1-190); central

tooth more or less quadrate, the lower outer corners being very much attenuated; cusp 9-dentate, 5 denticles being long and narrow, and two on each side smaller and more blunt; laterals in two alternate series, the primary teeth large, obliquely inclined, comb-like; the cusps are very peculiar, and vary to a large degree; some teeth have five long, pointed cusps with six small ones, one between each large one and one at each end (Fig. 5); others have but two small denticles, while still others have one or more between (Figs. 5, 2, 3, 4). The secondary teeth are long and narrow, with a wide, blunt cusp. These latter, as also the central tooth and small teeth between the cusps of the primary teeth, are very difficult to observe (Fig. 5).

Distribution: Probably inhabits the whole of the northern and central parts of the United States and Southern Canada. Geological distribution: Pleistocene; Loess. Habitat: Found very abund-

antly in ponds and streams of greater or lesser size, adhering to sticks or stones, and crawling over the muddy bottom. Inhabits either running water or stagnant pools.

Remarks: This is a very common and handsome species. Its habits are active, moving with a rapid, steady, gliding motion. It is very interesting to watch a number of *Physæ* in an aquarium; as they are crawling along the bottom, one will be seen to rise suddenly to the top of the water and move along with the foot applied to the surface, the shell hanging down. Again, they may be seen descending, suspended by a thin thread of mucus. When the animal rises suddenly, the branchial cavity opens with a faint clicking sound, probably due to the pressure of air in the lung. This species frequently inhabits water as cold as the freezing point, and may be observed in winter gliding along the bottom of a pond when the surface is frozen. The eggs are deposited on stones, the under side of sticks, etc., and are composed of large, glairy, transparent masses.

Several *Physæ* kept in captivity laid four egg masses on April 23, 1897. The egg masses measured 20 by 4 mill., and contained from 120 to 200 eggs. On April 24, ten additional egg masses were laid. The jar contained 15 individuals. On June 3, in the afternoon, the writer noticed a number of young in a jar containing egg masses deposited probably in the latter part of April. The young were half a mill. in length, vitreous in appearance and perfectly transparent. They were very lively, crawling about the jar and feeding voraciously upon the scum found on the sides of the glass. The heart pulsed 120 times per minute. On June 15th the young had increased to one mill. in length. About a week later, unfortunately, the whole lot died, so that no further notes could be taken.

Physa gyrina is by far the most common species of the genus (I might say of any genus) found in the area, and has been found in all parts of northern Illinois. It was at first confused with *heterostropha*, but that species has a smooth shell (see above) and is not found in any numbers in the area; it is very probable that *heterostropha* is not found west of the Mississippi River, and the quotations of this species from western localities were probably founded on *gyrina*, *sayii*, *gabbi*, *integra*, etc. This species is very variable in this region, some forms approaching *ampullacea* Gould, while others might be taken for *gabbi* Tryon, or *virginea* Gould, so far as form goes. It is probable that some west coast names will be added to the above synonymy, when more study is given to this genus.

Physa gyrina elliptica Lea. Fig. 6.

Physa elliptica LEA, Trans. Amer. Phil. Soc., vol. V, p. 115, pl. xix, fig. 83, 1837. *Physa aurea* LEA, l.c., vol. VI, p. 18, pl. xxiii, fig. 106, 1839. *Physa troostiana* LEA, Proc. Am. Phil. Soc., vol. II, p. 32, 1841. *Physa nicklinii* LEA, Proc. Phil. Acad. Sci., p. 114, 1864. *Physa altonensis* LEA, l.c., p. 114, 1864. *Physa febigerii* LEA, l.c., p. 114, 1864. *Physa oleacea* TRYON, Amer. Journ. Conch., vol. II, p. 6, pl. ii, fig. 6, 1866.

Shell differing from typical *gyrina* in being more elliptical, having a shorter, more rounded spire, and hence more convex whorls, the spire, as described by Tryon, "with the outline not elevated above a continuation of the general curve of the body." The shell is also more solid and the outer lip thicker with a very heavy, bluish-white callus. The surface sculpture is the same as in *gyrina*.

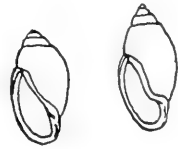


FIG. 6.

Length 15.00; width 7.50; aperture length 9.50; width 3.50 mill.

Length 11.00; width 6.00; aperture length 7.00; width 2.50 mill.

Length 12.00; width 7.50; aperture length 9.00; width 3.75 mill.

Animal, jaw, and radula, as in *gyrina*. Distribution: evidently the same as *gyrina*. Geological distribution: Pleistocene; Loess. Habitat: Almost always associated with *gyrina*.

Remarks: The typical form of this variety seems at first quite distinct from *gyrina*, but in a multitude of forms (the writer has examined several thousand specimens) is seen to fade imperceptibly into the typical form. From observations in the present area, *gyrina* would seem to be dimorphic, consisting of the typical *gyrina* with long spire, and the variety *elliptica* with short, dome-shaped spire. This belief is strengthened by the fact that the two forms are always associated together. It is not quite as common as the typical form.

Physa integra Haldeman. Fig. 7.

Physa integra HALDEMAN, Mon. p. 33, pl. IV, fig. 7, 8, 1841.

Physa niagarensis LEA, Proc. Phil. Acad. Sci., p. 114, 1864.

Shell oval, whorls $4\frac{1}{2}$ -5; spire short, pointed, the whole convex; sutures well marked, sometimes banded by a faint white line; color varying from light yellowish horn to pale brown; sculpture as in *gyrina*, the lines being very deep and the wrinkled edges very convex; protoconch consisting of one and a half smooth, rounded, wine-colored whorls; aperture oval, rather wide, produced at the

anterior end, about two-thirds the length of the entire shell; peristome thin, thickened within the aperture by a heavy white or yellowish callus, which shows through the shell very plainly; it is never bordered by any color stripe; the callus of two or three former peristomes may always be seen on the body whorl and sometimes one or two on the spire; columella

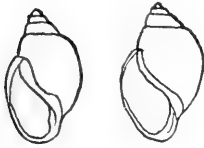


FIG. 7.

broad, flat, white, a callus spreading over the parietal wall.

Length 12.00; width 8.00; aperture length 7.50; width 3.00 mill.

Length 10.50; width 7.50; aperture length 7.50; width 3.50 mill.

Length 10.00; width 6.00; aperture length 5.50; width 3.00 mill.

Animal not differing essentially from *gyrina*. Jaw similar to that of *gyrina*. Radula similar in form to that of *gyrina*, but differing in having six large, nearly equal cusps, instead of five, in the absence, generally, of small cusps between the larger ones, and in the reflection being wider than in *gyrina* or *heterostropha*. The radula of this species is remarkably uniform in the form of the teeth and in the number of the cusps. The central tooth and secondary teeth appeared to be the same as in the species previously described.

Distribution: Great Lakes and St. Lawrence River, New York, Indiana, Illinois, Tennessee, Michigan, Wisconsin. Found in great abundance in Allen's Creek, near Rochester, New York. Geological distribution: Pleistocene; Loess. Habitat: At stations similar to *gyrina*.

Remarks: This species has been generally confounded with *heterostropha*, but will at once be separated from that species by the spiral lines; the general form also is different from any other shell found in this area, and the white callus on the lip is peculiar. It is a common shell at Hickory Creek, Lockport and Joliet, and has been found, though more sparingly, at Calumet Grove, Maywood and at Edgewater. It is more common than *sayii*, but less so than *gyrina*. The specimens from Hickory Creek are quite typical, resembling closely Haldeman's figures (pl. 4, figs. 7, 8) in his monograph of fresh water mollusca.

THE NAUTILUS.

VOL. XIV.

JULY, 1900.

No. 3.

IN SEARCH OF POLYGYRA PILSBERYI.

BY JAS. H. FERRISS.

In the month of February, both in 1899 and 1900, I made trips to Arkansas for health and shells, and on both occasions stopped at Hardy, Sharp county, Ark., on Spring River, which heads at the famous Mammoth Springs, in Missouri. This part of America at some time was plainly lifted by an enormous upheaval, and the limestone came down without regard to good order. The highest points are probably 1000 feet above the sea.

Spring river is a beautiful stream. The water so pure and deep is of a Nile green in color, but in every half mile or so at this point there is a natural dam, covered with fine unios and "periwinkles." When Messrs. Sterki and Simpson have helped me over the hard places, a list of these will be given. I found this year one new Unio anyhow.

Half of one day this year was given to Little Rock, where good collecting is to be found in a rocky bluff near the Iron Mountain bridge.

Upon both trips I jumped to DeKalb, Bowie county, Texas. Last year I went with a party of turkey hunters as far as Little River, in the Choctaw Nation, all in the low lands, then by rail to Tuhskahoma and Poteau, on the Frisco road—another blown-up limestone country. In this part of the Indian nation the road passes between two mountain ranges. It is the prettiest of landscapes, and I am sure in the month of May the snails swarm out of the damp corners and fern-clothed rocks in great numbers to view the scenery. Judging by the government maps of near-by territory, these mountains are about

1,000 or 1,500 feet above the sea. From Poteau, Sugarloaf, a dozen miles away, could be seen, and this knob runs up to 2,000 feet; but a cold wave drove me home before I could make this mountain a visit.

In three days, at Poteau and Tushkahoma I found *Polygyra Bineyana* Pils., *Poly. divesta indianorum* Pils., *Poly. dorfeuilliana percostata* Pils. and *Gastrodonta demissa lamellata* Pils. These places are about 80 and 40 miles east of Limestone Gap, where Simpson found *Poly. kiowaensis*; 50 miles west of Mena, and Mena is 70 west of Hot Springs, where *Poly. kiowaensis arkansaensis* Pils. was found. I never saw either, and I hunted hard.

But in the winter many shells surely could not be found. It was next to impossible to find a mature *Omphalina friabilis* or a *Pyramidula solitaria* alive, but their dead shells were common. Perhaps many of these species, as in the Tennessee mountains, are clannish sticklers for locality.

The *P. dorfeuilliana*, *monodon* and *G. demissa* colonize under logs, a pine log sometimes if charred, but the oaks with a rough bark suit them better. The Mesodons were found by digging. In fact nearly all of my new shells were found by quarrying. The first was *Poly. cragini*, described by Call. This I found on my old farm at Thayer, Kansas, while quarrying sandstone in search of fossil plants. Since then I have been a great digger, looking on the well-drained and ventilated rock, dampened only by the soil, as the best locality to find a new species. High up on the mountains is good ground, I have always supposed because it is a poor place for lazy collectors.

This year a Texas friend, who had a team, wagon and canvas cover, went with me from DeKalb, Texas, to Naples, Texas, on one trip, and then to Mena, Arkansas. I walked, and rolled over the rocks and logs, and he good-naturedly drove the team, and at good places stopped the procession and helped gather the shells. In this journey of over 200 miles I do not think I rode over 15, and I do not think he walked that far, except in our side journeys on foot. At night we made a shed of our wagon sheet, and with a roaring pitch-pine fire in front and plenty of blankets, got along nicely through snow and rain, or when the thermometer dropped to zero a few times.

The rivers were high after having been very low, but we could tell by the remains that it was a very rich region in *Unionidæ* for the seasonable comer. From Naples to the mountains, *P. dorfeuilli-*

ana, *monodon alicia*, *cragini* and *thyroides* were the rule, except on a chalky uplift called Rocky Comfort in Arkansas. Here we found *Helicina orbiculata tropica*, *Bulimulus dealbatus* and *Omphalina friabilis* in the uplands, and *Poly. texasiana* (banded) and *Poly. monodon friersonii* in low land.

Striking the hill country near Horatio, under the first stone outcrop we found *P. albolabris Alleni* and the first *Poly. Binneyana* I had seen alive. Wherever we found a shaded hill-top after that, with an outcrop of rock, we found these shells; and from the number of "bones" scattered about, they must be plentiful on warm spring days. Sometime I hope to get enough for all of my friends. We occasionally found *P. Binneyana* traveling, for there were times a week together when we walked in our shirt sleeves and the frogs and birds were singing.

P. albolabris was found more frequently under logs, but I found only one *binneyana* in that situation. Two *P. albolabris allenii* here usually hibernate together, just under the soil, face upwards. At Hardy I found as many as eight under one log, but the Hardy shell seems to me another variety, or a subdivision of a variety. It is the same as I have found in Kansas, smaller than the Mena *aleni*, more solid and compact, and more perfectly opaque.

From Horatio to Mena it is a clay hill country, and the shells were much the same. At Mena we seemed to strike a truly snail territory. Here the Rich Mountain range is 2,750 feet above sea level, the Fourche and Black Fork ranges were about as high, the Chastats about 2,000 feet, and it was but a little distance to the Magazine Mountain and the Petit Jean range, as high as the Rich Mountains. I found deep, mossy, ferny coves that in the Tennessee mountains would be jeweled with snails. *Gastrodonta demissa brittsi* here was large as *acerra*, and the species were more numerous. It looked altogether more promising. Some day, with an industrious collector, I should like to start from Hardy and never stop until we had gone into the panhandle of Texas. Limestone bluffs and coves are on every hand. There could be new shells every day. With the exception of Simpson's visit to Kiowa, in the Indian nation, and my own trips, the rocks were probably never scratched.

The following is my catch, named with much assistance from Mr. Pilsbry, numbered after the Pilsbry check list:

9a. *Helicina orbiculata tropica* Say. DeKalb, Lanesport, Rocky Comfort, Gilham, Mena.

48. *Vallonia pulchella* (Müll.). Lanesport, one specimen in 1899.

68. *Polygyra leporina* (Gld.). From Mt. Pleasant to Horatio, the animal black as *Z. nitidus* (Müll.), in damp situations, under logs and stones, or feeding about near by; active in winter.

70. *Poly. Dorfeuilliana* Lea. Naples to Mena, sometimes over one hundred in little pockets under logs and stones in well-drained soil. Every lot seemed a little different in color or size, and upon this last trip I collected 1,281. It is abundant in my travels from Arkansas City, Kansas, to Hardy, North Arkansas, to Waco, Texas, and all in between.

70a. *Poly. Dorf. Sampsoni* Weth. Tushkahoma, Ind. Ter., 1899. Fairly plentiful in the rocks.

70b. *Poly. Dorf. percostata* Pils. Poteau, Ind. Ter., 1899. Fairly plentiful on dry mountain side under slabs of sandstone and small logs.

72. *Poly. Jacksoni* Bld. At Poteau in '99. One large specimen found at Mena this year "of the variety with wholly closed axial perforation not uncommon at Fort Gibson."

79. *Poly. Texasiana* (Moric.) Opposite Lanesport in Texas, at Rocky Comfort and Chapel Hill, Ark., next to the water under drift. At Rocky Comfort, banded.

95c. *Poly. Cragini* (Call). Naples, to Mena, under logs in low land, usually. The animal is black and the shell more robust and about one mm. larger than the Kansas type, which is $8\frac{1}{2}$ and 9. The types are a bright, cherry red, these of Ark. nearer the flat corneous brown color of the usual *P. thyroides*.

97. *Poly. inflecta* (Say). Rocky Comfort to Mena.

109a. *Poly. albolabris Alleni* (Wetherby). Horatio to Rich Mountain Station, and at Tushkahoma, I. T. This variety has a thin shell and the color same as *divesta*, glossy. Measures from 28 mm. to 32, and in some cases the umbilicus is partly open.

110. *Poly. exoleta* (Binn.) Mena.

112. *Poly. divesta* (Gld.) A few dead specimens in '99 at Tushkahoma.

112a. *Poly. divesta indianorum* (Pils.) a few dead specimens and young (now alive in my snailery), at Tushkahoma and Poteau in 1899.

112-1. *Poly. Binneyana* (Pils.) a few dead shells and young at Tushkahoma and Poteau in 1899, and one dead at Hardy in drift.

I found it this year from Horatio to Rich Mountain most plentiful in the rocks scattered over the creek bottoms near the city of Mena, in company with *Gastro. demissa Brittsii* and *Poly. larsuta uncifera*. The measurements were from 23 diam. 11 alt., to 28 mm. diam., 13 alt.; all $5\frac{1}{2}$ whorls. In the Chastat Mountains four miles south I found a smaller variety and got a few alive by digging down a couple of feet. These ran from 16 diam., 8 alt., to 20 diam., 9 alt., with not quite 5 whorls.

124. *Poly. thyroides* (Say). DeKalb to Mena, occasionally, under logs in damp situations. Pilsbry will have much to say on this species, I think, as they run from the *clausa* size to the largest *thyroides*, and were so without regard to locality. The large size were usually found in situations suitable for *multilineata*, while the smaller were about the rocks and under logs upon higher ground.

134-1. *Polygyra Pilsbryi*, n. sp. Shell imperforate, lens shaped, about equally convex above and below, corneous-brown, the surface rather glossy, sculptured above with strong, slightly curved, uneven riblets, running with the growth lines; the riblets on the base very uneven or interrupted as though composed of compressed radial laminae, arranged in several concentric circles. Whorls fully 5, slowly increasing, the last carinated at the periphery, abruptly and shortly deflexed in front. Aperture basal, hook-shaped or like the letter "J" reversed; contracted by a long, arcuate parietal lamella, which extends to the axis and is decidedly curved in, or entering, at its outer end, and is connected with the end of the outer lip by a slight callous ridge. Basal lip reflexed and prostrate, with a rather shallow median notch, much more conspicuous in a front than in a basal view. Alt. 5, diam. 10 mm. Rich Mountain Station (Mt. Mena), Polk Co., Arkansas, on mountain, by roadside leading from R. R. station to the hotel, two specimens (one dead).

Allied to *P. labrosa*, from which it differs in the remarkable sculpture and the form of the basal lip and notch. This shell was picked up by my partner, Mr. Jolly.

At the suggestion of Bryant Walker it is named in honor of Dr. Henry A. Pilsbry, the very one who of late years has given conchologists the most delight, by his enormous zeal and industry, and his untiring exactness. I was instructed by Mr. Walker to find something for the occasion as large as *indianorum* or *Ferrissi*, but this shell has unusual features to make up for the disappointment in

size. It is the best novelty in American shells found, I believe, for some time.

138. *Poly. stenotrema* (Fer.). Found a few on the slope of the Chastat Mountains south of Mena.

139c. *Poly. hirsuta uncifera* (Pils.) n. var. In both the Chastat and Rich Mts. at Mena. From its silvery, clean appearance and unusually prominent basal lip, I believed this to be a new variety, and gathered all I could find. When one is out in the woods, by the way, he cannot always tell what is what.

141a. *Poly. monodon fraterna* (Say). Rocky Comfort on the bank of a creek in company with *friersoni* and *aliciae*.

141b. *Poly. monodon aliciae* (Pils.). Mt. Pleasant and Naples, Texas, to Horatio and Ultima Thule, Ark.

141d. *Poly. monodon friersoni* (Pils.). DeKalb, Texas; Rocky Comfort and Cove, Ark.

141e. *Poly. monodon imperforata* (Pils.), n. var. Rocky Comfort, Mena and Cove. Mr. Pilsbry has thrown a bomb into the monodon-Leai camp, and I merely list these, leaving the description for the article he promises the readers of the NAUTILUS.

153. *Bulimulus dealbatus* (Say). DeKalb, Rocky Comfort, Gilham, Mena.

180. *Strobilops labyrinthica* (Say). Cove, one specimen.

184. *Pupoides marginatus* (Say) [*Leucocheila fallax* of authors]. At Cove under rails in an abandoned field, and at Cerro Gordo under logs; plentiful in company with small red *Poly. thyroides* and *Bifidaria contracta*.

186. *Bifidaria armifera* (Say). DeKalb, Lanesport and Mena.

187. *Bifidaria contracta* (Say). Cove.

247. *Omphalina friabilis* (W. G. B.). DeKalb to Mena, most plentiful at Rocky Comfort.

263. *Vitrea petrophila* (Bld.). Mena. This is the first time this species has been found west of the Mississippi. Three others were also found in this catch that may turn out to be a variety of *V. wheatleyi* (Bld.).

270. *Vitrea indentata* (Say). From Morris' Ferry to Mena.

285. *Vitrea Simpsoni* (Pils.). Morris' Ferry to Mena, both under logs and in the rocks, active.

278-1b. *Conulus chersinus trochulus* Reinb. Cerro Gordo, Hatton's Gap and Chastat Mts., rocks and under logs, rare.

283. *Zonitoides arboreus* (Say). Mt. Pleasant, Texas, to Mena, Ark.

291. *Zon. laeviusculus* (Sterki). One in the Red River bottoms in 1899.

297. *Gastrodonta demissa* (Binn.). Morris Ferry to Mena.

297a. *G. demissa Brittsi* (Pils.). Ultima Thule and Mena. At the latter place in stone piles in the creek bottoms I found a large form. The largest measured 10 mm., and I supposed at the time I had run upon *acerra*.

297b. *G. dem. lamellata* (Pils.). From Morris Ferry to Mena. This was generally found under the logs and very often in company with *demissa*. The largest of both measured about the same, 8 and 9 mm. diameter.

338. *Pyramidula alternata* (Say). From Rocky Comfort to Mena. All rather strongly ribbed and dark in color.

367. *Succinea avara* Say. At Mt. Pleasant, Texas, and Cove, Ark.

As space is valuable in this journal, and my search at these points was far from thorough, I will merely give a list of species found at Hardy and Little Rock, Ark., and Dennison, Texas, not included in the above. Hardy is a particularly good locality, as there is a wide range of species. I found *Vitrea simpsoni* here on my last trip, the most northern and eastern limit so far recorded.

119c. *Polygyra appressa* (Say). At Hardy a highly sculptured variety with small denticle upon the upper lip. This variety is known as Say's "variety A." It measures from 18 to 20 mm. diameter.

119d. *Poly. appressa perigrapta* (Pils.), typical. Little Rock. I also have this from extreme northwestern Arkansas.

120. *Poly. elevata* (Say). Hardy.

125. *Poly. clausa* (Say). Hardy.

134. *Poly. labrosa* (Bld.). Little Rock.

190. *Bifidaria procera* (Gld.). At Hardy in '99.

198. *Bi. curvidens* (Gld.). At Hardy in '99.

199. *Bi. pentodon* (Say). At Hardy in '99.

278-1a. *Comulus fulvus dentatus* (Sterki). At Hardy in '99.

338c. *Pyramidula alternata rarinotata* (Pils.). At Dennison, Texas.

239. *Circinaria concava* (Say). Hardy and Little Rock.

340. *Pyramidula solitaria* (Say). Hardy.

342. *Pyr. perspectiva* (Say). Hardy.

346. *Helicodiscus lineatus* (Say). Hardy.

NOTICES OF SOME NEW JAPANESE MOLLUSKS.

BY H. A. PILSBRY.

[Continued from May No., p. 12.]

Bulminus Hirasei n. sp.

Shell rimate, cylindric-conic, rather solid, whitish-corneous or pale reddish corneous, with opaque white streaks and lines. Surface irregularly striatulate and very finely though rather irregularly spirally striate. Spire with quite convex outlines, a trifle attenuated near the obtuse apex. Whorls 8, the first slightly convex, following whorls *almost flat*, the last one more convex. Aperture but slightly oblique, pale reddish-brown within, ovate; peristome white, expanded, thickened within; columella simply concave, without a fold; parietal callus very thin in the middle, thickened toward the ends, having a low tubercle near the posterior angle.

Length 19, diam. 9, of last whorl above aperture 8; length of aperture 8.3 mm.

Length 19, diam. 8, of last whorl above aperture 7.5; length of aperture 7.6 mm.

Kikai, Prov. Osumi, Japan (Y. Hirase).

This species differs from *B. reinianus* Kob. and *andersonianus* Mildf., in the obese form and especially the light coloration. It is much smaller and especially shorter than *B. japonicus* Mildf., which was described from a single beached specimen. *B. japonicus* while decidedly larger, alt. 28, diam. 11 mm., the aperture 11 mm. long, has a half whorl less ($7\frac{1}{2}$), and no mention is made by Dr. v. Möllendorff of a tubercle near the posterior angle of the peristome, such as occurs in *B. Hirasei*.

It is named in honor of Mr. Y. Hirase, of Kyoto.

Bulminus extorris var. **omiensis** n.

Shell rimate, resembling *B. cantori* in general form, large, solid and dark chestnut brown; irregularly striate, the striae more or less cut into granules by very irregular spirals. Spire with convex outlines below, straight above, the last two whorls of about equal diameter; apex obtuse. Whorls $8\frac{1}{2}$, convex, the last rather compressed. White, somewhat thickened within, the ends connected by a white cord across the parietal wall, thickened into a slight tubercle near the posterior angle. Columella concave below, having a short strong fold above.

Length 29, diam. 10, length of aperture 10.3, width 8.3 mm.

Length 29.5, diam. 10, length of aperture 11, width 7.8 mm.

Ibuki, prov. Omi, Japan (Y. Hirase).

I refer this form with some doubt to *B. extorris* Brancsik (Jahresheft Nat. Ver. Trencsiner Comitatus, 1891, p. 81, pl. 7, f. 3), described as probably from Japan; but that species has a narrower aperture very like that of *B. cantori*, and is a more slender shell than this one, with the aperture and diameter less than one-third the length of the shell, while in var. *omiensis* these measurements exceed one-third. *B. e. omiensis* is a narrower shell than *B. japonicus*, with an additional whorl and folded columella. The peristome and parietal callus are more developed than in *B. reinianus*.

***Buliminus callistoderma*, n. sp.**

Shell rimate, thin, *conic*, somewhat translucent, of a brownish olive color; somewhat glossy, *densely granulose* in spiral series. Spire rather straightly conic; apex obtuse. Whorls $5\frac{3}{4}$, convex, the last a little ascending in front, swollen, convex beneath. Aperture irregularly ovate; *peristome thin*, expanded; columellar margin dilated, reflexed above; parietal callus a mere translucent film, not tuberculate or thickened near the posterior angle.

Length 10, diam. 5.5, length of aperture 4.9 mm.

Ogasawara Shima (Bonin I.), Japan (Y. Hirase).

Quite unlike other Japanese or Loo Choo species in its short, conic form, the small number of whorls, thin shell, and densely granulose surface.

(*To be continued.*)

SUPPLEMENTAL NOTE ON PLANORBIS CORPULENTUS SAY.

BY BRYANT WALKER.

Dr. E. W. Hubbard, of Elyria, Ohio, whose catalogue of shells of that State was published at an early date, and who there cites *P. corpulentus* as one of the species represented in his collection, was a grandfather of Mr. George H. Clapp, of Pittsburg, Pa. Mr. Clapp has kindly sent to me for examination two sets of *Planorbis* from Dr. Hubbard's collection, labeled *P. corpulentus*, one from Elyria, the other without locality. Both are *P. trivolvis* and do not differ from that species as usually found. This unexpected verification of the

misconception of Say's species, entertained by the early collectors, is both interesting and valuable.

My attention has been also recently called to the fact that Tryon first formally differentiated the west coast form from *P. corpulentus* as *P. binneyi*, in his review of Binney's "Land and Fresh-Water Shells," Part II, in the Am. Jour. of Conch., III, p. 197 (1867). This citation should, therefore, be added to the bibliography appended to my article in the April NAUTILUS.

The following typographical errors in that article should also be corrected:

In foot-note on page 134 delete the words "part of." Also for "Say," in lines one and three, read "Jay."

On page 136, in the quotation from Mr. Whiteaves' letter, for "five" read "fine."

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE AMERICAN SPECIES OF THE FAMILY DIPLODONTIDÆ. By W. H. Dall (Extracted from the Jour. of Conch. Vol. IX. pp. 244-246, Oct. 1899). Dr. Dall says: "The family Diplodontidæ comprises the genera *Felania*, *Diplodonta*, *Ungulina* and *Joannisiella*. The Cryptodontidæ which have been by some authors united with this group, possess very remarkable anatomical characters, and should be kept separate. *Joannisiella* has long been confounded with *Cyrenoides*, from which much misconception has arisen. The former is a brackish water Diplodonta with a flattened foot, the latter belongs to a distinct group. The typical *Felania* is close to *Diplodonta*, but many Lucinoid shells have been mistakenly referred to *Felania*."

East American Species.

Diplodonta punctata Say (*Amphidesma*). Syn. *D. venezuelensis* Dkr. *D. janeirensis* Rve., *D. subglobosa* C. B. Ads. *D. braziliensis* Mitre, *D. orbella* Gabb, *Mysia pellucida* Heilp. Cape Hatteras to South Brazil.

Diplodonta nucleiformis Wagner. Syn. *D. elevata* Conr., *D. carolinense* Conr. Coast of the Carolinas, 15-52 fathoms; fossil in the Miocene of Virginia and N. Carolina.

Section *Felaniella* Dall, 1899.

Diplodonta caudeana Orb. Marco, Florida, to Brazil.

Diplodonta vilardiboana Orb. Brazil and Argentine coasts.

Section *Phyctiderma* Dall, 1899.

Diplodonta soror C. B. Ads. Jamaica, north to the Florida Keys and Texas; fossil in the Miocene of Virginia and N. Carolina.

Diplodonta semiaspera Phil. Syn. *D. granulosa* C. B. Ads., *L. semireticulata* Orb. Cape Hatteras to Rio Janeiro, Brazil; fossil in the Pliocene of Florida.

Diplodonta puncturella Dall, n. sp. Jamaica; fossil in the Oligocene, Bowden, Jamaica.

Diplodonta platensis Dall n. sp. In 11 fathoms off Rio de la Plata.

Section *Sphærella* Conrad.

Diplodonta verrilli Dall, = *D. turgida* V. & S., 1881, not Conr. 1848. Martha's Vineyard, Mass., to N. Carolina, in 15-69 fathoms.

West American Species.

Diplodonta orbella Gould. (*Sphaerella tunida* Conr. Ms.) British Columbia to Lower California.

Diplodonta tellinoides Reeve. Panama to Guayaquil.

Diplodonta discrepans Cpr. Mazatlan.

Diplodonta subquadrata Cpr. Not *D. subquadrata* Gabb, but perhaps *D. undata* Cpr. Cape St. Lucas to Acapulco and Mazatlan.

Section *Felaniella* Dall.

Diplodonta obliqua Phil. (*Lucina calculus* Reeve). Cape St. Lucas, Mazatlan.

Diplodonta cornea Reeve. Gulf of Nicoya.

Diplodonta sericata Reeve. *Felania sericata* Cpr. Gulf of California.

Diplodonta nitens Reeve. Gulf of Guayaquil.

Section *Phlyctiderma* Dall.

Diplodonta cælata Reeve. Bay of Guayaquil.

Diplodonta semirugosa Dall, n. n. = *D. semiaspera* Cpr. not Philippi. Gulf of California.

DIE CONCHYLIIEN DER PATAGONISCHEN FORMATION. By H. von Ihering. (Neues Jahrbuch für Mineralogie, Geol. und Palæon. Bd. II, pp. 1-46, taf. I, II, 1899.) There are recorded from this formation 69 species. 9 new species are described, followed by general observations on the formation and fauna.

LAND AND FRESHWATER MOLLUSCA OF INDIA, Vol. II., pt. 9. By Lieut.-Col. H. H. Godwin-Austen. The part now before us continues the account of the *Zonitidæ*, a large part of both text and plates relating to the soft anatomy of the various forms. The groups *Macrochlamys*, *Eurychlamys* (n. s.-g.), *Ratnadvipia* (n. s.-g.), *Euplecta*, *Girasia*, *Austenia*, *Microcystina*, *Microcystis*, *Mariella*, *Bensonia*, *Haughtonia* (n. s.-g.), *Nilgira*, *Ariophanta*, *Khasiella* (n. s.-g.) are treated in more or less detail.

In so large an amount of new and interesting information, only a few points can be specially mentioned.

In *Macrochlamys pedina* the spermatheca was found to contain not less than seven spermatophores; and the morphology of the

spermatophore in various Indian genera is discussed at some length. The value of this organ in classification is stated to be not inconsiderable, as it is subject to modification probably generic in constancy. In *Euplecta semidecussata* the vagina (or free oviduct) is swollen above its union with the spermatheca duct, the author interpreting this structure as a provision for retaining the ova, and terming it the "ovithea."¹ In treating of *Mariella*, Godwin-Austen adopts Cockerell's suggestion that the *M. dussumieri* was from Mahé on the southwest coast of Peninsular India, not Mahé, one of the Seychelles. The genus is shown to be closely allied to *Girasia*.

By restricting several parts of his work to Zonitid anatomy, a quantity of data invaluable to other workers in this difficult group has been amassed, although, as Godwin-Austen modestly points out, the time for definite classification of the whole group has not yet arrived.—H. A. P.

GENERAL NOTES.

AGE OF DEPOSIT UNDERLYING LOS ANGELES, CAL.—The discovery of the remains of a species of *Radiolites*, *R. Humlini* Stearns, in the Third Street Tunnel clays in the city of Los Angeles, of which we have been informed, is of exceeding interest through its bearing on the question of the geologic age of the region, which has been in doubt (*Cf. NAUTILUS*, June, 1900, p. 15). The *Radiolites* is a Cretaceous form and not heretofore reported from the west coast.

ERRATA.—For "vertical" in the sixth line of the second paragraph, page 3 of the May number, read "ventral." In the next paragraph, fourth line, after the word ligaments, read "is" instead of "are."

LISTS OF RECENT MOLLUSCA.—Messrs Sowerby & Fulton have issued a series of lists of recent mollusks, enumerating a large number (11,300) of the known species of most of the genera, classified according to late authorities. They are well and accurately printed, and collectors will find them useful and interesting.

TO A SLUG. (IN ALCOHOL.)

Hail, Limax!—clammy, slimy thing,
 Poor houseless wretch, of thee I sing!
 Though ended is thy earthly run,
 Thy glory is but yet begun.
 For Science, with obtrusive pride,
 Will keep intact thy mortal hide
 And suffer thee, for future gain,
 In best of spirits to remain.

Oakland, Cal., Apr. 15, 1900.

H. H. BRUENN.

¹ Perhaps "oötheca" would be better, ovithea being a hybrid word.

THE NAUTILUS.

VOL. XIV.

AUGUST, 1900.

No. 4.

A NEW MUREX FROM CALIFORNIA.

BY WM. H. DALL.

Murex petri Dall, n. sp.

Shell solid, when perfect with an acute produced apex of four or five whorls, followed by four ordinary whorls; nepionic shell with convex shouldered whorls with up to six rounded varices, spirally sculptured with rather prominent threads; color of the shell purplish-brown more or less minutely mottled or articulated with paler spots; surface with obsolete flattish spiral threads stronger on the backs of the varices, and, when perfect, also showing very minute spiral striation; whorls between the varices with a single not very prominent knob; varices flattish, with five or six projecting points or digitations separated by shallow emarginations and slightly excavated on the forward face; these projections are not recurved; anterior face of the varices covered with profuse crinkled imbricating lamellæ; a marked sulcus between the anterior digitation and the canal; aperture ovate, thickened with a projecting yellowish margin without any dentiform process; the interior shows about six nodular denticles on the anterior two-thirds of the outer lip; canal closed, rather long, sharply curved to the right; lon. of shell 65, lat. 32; of aperture lon. 15.6, lat. 11.5 mm.

Habitat, San Pedro, in rather deep water. Mr. and Mrs. Oldroyd.

This shell belongs to a group of Murices which is exceptionally developed on the Pacific coast; having three varices and sometimes a basal tooth projecting from the margin of the aperture. Those

with the tooth belong to the genus *Pterorhytis* Conrad (long called *Cerostoma*) and those without a tooth have had various names applied to them from *Ocinebra* to *Pteropurpura*. Of the allied species *M. californicus* has scaly spirals of three sizes, ending in sharply pointed channelled recurved varical digitations; *M. triatatus* Sowerby has dark brown and white color bands, the shoulder of the whorls excavated, the large posterior digitation of the varices curved toward the apex of the shell, and the varix has no anterior sulcus next the canal. *M. carpenteri* Dall, is nearly smooth; thinner than the others, and with no knobs between the varices on the whorls. All have similar opercula of muricoid type.

A NEW LAMPSILIS FROM ARKANSAS.

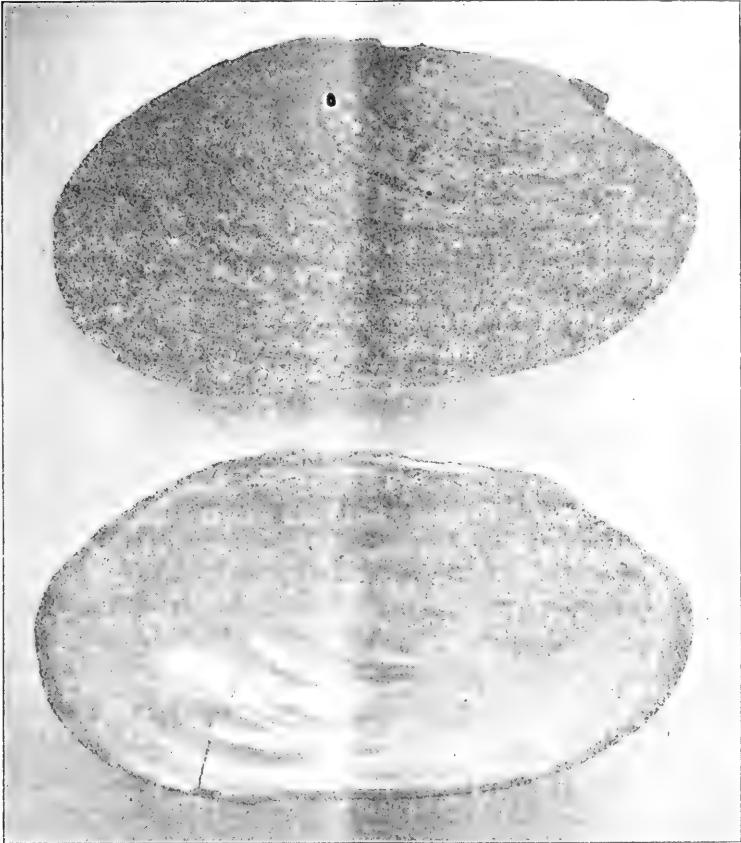
BY JAMES H. FERRISS.

Lampsilis Simpsoni.

Shell sub-solid, elongated, slightly obovate, narrowed in front, and rather evenly rounded at both ends, somewhat inflated, having the greatest diameter at the middle and gradually tapering each way to the ends, feebly gaping at the anterior base and behind, beaks rather low but distinct, their sculpture consisting of ill defined, irregular subnodulous corrugations; epidermis well developed, in the young specimens projecting beyond the shell all around, slightly concentrically wrinkled, and showing the rough irregular growth lines; tawny with green rays and coppery beaks in the young, brownish or blackish in the old state; posterior ridge well marked in the earlier stages of growth. Hinge line evenly curved; pseudo cardinals reduced to mere stumpy vestiges; there are two feeble, remote laterals in the left valve and one in the right; epidermal matter folded in along the hinge line; anterior cicatrices rather deep, irregular; posterior cicatrices shallow; naere shaded violet, bluish and coppery, iridescent behind. Length 95, height 50, diameter 32 millimeters. Spring River, Hardy, Arkansas.

This specimen seems to stand between *Lampsilis tenuissimus* and *L. gracilis*. The former is more compressed, has a stronger posterior ridge, is pointed behind, and is inflated at or just behind the center of the base, and gaps more decidedly behind. It has something the form of certain specimens of *L. gracilis*, but is more elongated and

straighter on the basal line. Three specimens were obtained, one adult, which is probably a male, and two young shells. The latter are very different from young *gracilis*, having the epidermis well projected around the border of the shell, and the outlines of the adult state.



To help commemorate the memory of one who has given nearly a life work towards perfecting the history of the humble clam, I name this in honor of Chas. T. Simpson of the National Museum. Types in my own collection.

NOTICES OF NEW AMERICAN SNAILS.

BY H. A. PILSBRY.

Gastrodonta intertexta volusiae, n. var.

Shell small, *thin and fragile, subtranslucent*, pale brown, somewhat glossy, the surface decussated by impressed spirals cutting fine but sharp striae above, smoother but still decussate below; rather widely perforate. Whorls $5\frac{1}{2}$, the earlier $1\frac{1}{2}$ smooth, last whorl slightly angular at the periphery, quite convex beneath. Aperture *without the slightest trace of callus within*. Alt. 5, diam. 8 mm.

Near "Mount Taylor," an aboriginal mound on the St. John's River, south of Volusia, Volusia Co., Florida; coll. by Pilsbry & Johnson. Types no 75,769 coll. A. N. S. P.

This shell differs from *intertexta* in the very small size, fragile texture, and total lack of an internal callus within the last whorl near the aperture. Some 56 specimens collected agree in these characters; and as I have seen no intermediate specimens, the form may prove be specific. However, the St. John's valley is deficient in lime; the land shells are in some other cases quite thin for their species, a fact which has its weight. But in the Tannersville valley of the Catskills, a sandstone region where snails are rare and actually eat each other's shells for lime, the *intertexta* I found still had the characteristic callus within the mouth.

Alexia myosotis marylandica, n. var.

Inner lip triplicate; outer lip with a conical tooth at its upper third, below which it is thickened by a callous rib.

Mouth of St. Leonard's Creek, Patuxent River, Maryland, collected by Charles W. Johnson.

Pyramidula Elrodi, n. sp.

Shell openly umbilicate, much depressed and acutely keeled, moderately solid. Spire but slightly convex; whorls 5, the first smooth, the next $1\frac{1}{2}$ rather convex, finely and regularly ribbed, the following whorls flattened, impressed above an acute keel which fills the suture, the last two whorls *very strongly, irregularly ribbed*, the ribs running with growth-lines, wrinkle-like; last whorl with *an acute peripheral keel, pinched and concave above and below it*, the keel of the preceding whorl projecting more or less above the suture; base convex, heavily ribbed, the umbilicus large and funnel-shaped. Aperture oblique, irregularly oval, angular at position of

the keel; peristome simple, the margins converging; parietal callus short and rather thin.

Alt. 9, diam. 21-22 mm.

Mission Mountains, Montana (Prof. M. J. Elrod).

This species holds toward *P. strigosa* a relationship like that of *P. cumberlandiana* toward *P. alternata*. Except in being more widely umbilicated and with a wider last whorl, it would be well represented by the published figures of *Epiphragmophora circumcarinata* (Stearns). The ribs are less regular than in the typical form of *P. idahoensis*, but are equally strong. None of the wonderful series of *strigosa* varieties discovered by Hemphill approach this form; which could not, with present information, be considered a sub-species of *strigosa*. It is, like *idahoensis* and *haydeni*, doubtless the terminal member in a differentiation-series from the *strigosa* stock, but the connecting links are wanting in the recent fauna, so far as present collections show.

It is named in honor of Prof. M. J. Elrod, of the University of Montana.

Helicodiscus Eigenmanni n. sp.

Shell similar to *H. lineatus*, but attaining a much greater size, the umbilicus much smaller in comparison with the diameter of the shell. Whorls $4\frac{3}{4}$ to 5, strongly lirate spirally. Aperture more lunate, embracing more of the preceding whorl, usually armed with a pair of small teeth within, as in *H. lineatus*. Umbilicus rather deep and cup-shaped. Alt. 1.9, diam. 4.8 mm., umbilicus 2 mm. wide.

Beaver Cave, near San Marcos, Hays Co., Texas.

This species was collected by Dr. C. H. Eigenmann, the well-known writer on fish morphology.

The specimens are very uniform in character, differing markedly from the common and wide-spread *H. lineatus*. The latter shows but little variation throughout its enormous range, and so far as I can see from a very large series, there is nowhere a tendency to become more narrowly umbilicated. The present form has been found only in the cave mentioned above, and may possibly be a modification induced by underground life, although until the immediate surroundings of the cave are searched, it would be unsafe to more than suggest this. I find only the ordinary *H. lineatus* from other Texan localities. Nothing like *H. Eigenmanni* occurred to me at San Antonio, New Braunfels, or Austin.

DESCRIPTION OF A LAND SHELL FROM SOUTH AMERICA.

 BY C. F. ANCEY.

Eurytus Couturesi. Anc.

Testa ovata, tenuiuscula, subimperfata, nitidula, sub epidermide tenui virenti vel luteo-fusca, plus minusve decidua, sordide purpurea. Spira brevis, obtusa, apice fusco-purpurea, ad summum rotundate subconoidea. Anfractus 4, celeriter crescentes, convexiusculi, sutura impressa, striis incrementi notati et minute granulati; penultimus ad dextram tumidulus; ultimus post mediam partem longe deflexus, malleatus et minutissime granulosus, striis ad suturam pliculosis. Apertura fere verticalis, irregulariter ovalis, superne angulosa, plica columellari callosa prædita, intus livide purpurea. Peristoma undique revolutum et incrassatum, roseo-purpureum, marginibus callo nitido junctis, columellari ad insertionem paululum dilatato.

Long. 38, diam. 22, alt. apert. cum peristomate 22 mill.

Hab. Bolivia (teste G. Coutures).

This is more egg-shaped than either *E. pulicarius* or *E. cathartica*, Reeve, which seem to be its immediate allies. In form it resembles *E. cardinalis* Pfr., from Quito, but is a smaller and much thinner shell. I have seen two specimens precisely alike, differing only in size; the larger one, the type, is in my collection.

DESCRIPTIONS OF NEW ASIATIC SPECIES.

 BY C. F. ANCEY.

1. Limicolaria oviformis, Anc.

Testa obtecte minuteque rimata, obtuso-oblonga, solida, opacula, nitida, sub epidermide decidua pallide stramineo-lutescente, griseolactea strigisque pallide fuscis exilibusque in medianis aufractibus variegata vel flammulata. Spira oblonga, relative parum attenuata, apice valde obtusa. Anfractus 7 convexi, regulariter et lente crescentes, sutura satis impressa, subirregulari; striis incrementi aliisque spiralibus paulo inter se distantioribus regulariter decussata; ultimus

oblongus, rotundatus, post medium lævigatus (striis spiralibus evanidis). Apertura subobliqua, oblongo-angustata, albida. Columella reflexa, incrassata, fere recta. Peristoma rectum, acutum, margine extero antrorsum haud arcuato.

Long. 44, lat. 21, alt. apert. $18\frac{1}{4}$ mill.

Hab. Mountains above Aden, Arabia (Jousseaume).

This is a *Limicolaria* of the typical African group and bears no relation to the species hitherto known from the opposite coast of the Somalis, like *L. Revoili*, Bourg., *Armandi*, Bourg., etc. It is remarkable in being very obtuse and of an oblong shape. The markings are but faint, at least as far as the original specimen is concerned.

2. *Buliminus* (*Petroeus*) *Pilsbryanus* Anc.

Bulimus Jousseaumei, Bourg., in coll.; *not* *Buliminus Jousseaumei*, E. A. Smith, Proc. Malac. Soc., Vol. I., part 4, p. 142 (1894).

Testa oblonga, clause rimata (rima obliqua, basi arcuata), candida, statu omnino recenti verisimiliter pallide luteotincta, solidiuscula, nitida. Spira conideo-oblonga, apice minuto, obtusiusculo, lævigato. Anfractus $7\frac{1}{4}$ convexiusculi, regulariter crescentes, sutura parum profunda discreti, superiores confertim oblique costulati, sculptura in sequentibus debiliore, in inferioribus obsolescenti et præterea lineis spiralibus numerosis indistinctis sub valida lenti passim impressa; ultimus postice convexus, ad dextram excentricus, versus aperturam breviter ascendens, circa rimam impressus et obtuse subangulatus. Apertura fere recta, superne oblique lunata, irregulariter subovata, ad dextram excentrica, ad marginem columellarum leviter oblique rectiuscula, extus valde convexa. Peristoma crassum, callosum, continuum, valide labiatum, planiusculum, latum, undique reflexum. Columella oblique recta, subsinuosa, intus plica valida in dentum acutum desinenti munita. Margines approximati, callo crasso juncti.

Long. 21, lat $10\frac{1}{4}$, long. apert. (perist. incluso) 10; long. ejusd. (peristom. excluso $6\frac{1}{2}$); diam. ejusd. (peristom. incluso) 8; diam. ejusd. (sine peristomate) $4\frac{1}{3}$ mill.

Mountains of Yemen, above Aden, Southern Arabia (Dr. Jousseaume).

SOME NAMES WHICH MUST BE DISCARDED.

BY WM. H. DALL.

In January, 1853, Gray (Brit. Mus. Cat. Brach., p. 114) instituted the genus *Cistella* for *Terebratula cuneata* of Risso and allied forms. This name has been generally adopted and, in the last revision of the Brachiopods by Schuchert, is not credited with any synonyms. But in 1848, Gistel, in his *Naturgeschichte des Thierreichs*, p. xi, proposed the name *Cistella* for a group of Insects. For the Brachiopod, therefore, I propose the name *Argyrotheca*, with the same type.

The name *Euryta* was proposed for a subgenus of *Terebra*, by H. and A. Adams in 1858, and is in general use, but *Euryta* had already been used for an acaleph by Gistel, in 1848, and must therefore be rejected. In its place I would propose *Mazatlaniania*. In 1876 Jeffreys proposed *Glomus* for a remarkable bivalve allied to *Leda*, but he had also been preceded by Gistel, who had proposed the name *Glomus* for a beetle (*Naturg.* p. xi, 1848). The genus may take the name of *Pristigloma*.

The dismemberment of the heterogeneous Linnean genus *Patella* was one of the first tasks of naturalists after the publication of the *Systema Naturæ*. The first author to undertake this necessary work has been generally overlooked. This was Modeer, who in 1793 (*K. vetensk. Akad. nya Handl.* xiv, pp. 110–111) divided the true limpets from those with internal septa or processes and gave to the latter group, with a proper diagnosis, the name of *Cheilea*. This group was subsequently divided by authors who, however, omitted to reserve any portion of the original genus *Cheilea* to preserve the name, as required by the rules of nomenclature. On the five species cited as examples by Modeer, four genera were instituted by Humphrey (after Hwass) in 1797, two belonging to his genus *Crypta*, more generally known as *Crepidula*. In 1799 Lamarck made two subdivisions with new names for three of the species, and added a third in 1809. Ferussac added a synonym to one of Humphrey's names in 1807, and Schumacher did the same in 1817, while a subgeneric name was proposed by Mörch, for one of the two *Crepidulas*, in 1852. What name must we now reject, to reinstate

Cheilea in its rights? There was no diagnosis given with Humphrey's names, only lists of species. Passing them over, we find Lamarck eliminated *Crepidula* and *Calyptrea* with proper diagnoses, though his *Calyptrea* comprised species of two genera. He left behind a single species, which, if Lamarck had been the first to divide the genus, would have kept the name *Cheilea*. On the other hand, he included in his genus *Calyptrea*, a species he should have omitted. The first was named *Septaria* by Ferussac in 1807, and this left only one genus included in the original *Cheilea* unnamed. This was called *Mitrularia* by Schumacher in 1817, but in our opinion this name must be rejected for that of Modeer, which should be adopted for the group represented by the *Patella equestris* of Linnaeus.

PUBLICATIONS RECEIVED.

MOLLUSCA OF THE GREAT SMOKY MOUNTAINS. By Henry A. Pilsbry. Proc. Acad. Nat. Sci., Phila., 1900, pp. 110-150. This is the most interesting faunal list the writer has seen in a long while. It results from the explorations of Messrs. Pilsbry, Ferriss, Bryant Walker, Clapp and Sargent in July and August, 1899, along the Tennessee-North Carolina boundary, among the valleys and on the peaks of the Great Smoky Mountains. In all, fifty-six species of terrestrial mollusca were obtained, among which *Gastrodonta walkeri*, *Punctum blandianum*, and several varieties of different species are described as new. Two things are especially noticeable, one the abundance of endemic species and varieties, the other the absence of many species which one is accustomed to regard as universally distributed in the mountains of this continent. Of course more of the latter may yet be found, but it cannot be purely accidental that the party came upon no *Vitrina*, no *Pupa*, only one *Vertigo*, and that very rare, only one *Bifidaria*, also rare, and no *Vallonia*! In some cases widely-distributed species are represented by segregates which have attained specific rank; thus in place of *Vitrea indentata* there is an abundance of *V. carolinensis* of a small type (var. *wetherbyi*, Ckll. ined.) intermediate between *indentata* and *carolinensis* proper, the exact locality of which is unfortunately unknown. In the case

of *Polygyra tridentata* the differentiation has not gone so far, so that while Dr. Pilsbry describes a mountain race with a more or less double basal tooth, he hesitates to give it a name. Throughout the paper the author, while naming a number of local races, shows a natural reluctance to recognize in the nomenclature all the incipient species which his studies have brought to light. As with the mammals in the hands of Merriam, Allen, Rhoads and others, abundant specimens with exact data have proved what the older authors did not expect; that everywhere segregation is going on, and that the recognizable species and subspecies are far more numerous than we had been led to suppose. Lord Salisbury's statement of a few years ago, that nobody had seen evolution actually going on in nature, appears absurd to the modern zoölogist or botanist. Even the attitude of those who do not believe in varietal nomenclature or the recognition of subspecies has changed. Thus Dr. Skinner, who from sundry published opinions might be regarded as a "lumper," is familiar with and has represented in his splendid collection of butterflies more geographical races than entomologists dream of; and I believe he will admit that if he were converted to the policy of splitting, he might produce a work which would astonish us all.

The writer of this notice believes that detailed studies like those of Dr. Pilsbry are of the highest importance from a philosophical point of view, and that until zoölogists are prepared to recognize the wonderful complexity and variety of living forms, they cannot hope to understand the larger problems of biology. And it seems to him, furthermore, that we should be rational enough to weigh and consider all characters, not merely those which strike the eye. We think of the Sandwich Island Achatinellidæ as being wonderfully diverse, because their diversity is largely that of bright colors and pretty patterns. Why may not the less conspicuous diversity of our simply-colored snails be just as real, and just as worthy of recognition by students of molluscan life?

T. D. A. COCKERELL.

THE ARMATURE OF HELICOID LAND SHELLS, by G. K. Gude (Science Gossip). Mr. Gude has now brought to completion his long series of articles on the genera *Plectopyllis* and *Corilla*, giving a synopsis and key to the former group, a discussion of its geographic

range, and a much-needed index, as the papers extend over a period of several years. A classification into seven sections is offered. These seem in all cases to be excellently founded groups, and decidedly useful in classifying some 75 species which now compose the genus. Few if any groups of Helices of similar extent have been so well monographed. The workman-like manner of the performance shows Mr. Gude to be an acute observer and clear expositor. He is a welcome recruit to the first rank of Helicologists.

LIST OF SHELLS collected by Vernon Bailey in Heron and Eagle Lakes, Minnesota, with notes. Proc. U. S. Nat. Mus. XXII, p. 135-138. DESCRIPTION OF A NEW VARIETY OF HALIOTIS FROM CALIFORNIA, with faunal and geographical notes. Proc. U. S. Nat. Mus. XXII, pp. 139-142. By R. E. C. Stearns, Ph. D. The first list enumerates some 18 species, all aquatic except *Succinea ovalis* Gld., reported from the shore of Heron Lake. A number of noteworthy variations of *Limmaza emarginata* from Eagle Lake are discussed, shouldered, lirate, patulous and variously distorted forms occurring. The second paper describes *Haliotis fulgens walallensis* (Nautilus, XII, no. 9).

GENERAL NOTES.

SHELLS OF LAS VEGAS, N. M.—We have received from Prof. T. D. A. Cockerell another small lot from this locality, collected by Miss Mary Cooper, and including the following species: *Vitriina pfeifferi* Newc. *Pupoides hordaceus* (Gabb). *Bijidaria armifera* (Say). *Bijidaria proceva* (Gld.). *Pupa blandi* (Morse). *Planorbis deflectus* Say. *Pisidium compressum* Pme.

Dr. Rudolph Bergh discusses the anatomy of various Tectibranches in the part of the Malacologische Untersuchungen, Vol. VII., just issued. He adopts the erroneous spelling *Haminæa* for *Haminea*, and retains it in the *Bullidæ*, where it does not belong. An excellent account of the anatomy of *H. cornea* Lam. follows. *Cryptophthalmus* follows, also referred to the *Bullidæ*, and the anatomy is now first described. The genus *Chelidonura* is described anatomically, and referred for the first time to the family *Doridiidæ*, doubtless correctly. This is a most interesting discovery. The

genera *Lobiger* and *Lophocercus* are then discussed. The anatomy of *Akera bullata* and of a new Pacific species of *Phyllaplysia* is also described.

NOTE ON A NEW ABYSSAL LIMPET. Under the name of *Bathysciadium conicum* Dautzenberg and H. Fischer have described* a new deep-water limpet which combines some curious characters. The specimens are simply conical with radiating riblets and an almost membraneous shell, and have a diameter of 1.5 mm. and a height of 0.9 mm. Some anatomical details are given by Dr. Pelseneer in a note appended to the description. The animal was obtained from the beak of a cuttlefish dredged by the Prince of Monaco off the Azores in 843 fathoms.

Like *Lepeta* it is without eyes or ctenidia, the respiration being carried on by the surface of the mantle. The muzzle appears to be without lappets, the right tentacle has an appendix like that of *Cocculina* (supposed to be a degenerate verge), there are no posterior filaments; an unpaired mandible and long radula are present, the nervous system is that of the *Docoglossa*, and the otoliths are single.

Dr. Pelseneer regards the genital gland (otherwise strictly decoglossate) as hermaphrodite, a condition so exceptional, and, considering the minute size of the animal, so difficult to determine, that judgment may fairly be suspended pending further confirmation of it. The radula as figured leads to the belief that except in the absence of the rhachidian tooth (often degenerate in abyssal limpets) the teeth are like those of *Lepetella*; the major lateral being broken into three pieces which have been taken for three separate teeth by the author cited. If this suspicion be correct, the formula is $1 + 2.0.2 + 1$, for a transverse series of the radula. The creature will be the first true limpet (*Docoglossa*) to show any trace of a verge, and if really hermaphrodite, the first to exhibit this character. The single otolith is very likely correlated with the small size of the animal. The genus will stand next to *Lepetella* among the Abranchiate *Docoglossa*.—WM. H. DALL, (*Science*, June 8).

* Bull. Soc. Zoöl. de France, xxiv., p. 207.

THE NAUTILUS.

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SEPTEMBER, 1900.

No. 5.

THE GREAT SMOKY MOUNTAINS.

BY JAMES H. FERRISS.

There was a general round-up of the snails in the Smokies last summer. When the roll of diggers was called at Cades Cove, Dr. H. A. Pilsbry answered to his name, and so did Geo. H. Clapp, of Pittsburg, Bryant Walker, of Detroit, Prof. H. A. Sargent, of Ann Arbor, and I did too. Prof. A. G. Wetherby and Mrs. M. L. Andrews intended to be with our party until the very last moment. The year before, I made the trip as far as Mirey Ridge with Mr. Clapp. With this exception it was my first excursion in company with up-to-date scientists. I have made four trips to the Smoky Mountains and expect to go again this year. On two occasions short stops were made at Burnside, Kentucky, on the Cumberland; at Oakdale, Tennessee, on the Emery; Lookout Mountain, at Chattanooga, and a side trip to the Little Tennessee, at Caringer post-office, or Talassee Ford, and one trip was made into the Unaka range. The Smoky Mountains on the north of the Little Tennessee and the Unaka range on the south (not the Unakas near Roan Mountain), form the boundary between Tennessee and North Carolina.

The readers of the NAUTILUS, I am sure, will be pleased to know something of this party. Briefly in ages, its members ran from 35 to 50; at least I am that high, but they are boys still, and can climb more trees and wade streams worse than ever. Mr. Walker, an attorney, and Mr. Clapp, a business man, I think the handsomest members of the party; and their dispositions, their patience, their interest in the comfort of others really approach the domain of the

angels, and when Mr. Blair, our mountain host, was with the party it made three of them. Mr. Clapp can suffer more and complain less than any entirely earthly being. When lame enough to put an ordinary man in a hospital he will sprinkle on a little taicum powder, keep up with the procession and never say a word. Mr. Walker did not sleep the night after our party separated because Sargent and I were out on the mountains without blankets, and the heathen, the two of us, at that very time were as near the happy hunting grounds, both in altitude and spirit, as we may ever be; with a bed of dry moss and a roaring fire at our feet, we slept sweetly as doves, under a massive balsam in the prettiest park I ever saw in the mountains. The next morning we got over 80 *Polygyra Ferrissi* each, and three were albinos.

For industry, zeal and business (shell business), Sargent and Pilsbry are not to be excelled. Sargent always hunts longer and gets more than any other, and Pilsbry, after a hard day's digging, was ready to clean up my catch any time I would bake biscuit. Not one was a believer in ghosts. It was the most sensible, kindly, lovable collection possible. A sad day came when the company separated. Dr. Pilsbry then borrowed soda of a herder and attempted to bake his own biscuit. He did not have any sour milk, and I think that yellow spot remains in the camp site to-day, a wonder to passing herders and a puzzle to those practical mountain scientists who condense their bulky corn crop into convenient form for transportation in jugs.

Cade's Cove, in Blount county, Tennessee, lying at the base of the Smokies, is 1,700 feet above the sea. It is six miles long, in some places two in width, and out of this valley are many other deep coves running up to the top of Boat and Rich mountains, 3,500 feet above the sea. This valley has been searched more than any we have visited. But last year we found four more kinds, and one of those a new variety. The soil is so fertile in shells, like the sea coast of Florida it will be good ground for many years.

With mountain friends, camp dunnage and mules, we left the settlement soon as possible. There was much rain, and the puncheons in the herder's cabin where we slept the first two nights were very hard, but it was a light-hearted company. There were plenty of snails, and school children were never more delighted or delightful. The pleasant days we climbed the mountain sides, when Mr. Pilsbry

and company talked snails, geology, botany and fungi, is a memory will long live pleasantly with your humble author.

Thunderhead is 5,500 feet according to the government maps, and it rains there every week in my experience and it is more storm-swept than many of the higher peaks. The beech trees and buckeyes are mere scrubs. Blockhouse mountain, of the same height, Coontown, Russell's field and other good coves were hunted over from the first camp. Then we moved along the backbone of the range to Clingman's Dome, some 15 miles farther, passing Briar Knob, the Derricks, Mirey Ridge, Siler's Bald and the Balsam, all over a mile high, and good collecting ground.

Clingman's Dome is 6,600 feet high, covered with balsam fir, and the sphagnum is so deep walking is like tramping on a spring mattress, and very tiresome. When away from a well-beaten trail it is difficult to walk a mile in less than an hour or an hour and a half. Many of the rocks were large as houses, and when we went under for rare shells we carried candles. These feed on the microscopic fungi, I suspect, growing upon the roof, and they seemed to select a roof nearly level. One of the *P. ferrissi* at a time is the rule, but on Andrews Bald, afterwards, we sometimes found as many as eight on one roof. Occasionally *P. clarkii*, *andrewsæ altivaga*, *depilata*, or a *Gastrodonta lamillidens* or *clappii*, would be found on the same roof, but not often.

Bidding the remainder of our party and the mules farewell, as our vacation was longer. Prof. Sargent and I, with a couple of mountain friends, carrying our camp outfit upon our backs, parted company from Pilsbry, Walker and Clapp, and made a trip to Andrews Bald (5,900 feet) from Clingman, though we really started out for Mt. Collins, some 600 feet higher. On Andrews, besides *ferrissi*, we found our finest red *andrewsæ altivaga*, banded with a still darker band. •

The next day we retraced our steps over Clingman and the Balsam to Siler's Bald, where we took the Welsh Bald trail and continued in a southwesterly direction in North Carolina for the next three weeks, with the exception of the two last days. Sometimes we were on the trail all day, while on other days we went only a mile or two. Sometimes we stayed several days in one place. The weather man furnished his best, and only twice were we compelled to build bark shelters to keep us dry.

On Welsh Bald, at an altitude of 5,000 feet, we first found the new variety of *Polygyra edwardsii*, and from a little spring that oozed out from near the top, we found *Pisidium roperi* Sterki. Sargent found this in Minnesota and I had found it in a small pool near Joliet, but the shell is still rare.

We descended to Chambers' Creek one hot afternoon, where it was only 1,500 above the sea. It was a tough slide and both of our mountain friends were sick before starting. From there Sargent made a side trip by rail to Hayesville, N. C., and I first found *Poly. monodon cincta*. And then and afterwards they were mostly dead and found around the basswood and buckeye trees. After a few days' rest, we crossed over to Tuskegee Creek, and in Ramp Cove, on the Tuskegee side of the Yellow Creek Mountains, we first found *Gastrodonta Walkeri* Pilsbry, a new species. It was in company with *significans*. These mountains run up about 4,000 feet, with soil on the slopes rich as a garden.

Passing down Yellow Creek, between the Cheowah and Yellow Creek Mountains, we loaded up with green corn, sweet potatoes and other good things, as the valley is settled. Here we discovered that *Poly. christyi* has a great fondness for the shrub called poison hemlock. The streams were swift and rocky. We found no clams and very few univalves.

At Cheowah river we were down to 1,500 feet again. Hangover and Mount Hayo, in the Unaka range, 5,200 feet, overlook the ford, and the trail we took to these peaks was up a dry pine ridge, steep as the roof of a house, and for the first time in our trip, good drinking water was a little scarce. It took us until 3 o'clock in the afternoon to get up, and all were sore and some were cross.

Every day brought new delights. One afternoon, on Bob Stratton's Bald, 5,400 feet (there is another peak a few miles away called John Stratton's Bald), near Hayo, we found over 200 *G. lamellidens*. We found these in company with *Helicodiscus lineatus*, and *Vitrea carolinensis*, by turning over slabs of stone that lay on top of the ground, and there were sometimes a half a dozen under one stone. The general rule is one *lamellidens* to a dozen or two rocks. The next day, at Glen Cove, a couple of miles lower down the range, we found 130 *Poly. chilhoweensis*. Back on the Little Tennessee river again at Talassee ford, we again found *Gastro. walkerii* at a point less than 1,000 feet above the sea—the lowest point in our trip. One of the

mules and a good walker came to our rescue at Talassee ford and we returned to Cade's Cove, 25 miles in a day. In all we traveled about 150 miles, as measured in a straight line, besides our side trips.

There is much land for the snail hunter here. From the highest peaks we could see mountains 125 miles distant, and it was all mountains as far as we could see in three directions, and over much of this roughness no specimen hunter has traveled.

In the proceedings of the Academy of Sciences of Philadelphia, Dr. Pilsbry has given one of his best reports on the shells of this region. I will, therefore, give merely the list with little more than locality. A number of varieties have been added by Mr. Pilsbry, but not enough.

10. *Helicina occulta* (Say). Rowan Creek in Cade's Cove, 5½ mm., farthest record south.

67. *Poly. pustuloides* (Bld.). Talassee Ford, 2 first trip.

90. *Poly. tridentata* (Say). A double-toothed variety. Rose flats in Cade's Cove, Welsh Bald, Talassee Ford.

91. *Poly. fraudulentata* (Pils.). One only, 13 mm. Welsh Bald, Swain Co., N. C.

96. *Poly. rugeli* (Shuttl.). Everywhere 9 to 15 mm. (Two kinds here sure, the big one is a dirty fellow.)

97. *Poly. inflecta* (Say). Tuckaleeche Cove.

105. *Poly. profunda* (Say). One on Slick Rock Creek in the Unakas in 1898.

106a. *Poly. chilhoweensis* (Lewis). Cade's Cove, Block House, Mirey Ridge, Clingman's Dome, Yellow Creek Mountains, Unakas, Talassee Ford, 27½ to 40 mm.

109. *Poly. albolabris* (Say). Rose Flats in Cade's Cove, Yellow Creek, Cheowah Mountain, 3,400 ft., Cheowah River, Slick Rock Creek (Monroe County, Tenn.). Found in dry situations, dry mountain tops, 32 to 35 mm.

110. *Poly. exoleta* (Binn.). Cade's Cove, Thunderhead, Glen Cove, Talassee Ford.

116. *Poly. ferrissi* (Pils.). Mirey Ridge, Clingman, Andrew's Bald, Welsh Bald. We found only three in two days on Welsh Bald, but got 160 in half a day on Andrew's. I offered to exchange a dozen of these shells with a dealer at the rate of \$6 per dozen. After we had been in Ferrissi territory a couple of days my expert brethren held a council of war and called me down. They said the price

should certainly be high as a dollar each. The next day they raised it to \$3 and before we parted they said, taking the rarity and beauty of the shell and the difficulties of finding it all into consideration, the price should be \$5 and railroad fare paid to the spot. Our experience at Andrews would tend to lower this price, but Andrews is 25 miles from civilization, the miles are wild ones, and whoever starts out to hunt *ferrissi* on speculation, I still believe will earn his money.

118. *Poly. palliata* (Say). Cade's Cove, Russell Field, Chamber's Creek, Tuskegee Creek, Slick Rock Creek, Talassee Ford.

119d. *Poly. appressa perigrapta* (Pils.) all along the route.

121. *Poly. clarki* (Lea). General in deep coves but sparingly, 18mm.

123a. *Poly. andrewsæ normalis* n. var. (Pils.). Mr. Pilsbry has added two varieties to *andrewsæ* and some day there may be others. Those on Thunderhead (*altivaga*) approached the small, thin, greenish, smoky type, but many are banded. They measure 22 to 24 diameter. The types I have from Roan Mountain are 20 to 23. *Normalis* finds its way to the lower altitudes, 1,000 ft., and apparently thrives as well as upon Mirey Ridge or Bobs Bald, and it is quite generally distributed—Cade's, Welsh Bald, Chamber's Creek, Tuskegee, Yellow Creek, Slick Rock, Citico Creek and Talassee Ford. It has been white or russet colored so far, and the largest with the highest spires were found on Mirey Ridge at an elevation of 4,500 and on Citico Creek at 3,000. The largest measures 40 mm. diameter, 25 altitude (Citico), 38½ diameter, 24 altitude (Mirey). Usually 31 to 35 diameter, occasionally with a small tooth on parietal wall. Sociable and active. The best traveler in the range.

123b. *Poly. andrewsæ altivaga* (Pils.). n. var. Thunderhead, Mirey Ridge, Clingman's Dome, Andrew's Bald. We did not find this after leaving this range, and it was always at the mountain top or the nearest basswood and buckeye belt, under stones or moss. On Mirey Ridge only, it occupies the same territory with *normalis*, but not often found in the grass or in the open. Unless further divided its colors are white, greenish or smoky white, cherry red, and both colors sometimes banded with a darker red band as in *profunda*. Sometimes there is an additional line at the suture and some are half and half, dark above and light below. (Mirey, N. C. side.) 22 to

25 diam. Largest red colored forms were found on Andrews but our stay was short and we found but few. This variety is more often toothed than normalis. In some localities 43 per cent. had teeth on the parietal wall. About $\frac{1}{2}$ are banded. On one slope of Mirey Ridge all were white, upon another all half and half, and upon another a fourth were red, the others white and banded. Upon Clingman and Andrews the choice "rediiis" were the most common. This variety furnishes the most entertainment and has caused more shouting and singing and expressions of joy and perplexity of any in the Smokies.

124. *Poly. thyroides* (Say). Welsh Bald, Chamber's Creek, Talassee Ford.

125. *Poly. clausa* (Say). Talassee Ford.

126. *Poly. wheatleyi* (Bld). All along the route in very damp situations.

This is the most variable shell of this region. At Cade's the measurements were 16 to 18 mm. diam. All dentate, all hirsute, large flaring lip and a few were albinos. The same measurements prevailed at Block House. On Clingman they dropped back to 13 and 14 diam. and some were not toothed or hirsute and quite globose, with narrow lip. At Welsh Bald we found part of both. At Tuskegee and Cheowah all were small and only partially dentate or hirsute. Ascending Mt. Hayo, we again found the 13 mm. variety up the sides and at the top. Two miles further we found on Bobs Bald a large variety I first supposed to be *ferrissii*. It was not hirsute but deeply sculptured and 2 or 3 were dentate. 23 mm. On our return to Cade's in Brannon's Cove, we again found the small globose form, the smallest being only 12 mm.

127. *Poly. christyi* (Bld.). Cade's Cove, Tuskegee Creek, Cheowah river, in flat ground near streams.

136a. *Poly. edwardsi magnifumosa* (Pils.). n. var. Welsh Bald, Chambers' Creek, Tuskegee Creek, Mt. Hayo, Glen Cove. Mr. Sargent also found this at Hayesville, N. C.

138. *Poly. stenotrema* (Fer.). Cade's, Welsh Creek and south of Little Tennessee. At Chambers' Creek south side of Little Tennessee and at Talassee Ford we found it measuring 13 mm.

138b. *Poly. depitata* (Pils.). Cade's, Thunderhead, Mirey Ridge, Clingman, Andrew's Bald and Bobs Bald. Under moss and stones.

139a. *Poly. hirsuta pilula* (Pils.). n. var. Cade's Cove and

Thunderhead only. Do not remember of ever finding the typical *hirsuta* in these mountains.

141c. *Poly. monodon cincta* (Lewis). Tuskegee Creek, Yellow Creek, Mt. Hayo, Glen Cove, Talassee Ford.

180a. *Strobilops labyrinthica strebeli* (Pfr.). Cade's Cove, Yellow Creek Mountains.

187. *Bifidaria contracta* (Say). Cade's Cove.

194. *Bifidaria corticaria* (Say). Cade's Cove.

225. *Vertigo gouldii* (Bid.). Cade's Cove.

226. *Vertigobollesiana* (Morse). Cade's Cove. These four species very rare.

235. *Cochlicopa lubrica* (Mull). Sugar Cove in Cade's. One specimen by Sargent.

239. *Circinaria concava* (Say). General. Largest $23\frac{1}{2}$ diam.

246a. *Omphalina fuliginosa polita* (Pils.). Cade's Cove, Coontown, Chambers' Creek, Talassee Ford. At the two last named places on the Little Tennessee the shells were as light colored as the typical *fuliginosa*, but polished. There were no black forms at these points.

248. *Omphalina lævigata* (Pfr.). Cade's Cove, Cheowah river. Only a few found at the latter place and these were dark colored and as well polished nearly as *Omp. Andrewsæ*. Largest 20 mm. diam., 12 altitude.

248a. *Omp. lævigata perlævis* (Pils.). n. var. Talassee Ford.

248b. *Omphalina lævigata latior* (Pils.). n. var. This variety has given me trouble since I saw it on my first trip to Tennessee. It is much larger than type, much depressed and a light "Melantho" blue in color. As I read shell music by ear, it has very little resemblance to the typical form. The largest from Talassee Ford measured 28 diam., 10 altitude. Also found at Chambers' Creek.

250. *Omphalina subplana* (Binn). All along the route in damp moss. On the Unakes the shells were very fragile, sometimes the shell was a mere membrane but large and healthy otherwise. It is as much of a cannibal as *concava*. Largest (Mt. Hayo) 24 diam., 10 altitude.

252. *Omphalina andrewsæ* (Pils.). All along the route. In Cade's Cove there is a light colored form, faintly banded with darker color. Largest 18 mm. in diam. 16 is large.

252a. *Omp. Andrewsæ montivaga* (Pils.). Cade's Cove, Mirey

Ridge, Welsh Bald, Mt. Hayo. Largest $20\frac{1}{2}$ greatest diam., 16 smallest diam.

253. *Vitrinizonites latissimus* (Lewis). Cade's Cove, Block House, Thunderhead, Mirey Ridge, Siler's Bald, Balsam, Clingman, Andrew's Bald, Welsh Bald, Mt. Hayo, moss and stones.

253a. *Vitrinizonites latissimus uvidermis* (Pils.). n. var. Thunderhead, Mirey Ridge, Clingman's Dome. These two often associate with the above, but not always. It is more active in its habits. The elastic shell is so thin our specimens collapsed, and in fact the shell is worn indented and crushed in by its rightful owner. It is darker and larger than the type. The largest are 19 greatest diam.

263a. *Vitrea petrophila pentadelphia* (Pils.). n. var. Named after the five of us. At Cade's Cove, Cheowah River and Bob's Bald; found by mining.

270. *Vitrea indentata* (Say). Cade's Cove. Greatest diam. 5 mm.

271. *Vit. sculptilis* (Bld.). At nearly all points high or low, but never abundant. It is one of the most beautiful of mountain shells, being a warm pink in color, but from improper handling, perhaps, this beautiful tint fades away. Largest 10 diam. Binney reports $12\frac{1}{2}$.

272. *Vit. carolinensis* (Ckll.). Generally distributed along the route, under rocks; a brigadier indentatus. Largest $8\frac{1}{2}$, found by Mr. Clapp on Mirey Ridge.

274. *Vit. capsella* (Gld). Cade's Cove, Chambers' Creek.

276. *Vit. capsella placentula* (Shuttl.). Cade's Cove.

278. *Conulus chersinus* (Say). Cade's Cove, 3 in 1898.

283. *Zonitoides arboreus* (Say). As far as Tuskegee river and again at Talassee Ford.

287. *Z. patuloides* (Pils.). Cade's Cove, very sparingly.

295. *Gastrodenta intertexta* (Binn.). Cade's Cove, Mirey Ridge, Welsh Bald, Chambers' Creek, Yellow Creek Mts., Tallassee Ford. Largest 17 diam. Never plentiful, fond of poison hemlock; sometimes albino as all these mountain shells seem to be.

296. *Gastro. acerra* (Lewis). One of the common kind all along the road. It shows much variation without change of locality. My largest is 18 diam., $10\frac{1}{2}$ alt. Another of only 17 diam. is $13\frac{1}{2}$ in alt.

297. *Gastro. demissa* (Binn.). Cade's Cove.

301. *Gastro. gularis* (Say). Common on the route.

302. *Gastro. suppressa* (Say). Brannan's Cove and Chestnut Flats in Cade's Cove, Chambers' Creek.

305. *Gastro. elliotti* (Redf.). General but not plentiful.

306. *Gastro. interna* (Say). Welsh Bald and south of Little Tennessee, plentiful.

307. *Gastro. significans* (Bld). Cade's Cove, Yellow Creek Mts.

309. *Gastro. multidentata* (Binn.). Talassee Ford, found one first trip.

310. *Gastro. lamellidens* (Pils.). Thunderhead Block House, Coontown, Mirey Ridge, Clingman, Cheowah River, Bobs Bald. 4 mm.

310-1. *Gastro. Clappi* (Pils.) Thunderhead, Block House, Mirey Ridge, Clingman.

310-2. *Gastro. Walkeri* (Pils.). n. sp. Cheowah river, Yellow Creek Mts., Talassee Ford. Diam. 29, altitude 1.45.

The last five belong to the Taxeodonta group; the other member, *andrewsæ*, is found at Roan Mt., about 75 miles east of Clingman.

338. *Pyramidula alternata* (Say). Andrew's Bald, Chambers' Creek, Yellow Cr. Mts., Yellow Creek and Unaka range; depressed and small. 18 mm. At Cade's two were found of the Knoxville type, large, whorls round and epidermis crinkled. 25 mm.

338b. *Pyr. alternata costata* (Lewis). Cade's Cove and Thunderhead only. 20 mm.

342. *Pyr. perspectiva* (Say). Common, large and toothed. 10 mm.

346. *Helicodiscus lineatus*, Cade's Cove, Mirey Ridge, Tuskegee Mts., Bob's Bald.

347. *Helicodiscus fimbriatus* (Weth.). Talassee ford, two first trip.

348. *Punctum Blandianum* (Pils.). n. sp. Found by Mr. Clapp, in 1898, on a tulip tree stump at Brannan's in Cade's Cove. These stumps beginning to decay, make fine feeding ground for little fellows.

362. *Succinea obliqua* (Say). On the very top of Thunderhead, Mirey Ridge and Clingman.

Goniobasis saffordi (Lea). Chambers' Creek.

Goniobasis proxima (Say). Welsh Bald branch. Tuskegee Creek.

Pleurocera trivittatum (Lea). Talassee Ford.

Pisidium roperi (Sterki). Welsh Bald.

Between Knoxville and Cade's Cove, 35 miles, the following are found, *Poly. elevata*, form *cincta*, Taylor; *Poly. spinosa* (Lea); *Omphalina kopnodes* (W. G. Bin.); *Gastrodonta macilenta* (Shuttl.) and *Pyr. Bryant* (Harper).

A NEW PHILOMYCUS.

BY T. D. A. COCKERELL.

Philomycus secretus n. sp.

Length (in alcohol) 12 mm Mantle very dark grey, with numerous small black spots, best seen at the sides. Body pallid, sole whitish with an ochreous tint:

Jaw light yellow, arched, with five strong ribs in the middle, nearly the outer thirds being ribless. Teeth 9-11-13-1-13-11-9. The side cusps on both centrals and laterals are very small. Penis-sac as Binney describes for *P. hemphilli*.

Hab.—Roan Mtn., Mitchell Co., North Carolina. (A. G. Wetherby.)

Mr. Wetherby sent me two specimens with these remarks: "A small slug found here which I am quite sure has never been described. It is never larger than these specimens; lives deep down in drifts of damp leaves, and never comes to the surface so far as my careful observation of it for the last ten years goes to show. It is "sluggish" in its habits; about all it will do when brought to the light is to cautiously protrude its very short tentacles." (Litt., March 22, 1899.)

By its jaw characters, this resembles only *P. hemphilli*. From that, as described by Binney, it differs mainly in being only half the size. Mr. Wetherby knows both species, and states that the present animal is uniformly small; further, although I was not able to make a satisfactory examination of the anatomy, the genital organs appear to be fully developed.

ON SOME JAPANESE LAND SNAILS.

BY H. A. PILSBRY.

In a former paper on Japanese snails, I identified a species of *Eulota* from Ushika, prov. Teshio, with the *Helix læta* of Gould, but

that name being pre-occupied, I gave the new name *Eulota gainesi* to my specimens. Further study of the group with more material, and notes on the type specimen of *læta*, kindly supplied by Prof. Dall, shows that *E. gainesi* is perfectly distinct from *læta*.

I propose now to designate as *E. gudeana* n. sp., a large greenish species, also from Ushika, Teshio prov., Hokkaido, which has somewhat the aspect of *Natalina caffra*, and which differs from *E. gainesi* in the broader form, less plicate surface, and the peristome, which is barely everted outwardly, becoming expanded below and reflexed at the columella, whorls 5.

Alt. $27\frac{1}{2}$, diam. 37 mm.

I regard *Helix læta* Gld. (not Pfr.) as a less-developed race of this species; and the name being pre-occupied, I propose to call this Hakodate form *Eulota gudeana hakodatensis*. It is more fragile than *gudeana*, smaller, diam. about 26 mm., and yellowish-brown, with two brown bands above. Types of *E. gainesi*, *E. gudeana* and *E. g. hakodatensis* are in the collection of the Academy.

Figures of these several species and races will appear in the Proceedings of the Academy of Natural Sciences.

***Eulota callizona dixonii* n. var.**

Shell rather narrowly umbilicate, globose-pyramidal with high-conic spire, rather thin and smooth; greenish-corneous, usually with a black brown peripheral band, a narrower subsutural band, and a large basal patch formed of the united basal band and umbilical patch. Aperture rounded-lunate, oblique, the lip broadly expanded, thickened within, reflexed below, purplish flesh colored, and at the terminations of the bands purple-black. Alt. $32\frac{1}{2}$, diam. 33 mm.

Inga, prov. Hoki, in southwestern Hondo. Type no. 76263 coll. A. N. S. Phila.

This form has hitherto been erroneously united to *E. callizona* Crosse, or *E. amalixæ* Kobelt. The latter is probably nearest, its area of distribution lying chiefly northeast of that of *dixonii*, while *E. callizona* is undoubtedly the northern fringe, so to speak, of the *amalixæ* stock, and came in all probability from the Hakone region.

A small form before me from Hagi, Nagato Province, is clearly related genetically to *dixonii*, and not referable to *callizona*.

GENERAL NOTES.

Apropos of the note on *Bathysciadium* in the last number (p. 48), it might be well to state that Prof. Wilcox found *Aemæa fragilis* of New Zealand to be hermaphrodite, and exceptional specimens of another species have also been stated to have both male and female reproductive organs. These facts render the case of *Bathysciadium* less exceptional. It is noteworthy that the deep-water limpets, like the Chitons, belong to the lowest groups in their respective orders.

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CATALOGUE OF SPECIES OF THE GENUS PHENACOLEPAS, PILSBRY.

BY HENRY A. PILSBRY.

Some years ago I compiled a list of the species of this genus with a view to writing a more complete monograph than that in the Manual of Conchology. Other work preventing this undertaking, I think it may prove useful to publish the mere list of species described up to 1900, with appropriate references, and the original localities. Most of the species were originally described as *Scutellina*, a pre-occupied name which I changed as above (NAUTILUS V, p. 88, Dec., 1891). The arrangement of species in this list is chronological, and each is given under its original generic name.

1819. *Patella galathea* Lamarek, Anim. s. Vert., vi, pt. 1, p. 334; Delessert, Rec. de Coq., pl. 23, f. 10.

1834. *Scutella crenulata* Broderip, P. Z. S., 1834, p. 48. Chain Island, S. Pacific. See also P. Z. S., 1865, p. 197 (Formosa).

1846. *Patella cinnamomea* Gould, Proc. Bost. Soc. N. H., ii, 151; U. S. Expl. Exped. Moll., p. 345, f. 449. New South Wales.

1852. *Crepidula osculans* C. B. Adams, Catal. Shells Panama, p. 234. Panama.

1854. *Scutellina arabica* Rüppell, H. & A. Adams, Gen. Rec. Moll., i, p. 461 (nude name), iii, pl. 52, f. 6b.

1854. *Scutellina ferruginea* A. Adams, Genera i, 461; iii, pl. 52, f. 6, 6a = *P. cinnamomea* Gld., teste Angas, Smith and Brazier.

1854. *Scutellina asperulata* A. Ad., Genera i, 461 (nude name). = *P. galathea* (Lam.), teste E. A. Smith.

1854. *Scutellina costata* A. Ad., Genera i, 461 (nude name) = *P. galathea* (Lam.), teste E. A. Smith.
1854. *Scutellina elongata* A. Ad., Genera i, 461 (nude name).
1854. *Scutellina granulosa* A. Ad., Genera i, 461 (nude name).
1854. *Scutellina lævicostalis* A. Ad., Genera i, 461 (nude name).
1855. *Scutellina navicelloides* Carpenter, Mazat. Catal., p. 211. Mazatlan. = *P. osculans* (C. B. Ad.), teste Carpenter, P. Z. S., 1863, p. 361.
1857. *Acmaea hamillei* Fischer, Journ. de Conchyl., v, 1857, p. 277; 1872, p. 145, pl. 5, f. 6. Guadelupe, French West Indies.
1859. *Scutellina unguiformis* Gould, Proc. Bost. Soc. N. H., vii, 162. Kagosima, Japan.
1859. *Scutellina scobinata* Gould, t. c., p. 162. Oosima, Japan.
1860. *Scutellina cancellata* Pease, P. Z. S., 1860, p. 437. Sandwich Is. Mr. D. Thaanum has found this species at Hilo, Hawaii.
1868. *Scutellina compressa* Pease, Amer. Journ. of Conch., iv, 99. Tahiti.
1868. *Scutellina granocostata* Pease, t. c., p. 100. Hawaii.
1868. *Scutellina aculeata* Pease, t. c., p. 100. Hawaii.
1871. *Scutellina pulchella* Lischke, Mal. Blätter xviii, p. 41; Jap. Meeres-Conchyl. ii, p. 100, pl. 6, f. 20-23. Nagasaki, Japan.
1877. *Scutellina squamosa* Garrett in Catal. Mus. Godeffroy, vi, p. 91, no. 11030, Viti Is., no description, probably = *P. galathea* Lam.
1882. *Scutellina fischeri* Rochebrune, Bull. Soc. Philomathique, 1881, p. 29; Nouv. Arch. du Mus. IV, 1881, p. 269, pl. 18, f. 9. Santiago, Cape Verde Is.
1890. *Scutellina antillarum* Shuttlw. in Dall, Blake Gastrop., p. 342, pl. 31, f. 10, 11. Key West, Fla. = *Phenacolepas hamillei* (Fischer), see Man. Conch. xiii, p. 36.
1899. *Phenacolepas senta* Hedley, Mem. Australian Museum, iii, pl. 7, p. 403, fig. 1 (March 9, 1899). Funafuti.
1899. *Phenacolepas linguaviverræ* Melvill & Standen, Linn. Soc. Journ. Zool., xxvii, 179, pl. 10, f. 11. Torres Straits.
- Mr. E. A. Smith kindly examined the specimens in the British Museum, where the types of Adams' undescribed species are preserved, and writes that he regards *S. elongata*, *granulosa* and *lævicostalis* as well as *arabica* Rüpp., as distinct species, but *asperulata* and *costata* are identical with *galathea*.

There seem to be about 15 valid species, not counting Adams' undescribed forms. The largest is *Phenacolepas galathea* Lam., of the South Pacific.

LAND MOLLUSCA OF KENNEBUNKPORT, ME.

BY GEORGE H. CLAPP.

The collection was made during the months of July and August of this year. Most of the shells were found in the woods back of the "Casino" and extending from there to the ocean. The timber is principally pine and spruce, with a few deciduous trees around the edge of the woods and in swampy places. The best collecting ground was in a small group of oaks and beeches at one corner of the woods, and it was here that *Polygyra sayii* and most of the *Pupidæ* were found. The only species found everywhere through the woods were *Zonitoides arboreus* and *Pyramidula striatella*. In no place were shells plentiful; it was a case of collecting one at a time, rarely two or three under the same stick or piece of bark.

As the country rock is granite the molluscs probably get their lime from the marine shells and "carapaces" of crabs (the common shore-crab, *Cancer irroratus* (?)) which are scattered all through the woods. I noted the following species: *Mytilus edulis* L., *Modiola modiolus* L., *Mya arenaria* L., *Lunatia heros* Say, *Buccinum undatum* L.

On wet days one or more mollusks would be found "feeding" on nearly every dead shell. *Polygyra albolabris* appears to be particularly fond of the crab shells. The scarcity of some of the *Pupidæ* and other moisture-loving species may be accounted for by the fact that the season was very dry. The shells of *P. albolabris* were somewhat darker than those found inland and are rather fragile, they range from 24 to 28 mm. greater diameter, altitude $14\frac{1}{4}$ to 19 mm.

Polygyra sayii is also dark-colored and very thin; they range from $19\frac{1}{2}$ to 22 mm., greater diameter, altitude 11 to 14 mm.

I am indebted to Dr. Pilsbry for identification of some of the minute species.

106. *Polygyra sayii* (Binn.), 7.

109. *Polygyra albolabris* (Say), 17.
 141. *Polygyra monodon* (Rack.), 10.
 181. *Strobilops virgo* (Pils.), 124 (17 albino, the others reddish).
 199. *Bifidaria pentodon* (Say), 9.
 225. *Vertigo gouldii* (Binn.), 16.
 260. *Vitrea hammonis* (Strom), 9.
 264. *Vitrea binneyana* (Mse.), 13.
 268. *Vitrea ferrea* (Mse.), 20.
 278. *Conulus fulvus* (Müll.), 10.
 278b. *Conulus chersinus polygyratus* (Pils.), 38.
 283. *Zonitoides arboreus* (Say), 64.
 293. *Zonitoides exiguus* (Stimp.), 30.
 294. *Zonitoides milium* (Mse.), 6.
 315. *Agriolimax agrestis* (L.), 2.
 333. *Philomycus carolinensis* (Bosc.), 2.
 334. *Philomycus dorsalis* (Binn.), 7.
 344. *Pyramidula striatella* (Anth.), 40.
 346. *Helicodiscus lineatus* (Say), 37.
 348. *Punctum pygmaeum* (Drap.), 4.
 362. *Succinea obliqua* (Say), 7.
 367. *Succinea avara* (Say), 1.
Carychium exiguum (Say), 17.

The following species occurred in the mud in places that would be swamps under favorable conditions.

- Pisidium abditum* Hald., 30.
Limnæa caperata Say, 11.

While out driving one day, I stopped on Mt. Agamenticus, Me., for about twenty minutes, and got the following on the eastern side near the base :

- Strobilops virgo* Pils., 4.
Pupa pentodon Say, 1.
Vertigo bollesiana Mse., 1.
Conulus fulvus Müll., 2.
Zonitoides arboreus Say, 1.
Philomycus carolinensis (Bosc.), 1.
Pittsburgh, Pa., Sept. 9, 1900.

A NEW SPECIES OF CERION.

BY W. H. DALL.

Mr. J. A. Stevenson, of Palm Beach, Florida, recently collected a number of land shells in the Bahamas, adding several species already known from other localities but not from Nassau, to the Bahaman fauna. Among those obtained from Long or Berry Island, was a form of *Cerion* which appears to be undescribed and is related to the group of *C. scalarinum* Pfr., called *Umbonis* by Maynard.

Cerion Stevensoni n. sp.

Shell very variable in general form, but in general roughly cylindrical, with the nuclear whorls as it were jammed down into the blunt summit of the cylinder, with the base carinate at the periphery, where the ribs cease, and below that constricted; whorls 8-10, nuclear ones nearly smooth, gradually developing fine transverse ribbing with subequal interspaces; these become stronger, with a strong revolving thread behind the suture; at the third whorl then the diameter of the shell suddenly increases the sides develop strong transverse rather irregular ribbing with wider interspaces, the ribs extending from the suture to the basal keel, beyond which they rarely extend; the base beyond the keel is constricted, rudely transversely wrinkled, inside the verge of the umbilicus centrifugally impressed and axially deeply perforate; aperture very variable in shape, with a broad, flattish, rather thin reflected margin; there is a parietal short lamina centrally situated and strong, but no trace of an axial fold; color light brownish or ashy to white, the whole surface sharply spirally striated, the striae sometimes crowded, sometimes distant. Alt. of two specimens, A, 27; B, 21; diam. A, 12; B, 14.5 mm.

Types, U. S. Nat. Museum; specimens in Stearns' collection, Detroit, Mich., and Mr. Stevenson's collection.

The entire absence of the axial fold is notable.

VALLONIA PULCHELLA MÜLL., IN LOS ANGELES AND ELSEWHERE IN CALIFORNIA, ETC.

BY ROBERT E. C. STEARNS.

For several months past, I have been making a careful search for *slugs*, in the interest of Dr. Pilsbry, with poor results, as these ani-

mals, for some reason, are of rare occurrence on my grounds; neither my own nor those of my immediate neighbors containing any. About the middle of last August, I made my regular examination of certain bricks, bats and pieces of wood, that have been turned over for the hundredth time, with the usual experience in the way of *slugs*, but had my reward by finding, to my great surprise, a large number, over a hundred, of *Vallonia pulchella*. This species has not before been reported as occurring in Los Angeles or elsewhere in this region. Many species and some varieties of the general *Vallonia* form have been made by Dr. Sterki and others, based on the American aspects of this genus. Dr. Pilsbry, referring to the examples sent to him from my premises, says it is our "old friend pure and simple," and further remarks that "Curiously we did not find it in the Great Smokies, but Ashmun gets some costate forms (not *pulchella*) in Arizona and New Mexico." Raymond obtained one specimen of the var. *costata* in Bloody Canyon, east side of Mono Pass, at an altitude of about 8000 feet, in 1889. Mr. R. C. McGregor,¹ collected *V. pulchella* "in a yard at base of rose bushes," at Redding, in Shasta county.

In Dr. Cooper's catalogue of West North American shells, he gives the distribution as "circumboreal," south to Mono county, Cal., and subsequently, "Donner Lake, and near Truckee," in the California Sierras. Mr. Button informs me that he found it plentiful some years ago in Mountain View Cemetery, near Oakland; that specimens from that locality "are light-colored, living on white marble copings." Mr. Hemphill states that he has "found *V. pulchella* at Julian City, San Diego Co., and at several other places in California, Oregon and Washington." The late A. W. Crawford, according to Mr. Raymond, collected it at "San Jose," in Santa Clara county.

It will be seen by the above that this pretty little snail is quite widely dispersed in California, as well as elsewhere in the Pacific States. In Pilsbry and Johnson's list² of American Land Shells, etc., it is credited to "Montana eastward, from Canada to, or nearly to, the Gulf of Mexico. Europe."

¹ See NAUTILUS, XII, Sept., 1898, p. 60, and Mrs. Williamson in same for Oct., 1898, pp. 71-2.

² Philadelphia, April, 1889, p. 7.

The æsthetic taste exhibited by *Vallonia pulchella* is noteworthy; from under the *Roses* of Shasta county in the north, to the *Verbena* beds of Los Angeles in the south, and among the *marbles* of Mountain View, in Alameda county, suggests a refinement of discrimination in this "mere atom of humble life," that would furnish a good text for a sermon.

Mr. Button, in his note to me referring to the cemetery habitat, writes, "Query—Brought from the East in plants?" As to the occurrence of *V. pulchella* in my grounds, I am wholly at sea, for no plant forms, from the neighborhood or elsewhere, have been introduced by me for a long time, and these little snails have appeared in numbers, *within six weeks*.

In considering the hypsometric distribution, the altitude of Donner Lake is, according to Gannett,¹ from whom these various elevations are quoted, 6095 feet; Truckee 5820 and Redding 555 feet; Julian 4500 and Los Angeles about 300 feet, while the Mountain View Cemetery grounds are probably slightly less than the Los Angeles figure.

Los Angeles, California, Sept. 12, 1900.

AN HOUR ON THE GREAT RAFT.

BY LORRAINE S. FRIERSON.

While the readers of NAUTILUS are waiting to hear of the results of the exploration of the Great Smokies by Ferriss, Walker & Co., perhaps they would like to hear about a trip to the Great Raft of the Red River.

This raft of logs was at one time 150 miles long, but it has long since been removed from the main river. There still remains in an arm of the river about five miles of the old raft. This raft is not continuous, but consists of separate pieces from a mile long down to fifty yards. These logs are in some places only one log deep, *i. e.*, the surface of the water is covered by a single layer of logs.

In other places, however, the river is completely filled with a solid mass of logs from ten to fifteen feet deep. These logs are covered

¹Dict. of Altitudes in the U. S., 3d Ed., U. S. Geol. Survey, 1899.

with a mass of vegetation consisting of smart-weed, various species of sedges, grasses and bushes. Near the water, on a zone of about two inches wide, which is permanently wet, may be found two minute snails: *Vertigo rugosula* Sterki and *V. ovata* Say. On the tops of old and large logs there is frequently a deposit of earth, which supports a colony of land shells. Among these may be found *Polygyra thyroides* and its variety *bucculenta*, *Polygyra monodon* var. *friersoni* Pilsbry. Rarely may be obtained *Polygyra carolinensis* Lea.

Roaming about on the logs may be found colonies of *Succinea* of a black color. That is to say, the animal itself is black, covered with small golden-colored spots, making a handsome animal. These *Succineas* would be found here in untold numbers, probably, were it not for two enemies who derive a considerable part of their living from them. One of these enemies is the whole Heron family, and the other is the frog family. Between the heron and frogs the *Succineas* have a poor chance.

As before remarked, bunches of various sedges grow on these logs. These sedges grow in bunches about two feet high and about one foot in diameter. Hidden in these bunches, down near the roots, may be found another species of *Succinea*. These are of a straw-yellow color. Between these and the blacks are several points of difference. The blacks live on the logs, the yellow ones live on the tussocks of sedges. Here is a nut for the evolutionist. Is the straw-colored snail colored like straw because it lives on straw? or does it live on straw because it is straw-colored? Another point is that the straw-colored snail (who is nearly always hidden in the bunches of grass) is sweet tasted, or at any rate is not nauseous; while the blacks who roam about considerably have quite a pronounced bitter taste. Both of these snails have been called *S. salleana*, but being sure that there were two species, they were submitted to Dr. H. A. Pilsbry, with the result that the blacks are *Succinea luteola* Gld., while the yellow fellows are *Succinea salleana* Pfr.

Out in the water, among the floating roots of the duck weeds, etc., may be found *Planorbis trivolvis* Say, and a minute *Limnæa*. This *Limnæa* is the only representative of its tribe thus far seen in Northern La. No specimen over one fourth of an inch long has ever been secured. It is labelled *L. caperata* Say, but with a good deal of doubt.

More about this raft and its inhabitants could be written, but *hot!*

Gracious, how the perspiration rolls off a fellow! Down between the banks, with an August sun overhead, and the steam arising from the rank vegetation, and the sun's rays reflected from the water, we thought of Ferriss digging snails on the mountain tops, and we quit, but we had at least 100 *Succineas*.

SHELL COLLECTING NEAR ROCHESTER, N. Y.

BY FRANK C. BAKER.

For the past five years the writer has made annual pilgrimages to Rochester, New York, partly to spend his summer vacation, and partly to get better acquainted with the mollusks which flourish about the "Flower City." The vicinity of Rochester is peculiarly adapted for molluscan life, owing to the fact that the Niagara limestone out-crops in various places, affording an abundance of lime for the secretion of their shells, which are, therefore, large and fine.

The Eskers known as the Pinnacle and Cobb's Hill, are my favorite localities, and many fine species have been collected. The former locality is a rounded, dome-shaped hill some 200 feet in height, the slope being from 10 to 30 degrees, well wooded on its summit, with a little ravine between the main hill and a small knoll, and littered by fallen, rotting logs and dead leaves. Helices are here very abundant, such forms as *Vitrea arborea*, *V. indentata*, *Omphalina fuliginosa*, *Gastrodonta intertexta*, *Pyramidula alternata*, *P. striatella*, *Polygyra albolabris*, *P. sayii* (rare), *P. monodon*, *P. tridentata* (many varieties), and *Cochlicopa lubrica* being readily collected. Cobb's Hill, just across Monroe avenue, yields about the same fauna.

At a point in the Erie Canal where the waters widen to form a pond, hence called "wide-waters," the fresh water mollusks are numerous, and such species as *Limnæa stagnalis* (large and fine), *L. palustris*, *L. catascopium*, *L. desidiosa*, *Planorbis trivolvis*, *Physa heterostropha*, *Pleurocera subulare*, *Goniobasis livescens*, *Bythinia tentaculata*, *Valvata sincera*, and *V. tricarinata* are common. Between Rochester and Pittsford, in the canal, a colony of *Vivipara contectoides* has established itself, and a large number of fine specimens may be gathered at any time. When the water is drained from the

canal in the spring, it is a fine place for unios, such species as *Anodonta salmonia*, *A. benedictii*, *Alasmodonta marginata*, *A. deltoidea*, *Unio gibbosus*, *Anodontopsis ferussacianus*, *Quadrula plicata*, *Q. undulata*, *Lampsilis gracilis*, *iris*, *nasutus*, *luteolus*, *ventricosus*, *rectus*, *alatus*, and *cariosus* being found in great abundance and beauty; the bottom is covered knee-deep with black mud, affording a fine retreat for the mussels.

The Genessee River, both above and below the falls, affords good collecting, the unios being abundant above and the gastropods below the falls. The characteristic species above the falls are *Alasmodonta marginata*, *A. rugosa*, *A. pressa*, *Quadrula rubiginosa*, *Lampsilis iris*, *L. luteolus*, *L. alatus*, *Sphærium simile*, *S. stanineum*, *S. transversum*, *Limnæa palustris*, *Planorbis trivolvis*, *Physa heterostropha*, *Goniobasis livescens* and *Campeloma decisum*, while those below are *Sphærium transversum*, *Limnæa catascopium*, *Planorbis trivolvis*, *Physa heterostropha*, and *Bythinia tentaculata*.

Both the east and west banks of the Genessee River below the falls are good localities for mollusks, about the same species being found as on the Pinnacle, with the addition of *Pupa muscorum*, *Circinaria concava*, *Vallonia pulchella*, *V. costata*, *Polygyra thyroides*, *P. hirsuta* and *P. palliata*. The wooded banks of Seneca Park afford good retreats for mollusks, and they may be found here in great abundance.

One of the pleasantest trips near Rochester is to Irondequoit Bay, an inlet from Lake Ontario, five miles long and about one in breadth. The hills about are from 100 to 200 feet high, and the water has a maximum depth of 80 feet. Mollusks are correspondingly numerous: *Sphærium simile*, *S. transversum*, *Succinea ovalis*, *Limnæa palustris*, *L. desidiosa*, *Planorbis campanulatus*, *P. trivolvis*, *P. bicarinatus*, *P. deflectus*, *P. parvus*, *Segmentina armigera*, *Ancylus tardus*, *Physa heterostropha*, *Pleurocera subulare*, *Goniobasis semicarinata*, *Bythinia tentaculata*, *Annicola lustrica*, *Valvata sincera* and *V. tricarinata* are found in great abundance along the shore or living on the lily pads. The wooded banks yield the common helices in great abundance.

The best fresh-water beach collecting which the writer has ever experienced is to be found at Charlotte and Summerville, on Lake Ontario, the former on the west and the latter on the east side of the mouth of the Genessee River. There is always a line of "seawrack" which is alive with fresh-water mollusks. Here we have

always collected *Lampsilis luteolus*, *Sphærium simile*, *S. stamineum*, *S. fabale*, *Pisidium abditum*, *P. bakeri* (= *P. amnicum* Müll., teste Sterki), *Limnæa palustris*, *L. desidiosa*, *Planorbis campanulatus*, *P. trivolvris*, *P. bicarinatus*, *P. deflectus*, *P. parvus*, *Ancylus parallelus*, *Physa heterostropha*, *Pleurocera subulare*, *Bythinia tentaculata*, *Amnicola limosa*, *A. lustrica*, *A. obtusa*, *A. cincinmatiensis*, *Gillia altilis*, *Somatogyrus subglobosus*, *Valvata sincera*, *V. tricarinata* and *V. obtusa*. *Pisidium bakeri* Pilsbry has been found in great abundance at Summerville, where specimens nearly a quarter of an inch in length have been collected. *Valvata obtusa* Drap. was found at both Charlotte and Summerville in 1899 fully as abundant as *V. sincera*! This species was reported from this country for the first time in 1897, when but a few specimens were obtained. In the interval between that time and August, 1899, it had increased a hundred fold. It is probable that many introduced species will be found in our Great Lakes if the shore debris be carefully searched.

The localities mentioned above have yielded altogether 150 species, many of which may be found here in as great abundance and perfection as at any locality in the northern part of the United States.

NOTES AND NEWS.

A NEW AMERICAN SLUG.—Dr. J. F. Babor has described an interesting new form, *Ariolimax steindachneri*, from a specimen collected by F. Steindachner on Puget Sound, in 1874.¹ It is large, length 80 mm., breadth 19, height 21 mm., about the size of *Ariolimax columbianus*, and differs externally from that species in having the well developed tail pore an open slit, as in *Hesperarion*, not plugged as in the other *Ariolimaces*. The teeth are as in *A. californicus*. The genitalia lie free, the ovotestis anterior, at the stomach. The penis contains a large papilla but is otherwise hollow, much as in *Hesperarion*. There is no appendiculum, and no "retensor" muscle, but a vaginal retractor is developed.

The species is clearly intermediate to some extent between *Hesperarion* and *Ariolimax*, and may indicate that the former group

¹ Annalen des K. K. Naturhist. Hofmuseums, xv, 1900, p. 95.

should be reduced to the rank of a subgenus. Zoölogists who have opportunity to collect in the Puget Sound region should be on the lookout for this slug, for it is important that its anatomical characters be confirmed by additional specimens, as only one was examined by Dr. Balor. It can probably be recognized externally by the different tail pore. It has not been figured.

NOTE ON *ASHMUNELLA HYPORHYSSA* (Ckll.).—I have recently visited Cloudercroft, in the Sacramento Mts., N. M., and found *hyporhyssa* excessively abundant, under pine logs and pieces of pine bark upon the ground. The Cloudercroft form differs from the type of *hyporhyssa* (*rhyssa* var.) in uniformly lacking the parietal tooth, but otherwise the shell seems quite the same. It may be called var. *edentata*. There are three color-mutations, as follows:

(1) *Edentata* proper; shell horn-color or pale greyish-brown. The commonest form.

(2) *Rufescens*, n. mut.; shell deep ferruginous or chestnut color, lip tinged with pink. Quite common. Analogous to the mut. *rubens* of *Hygromia rufescens*.

(3) *Alba*, n. mut.; shell creamy white. Rare, only three or four found. The first albino reported in *Ashmunella*.—T. D. A. COCKERELL.

CIRCINARIA HEMPHILLI IN CALIFORNIA.—I have specimens of *Circinaria hemphilli* from Central California, as follows:

1. Mission Peak, near eastern shore of San Francisco Bay.
2. Forest Hill, Placer Co., in Sierra Nevada Mts., west slope, 3,700 ft. alt. I think this species has not heretofore been reported from further south than Oregon.—FRED L. BUTTON.

HELIX HORTENSIS IN NEWFOUNDLAND.—A friend has just brought me a living example of *H. hortensis* (12345) from the "headwaters of Robinson's River," west coast of Newfoundland, and promises a lot of them next year. Isn't this a new locality?—G. H. CLAPP.

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No. 7.

LAND SNAILS OF CAPE MAY, NEW JERSEY.

BY HENRY A. PILSBRY.

The littoral of Southern New Jersey is perhaps as unpromising collecting ground for the land shell hunter as can be found in the Eastern States. The general physical features of the region are well known, now that the whole coast has become a great summer playground; but it may be said that the land snails are nearly or entirely confined to the occasional patches and strips of cedar scrub on the islands and along the shore, usually within a couple of hundred yards of the beach, and often separated from it by a narrow strip of shifting sand dunes. Between these littoral cedar groves and the mainland proper, wide stretches of salt marsh intervene, intersected by inlets, and inhabited by myriads of *Melampus lineatus*, *Litorina irrorata* and *Modiola plicatula*.

Such situations occur at frequent intervals from Atlantic City to Cape May. At the latter place the salt marshes are reduced to a minimum; but in common with the more northern localities, the shore strip is insulated, so far as the land snail fauna is concerned, by the pine belt of the interior. There are, however, many deciduous trees and a rich soil at Cape May, while at the more northern localities the deciduous trees are wanting, except where imported, and the dark soil is a mere film over nearly pure sand.

The snails are everywhere, so far as my own experience goes, confined to the cedar groves. At Cape May Point there is a dense growth of cedar, oak, dwarf plum, bay, with more or less holly and prickly pears. It need not be mentioned to a New Jersey naturalist

that in these choice retreats mosquitoes are abundant. The New Jersey mosquito, like Napoleon's famous Old Guard, dies, but never surrenders. You wipe him off, and the gore flows freely. Here were found *Polygyra albolabris maritima*, *Bifidaria hordeacella*, *B. pentodon*, *Vertigo milium*, *Zonitoides arboreus*, *Agriolimax campestris* and *Succinea campestris vagans*. Only one specimen each of the *Zonitoides* and *Agriolimax* were found. An additional species, *Zonitoides minusculus*, occurred a few miles further northwest.

In Cape May city, on mounds around the tanks at the gas works at 703 Lafayette street, I found *Vallonia pulchella* and *Pupoides marginatus* quite abundant. These may possibly be imported species, as nothing of them was seen except in the old and long settled part of town.

The most remarkable records are *Bifidaria hordeacella*, a species of the Gulf States, hitherto not known north of the Georgia Sea Islands, and the very distinct variety of *Succinea*, which may be defined thus :

***Succinea campestris vagans*, n. v.**

Shell similar to *S. campestris* in the wrinkled surface and very convex last whorl, but smaller, with only $2\frac{2}{3}$ whorls in fully mature specimens, the aperture shorter and less ovate, and the color a rather pale olive-green, translucent, with scarcely any whitish layer within ; surface rather dull.

Length 9, diam. 6.5, longest axis of aperture 6.2 mm.

Length 7.6, diam. 5.6, longest axis of aperture 5.4 mm.

Cape May Point, N. J. (H. A. P., August, 1898.) Types No. 78,882, coll. A. N. S.

I cannot refer the specimens to any Northern species. They are nearer *S. campestris*, which extends from the Georgia coast, throughout Florida, and west to the mouth of the Mississippi, the western specimens being the thin, smooth and glossy variety *unicolor* of Tryon.

Some years ago, Mr. W. B. Marshall reported *Succinea avara* from Cape May. "The exact locality was on the ocean front at 8th avenue, Mt. Vernon, between Cape May City and Cape May Point, and was not more than 200 feet from the line of high tide."¹ Some of these specimens are now before me, and seem referable to *S. aurea* Lea rather than to *avara*; though it must be acknowledged that the

¹ NAUTILUS, VI, p. 19, June, 1892.

determination of *Succineas* is often far from certain. Similar shells were sent by Mr. C. Le Roy Wheeler, also from Cape May, exact locality not given.

My collection was made in August, 1898.

MOLLUSCA OF SOUTHERN KENTUCKY.¹

BY SADIE F. PRICE.

While engaged in botanical work, I have collected the following land and fresh-water shells, most of them in Warren county :

Polygyra plicata Say.

Polygyra divesta Gld. Scarce. Probably the first time this species has been listed so far east or north. Bowling Green.

Polygyra troostiana Lea.

Polygyra monodon Rack.

Polygyra palliata Say. Warren, Barren and Edmonson counties, and East Kentucky at Burnside.

Polygyra appressa Say. Common, Warren and Edmonson counties.

Polygyra inflecta Say. Common, Warren, Barren and Edmonson counties.

Polygyra rugeli Shuttl. Bowling Green.

Polygyra tridentata Say. Common, Warren, Edmonson and Barren counties.

Polygyra obstricta Say. Not common. Under rotten logs. Warren and Barren counties.

Polygyra albolabris Say. Warren, Barren and Edmonson counties.

Polygyra elevata Say. Common throughout South Kentucky.

Polygyra exoleta Binn. Very common.

Polygyra clausa Say.

Polygyra thyroides Say. Very abundant.

Polygyra thyroides bucculentus Gld. Bowling Green.

Polygyra downieana Bld. Rare. Warren and Edmonson counties.

Polygyra profunda Say. Scarce. Edmonson county.

Polygyra stenotrema Fér.

¹I am indebted to Mr. C. T. Simpson, National Museum, for naming doubtful Unios.

Vallonia pulchella Mull. Rather common. Bowling Green.

Pyramidula perepectiva Say. Rather common throughout Southern Kentucky. Also found at Torrent, East Kentucky Mountain.

Pyramidula bryanti Harper. Only one specimen found. This Mr. Simpson says is considerably out of its usual range.

Pyramidula alternata Say. Barren, Edmonson and Warren counties, East Kentucky in the mountains.

Pyramidula alternata carinata Pils. Rather common. Bowling Green.

Pyramidula alternata mordax Binney. Not common. Bowling Green.

Strobila labyrinthica Say. Bowling Green.

Pupoides marginatus Say.

Bifidaria contracta Say.

Bifidaria armifera Say.

Bifidaria procera Gould.

Circinaria concava Say. Bowling Green, Brownsville.

Vitrea indentata Say. Warren county.

Zonitoides arboreus Say. Warren county.

Vitrea sculptilis Bld.

Omphalina levigata Pfr. Warren and Edmonson counties.

Gastrodonta ligera Say. Throughout southern Kentucky.

Gastrodonta acerra Lewis. Barren county.

Gastrodonta demissa Binn. Common.

Gastrodonta interna Say. Southern Kentucky and in the mountains of East Kentucky.

Bulimulus dealbatus Say. Common on rocky hillsides. Bowling Green.

Succinea avara Say.

Succinea ovalis Gld.

Succinea totteniana Lea (?). On ferns in sink-hole. Bowling Green.

Heliodiscus lineatus Say. Bowling Green.

Helicina orbiculata Say.

Limnæa humilis Say. Near Green and Barren rivers, under damp moss.

Planorbis bicarinatus Say. Rather common.

Planorbis trivolvis Say. In ponds. Common.

Planorbis parvus Say. On rocks in ponds.

- Ancylus rivularis* Say. In ponds and rivers.
- Physa gyrina* Say. In springs and creeks throughout southern Kentucky and at Lexington.
- Physa pomilia* Con. In ponds. Not uncommon.
- Physa heterostropha* Say. Barren River.
- Physa heterostropha*, var. Creeks.
- Campeloma obesum* Lewis (?). Barren River.
- Campeloma integrum* Say. Barren River.
- Campeloma ponderosum* Say. Common.
- Lioplax subcarinata* Say.
- Pomatiopsis lapidaria* Say. Bank of Barren River.
- Pleurocera filum* Lea. Very common.
- Pleurocera sycamorensis* Lea.
- Pleurocera undulatum* Say.
- Lithasia planispira* Anthony.
- Lithasia nuclea* Lea.
- Lithasia undosa* Anth.
- Lithasia obovata* Say.
- Goniobasis curvilabris* Anth.
- Goniobasis curvilabris*, var. Rather common.
- Goniobasis abbreviata* Lea.
- Goniobasis curreyana* Lea. Common.
- Goniobasis costifera* Hald. Green and Barren Rivers.
- Goniobasis costifera*, var.
- Goniobasis vicina* Anth. Warren county.
- Goniobasis athleta* Anth. Barren county.
- Goniobasis depygis* Say.
- Goniobasis nassula* Con. var. Indian Creek.
- Goniobasis infantulum* Lea.
- Goniobasis saffordii* Lea. Indian Creek.
- Goniobasis edgariana* Lea. Creeks.
- Goniobasis elegantula* Anth. Barren River.
- Goniobasis paupercula* Lea.

UNIONIDÆ.

- Quadrula undulata* Barnes. Common in all streams.
- Quadrula trigona* Lea. Common.
- Quadrula rubiginosa* Lea.
- Quadrula pyramidata* Lea.

- Quadrula coccinea* Con.
Quadrula pustulosa Lea. Very common.
Quadrula obliqua Lam.
Quadrula verrucosa Barnes.
Quadrula globata Lea.
Quadrula lachrymosa Lea.
Quadrula plicata Say.
Quadrula cooperiana Lea.
Quadrula heros Say. Barren county.
Quadrula metanerva Raf.
Quadrula cylindrica Say,
Quadrula solida Lea.
Plagiola elegans Lea.
Plagiola securis Lea.
Plagiola donaciformis Lea.
Lampsilis ventricosus Bar. Barren River.
Lampsilis multiradiatus Lea.
Lampsilis ligamentinus Lam. Very common.
Lampsilis ligamentinus Lam. var.
Lampsilis gracilis Barnes.
Lampsilis anodontoides Lea. Ohio, Green and Barren Rivers.
Lampsilis rectus Lam.
Lampsilis cumberlandicus Lea.
Lampsilis luteolus Lam. *L. lienosus* Con.
Lampsilis texasensis Lea.
Lampsilis ovatus Say. *L. obscurus* Lea.
Lampsilis regularis Lea.
Lampsilis alatus Lea. Common.
Lampsilis iris Lea. *Lampsilis perdix* Lea.
Lampsilis subrostratus Say.
Lampsilis planicostatus Lea.
Lampsilis parvus Barnes.
Lampsilis caliginosus Con.
Lampsilis vanuxemensis Lea.
Lampsilis nigerrimus Lea.
Lampsilis fatuus Lea.
Unio grandiferus Lea. Rather common.
Unio gibbosus Barnes. Both the purple and salmon-colored forms
are found in all streams.

- Obliquaria reflexa* Raf. Common.
Obliquaria lens Lea.
Ptychobranchnus phaseolus Hild.
Strophitus edentulus Say.
Truncilla perplexa Lea.
Truncilla perplexa rangiana Lea.
Truncilla triquetra Raf.
Pleurobema clara Lam.
Pleurobema æsopus Green.
Pleurobema edgariana Lea.
Obovaria circulus Lea.
Tritigonia verrucosa Raf. *U. tuberculatus* Barnes.
Cyprogenia irrorata Lea. Common.
Micromya lapillus Lea.
Alasmodonta rugosa Barnes. Common.
Alasmodonta deltoidea Lea.
Alasmodonta minor Lea. Gasper River.
Alasmodonta truncata (Say) Wright.
Anadontoides ferussacianus Lea.
Anodonta imbecilis Say. Rivers and ponds near rivers.
Anodonta grandis Lea.
Anodonta grandis gigantea Lea.
Sphærium sulcatum Lam.
Sphærium fabale Prime. River and creeks.
Calyculina partumeia Say.
Calyculina transversa Say.
Pisidium virginicum Gm. Rivers and ponds.
Pisidium peraltum Sterki. Ponds.

NEW SPECIES OF JAPANESE LAND MOLLUSCA.

BY H. A. PILSBRY.

Eulota (Plectotropis) kiusiuensis n. sp.

Shell openly umbilicate, depressed, acutely carinate, light yellowish brown, slightly shining. Surface densely but lightly striate spirally, under a thin cuticle which bears rather wide-spaced, irregularly developed lamellæ ending in short shreds at the periphery, the

lamellæ frequently interrupted on the base. Spire very low-conic; whorls barely 6, slightly convex, slowly increasing, the last a little pinched above and below the peripheral keel. Base much more convex than the spire, flattened and sloping below the keel, swollen towards the middle, obtusely angular around the conic umbilicus. Aperture oblique, irregularly squarish, the peristome white, somewhat thickened within, angular at the terminations of the peripheral and umbilical carinæ, the upper margin hardly expanded, basal margin expanded, somewhat reflexed, columellar margin a little dilated.

Alt. 8.5, diam. 17.5 mm.

Alt. 8.5, diam. 17 mm.

Kikai, Osumi, in southern Kiusiu (Mr. Y. Hirase).

This species is closely related to *E. trochula* (A. Ad.), known only from Tsusima, differing from that species in the much more angular aperture, far flatter spire and more convex base.

Trishoplita goodwini var. *suprazonata* n. var.

Shell similar in form to *T. goodwini*, but with apex obtuse; thin, somewhat translucent, corneous-brown, paler around the umbilicus, and with a wide white zone bordering the suture, ascending the spire. Whorls $5\frac{1}{2}$. Alt. 9.5, diam. 13.5 mm.

Ushirokawa, Tosa, Shikoku Island (Mr. Y. Hirase).

A smaller form, alt. 8.5, diam. 11.5 mm., occurs at Kagoshima, Satsuma, in southern Kiusiu. This variety is more conic than the variety *fusca* of Gude, which is moreover smaller and without the whitish band above.

Kaliella symmetrica n. sp.

Shell minutely perforate, turreted-pyramidal, the spire with convex lateral outlines and blunt, rounded apex; yellowish-corneous; sharply striated above with excessively fine, densely crowded longitudinal striæ, which give it the luster of silk, the base glossy, showing faint, spaced spiral lines under a high magnification. Whorls $5\frac{1}{2}$, very convex, the last obsoletely subangular at the periphery, moderately convex beneath, impressed around the perforation. Aperture basal, rather narrow, curved, shaped like the middle third of a crescent with the ends cut off; outer and basal margins of the peristome acute and simple, the columella vertical, its edge triangularly reflexed. Alt. 2.1, diam. 2 mm.

Kashima, Harima (Mr. Y. Hirase).

This species somewhat resembles *Hyalina pustulina* Reinhardt, but it is proportionately higher, smaller, the last whorl less enlarged, the spire being more prominent; consequently the aperture is smaller. I would consider this shell an *Euconulus* were it not so closely allied to the following species, which I do not doubt is a *Kaliella*. Half-grown specimens are still only obtusely angular at the periphery.

Kaliella fraterna n. sp.

Shell similar to *K. symmetrica*, except that it has an acute, projecting, thread-like peripheral keel, like that of *K. labilis* (Gld.), extending undiminished to the aperture.

Kashima, Harima, with *K. symmetrica* (Mr. Y. Hirase).

Euconulus Reinhardti n. sp.

Shell globose-conic, perforate, fragile, pale corneous yellow; glossy, with sparse rather conspicuous oblique growth-wrinkles and extremely fine subobsolete, crowded spiral striæ. Spire elevated, the apex rather acute. Whorls $5\frac{1}{2}$, quite convex, separated by deeply impressed sutures, the last whorl large, subglobose, rounded at the periphery, but showing the almost obsolete trace of a peripheral angle; base strongly convex, slightly impressed around the narrowly perforate axis. Aperture somewhat oblique, roundly lunate, the peristome thin, very fragile, simple, the columellar margin rather broadly dilated above. Alt. 3.9, diam. 3.7 mm.

Kashima, Harima (Mr. Y. Hirase).

A globose-conic species which I first thought to identify with *H. pupula* Gould; but it differs from that insufficiently defined species in the rounded last whorl and various other characters.

It has been shown that the name *Conulus* is preoccupied in Mollusca by Rafinesque, who proposed that name for the genus *Conus*. This will prevent its use for the common *Helix fulva* of Müller, and various European authors have now abandoned *Conulus* in favor of *Arnouldia* of Bourguignat. It has apparently escaped the notice of these gentlemen that *Euconulus* of Reinhardt was proposed for the *fulvus* group some seven years before Bourguignat's publication. The genus will therefore stand thus:

EUCONULUS Reinh.

Conulus Fitz., 1833, not of Rafinesque, 1814.

Euconulus Reinhardt, Sitzungs-berichte Ges. naturforsch. Freunde zu Berlin, 1883, p. 86 (*E. fulvus* and *praticola*).

Arnouldia Bgt., Bull. Soc. Mal. France, VII, 1890, p. 328.

It is doubtful whether any Japanese species really belong to *Euconulus*. Most of them have all the shell characters of *Kaliella*, a genus abundantly developed in India, China and indeed the whole Orient. Reinhardt's Japanese "*Trochoconulus*" I refer to *Kaliella*. His "*Discoconulus*," judging from *sinapidium*, the only species I have seen, might belong to *Vitrea*. *Arnouldia nahavensis* of Gude is a *Kaliella*.

Punctum japonicum n. sp.

Shell minute, openly and rather widely umbilicate, depressed, thin, light brown. Spire convex, low; whorls $3\frac{1}{2}$, quite convex, separated by deeply impressed sutures, regularly and rather slowly increasing; last whorl tubular, rounded at the periphery. Sculpture of delicate spaced, irregular lamellar riblets, the intervals sharply finely striated, and with close spiral striae. Width of the umbilicus is contained about $3\frac{1}{3}$ times in the diameter of the shell, all the whorls readily visible within it. Aperture rounded-lunate, oblique, the peristome simple and acute.

Alt. 0.7, diam. 1.25, width of umbilicus 0.37 mm.

Kashima, Harima (Mr. Y. Hirase).

The only other known Japanese species of *Punctum* is "*Helix* (*Patula*) *lepta*" of Westerlund, described from Nagasaki. It has a much narrower umbilicus than *P. japonicum*, the last whorl is sub-angular above, and it is described as with dense riblets.

NEW RECORDS OF NEW MEXICAN SNAILS.

BY H. A. PILSBRY.

August 25th last, Professor T. D. A. Cockerell collected a few snails "in Chicorico Cañon, near Raton, New Mexico. This is in the region of *Quercus gambeli* and *Robinia neomexicana*, at an elevation of about 7000 ft. There are no previous records of mollusca from this region. It is quite in the northern part of the State, only a few miles from the Colorado boundary." The species are:

Vallonia gracilicosta Reinh.

Vitrina pfeifferi Newc.

Euconulus fulvus (Müll.).

Zonitoides arboreus (Say).

Bifidaria pilsbryana Sterki. A form with the crest more developed than in the type, and the palatal folds standing upon a callous ridge.

In this connection I may mention that a specimen of *Bifidaria holzingeri* (Sterki) has been found among minutiae collected by Prof. Cockerell at Mesilla, N. M., in drift of the Rio Grande. So far as I know, this species has not been reported before from west or south-west of Wichita, Kansas.

Ashmunella chiricahuana (Dall) has been collected by Prof. E. O. Wootton in a pine region on the west fork of Gila River, near Mogollon Peak, N. M.

DESCRIPTION OF NEW SPECIES OF ASIATIC SHELLS.

BY C. F. ANCEY.

Euhadra (?) *pseudocampylæa* Anc.

Testa convexo-depressiuscula, omnino tecte perforata, nitidiuscula, parim solidula, sub epidermide tenui fusco lutea sordide albescens vel pallide brunnea, lineolis incrementi subtus magis conspicuis obsolete notata. Spira convexa, parum elevata, obtusissima. Anfractus $5\frac{1}{2}$ convexi, sutura impressa separati, sat lente et regulariter crescentes, ultimus supra prope aperturam leviter malleatus, antice leniter descendens, dein ad peristoma paululum ascendens, supra convexus, ad peripheriam rotundatus, basi convexo-depressus, in umbilici loco profunde impressus pone aperturam breviter constrictus. Apertura transverse suboblonga, lunata, obliqua, marginibus distantibus, callo tenui junctis, extero regulariter arcuato, basali subdeclivi. Peristoma album, incrassatum, breviter expansum, ad basin et columellam præcipue reflexum, angustum, supra perforationem prorsus clausam dilatatum.

Diam. max. 30, min. $25\frac{1}{2}$, alt. 17 mill.

Hab.: Tâtsièn-loû, ad limites Thibeti et provinciæ sinensis Ssetchuen (Comm. Cl. Abbé Mège).

This is a very distinct species, and at once recalls to mind a large and more globose *Helicigona pyrenaica* with a closed umbilicus. It is provisionally referred to *Euhadra*, but the generic position is difficult to ascertain. A single dead example was obtained, and is in my collection. With this I received a fine example of the very rare *Helicarion Böttgeri*, Hilber, of which the Austrian expedition of

Szechenyi obtained a single specimen. These shells were detected by French missionaries, and the locality, although furnishing several species of mollusca, is not a rich one as far as shells are concerned.

Planorbis persicus Anc.

Testa compressa, non carinata, olivaceo vel subgriseo-cornea, oblique confertim striata, nitidula, pro genere relative solidiuscula, utrinque lateumbilicata et concava, discoidea. Spira apice minute immerso. Anfractus 5, convexi, sutura impressa, sat lente crescentes; ultimus supra convexo-declivis, post medium rotundato-subangulatus, infra depressus. Aperturæ obliqua, transverse oblonga, sublunata, intus obscure albo-labiata (in peradultis), marginibus callo appresso junctis. Diam. mag. 9, min. $7\frac{1}{2}$, alt. $2\frac{2}{3}$ mill.

Hab.—Téhéran, prov. Trak-ajemi, Persia; Salmas, north of Lake Urmiah, Persia (Comm. G. Nægele).

This is allied to, but different from, *Pl. subangulatus* Phil., from which it is easily distinguished in being much less distinctly angled below the periphery. The above description is drawn from the largest specimen sent me by Herr G. Nægele; some also probably mature are much smaller and more rounded.

Physa Moussoni Ancy.

Physa lirata, Mousson in Journ Conch., 1874, p. 43, non Tristram (1863), nec Craven (1880).

The name *Physa lirata* having been used several times, I should call attention to the fact that Dr. Rudolf Sturany (Catalog der Sudafrik. Land- und Süßwasser-Moll., 1898, p. 76), not being aware that several years ago I proposed to substitute *Physa Craveni* for *lirata* Craven (not of Tristram), calls the latter *Craveni* Sturany, while I should claim for the priority of *Craveni*, Ancy; but this induces me also to change *lirata* Mousson to *Moussoni* Ancy, as the specific name *lirata* must be retained for the species originally described from Madagascar.

Ph. Moussoni Ancy was discovered in Mesopotamia by Dr. Schæfli.

Helicina Sundana Ancy, nom. nov.

The above name I suggest for *Helicina exserta* Martens, a species occurring in the islands of Saleyer, Kalao and Jampea, between Celebes and Flores, as another *Helicina* from Cuba has long ago been described under the same name of *exserta*, "Gundlach, MSS.," by L. Pfeiffer (see Malak Blätter, v, 1858, p. 194).

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RECORDS OF MOLLUSCA FROM NEW MEXICO.

BY H. A. PILSBRY AND T. D. A. COCKERELL.

The Mollusca of the Sandia Mts., New Mexico.

Nothing has hitherto been reported concerning the mollusca of the Sandia Mountains, near Albuquerque, so it may be well to enumerate a small collection made there by Miss Maud Ellis, and submitted to us for determination. The precise locality is Las Huartus Cañon, alt. 8-9000 ft. The species are similar to those of the Colorado mountains, and the Sandias, so far as our present knowledge goes, marks the southern limit of this fauna as a whole, though certain of its members extend much further south.

<i>Vitrina pfeifferi</i> Newc.	<i>Pyramidula cockerelli</i> Pils.
<i>Euconulus fulvus</i> (Drap.).	<i>P. cockerelli</i> mut. <i>viridula</i> (Ckl.). ¹
<i>Zonitoides arboreus</i> (Say).	<i>Vallonia cyclophorella</i> Ancey.
<i>Z. minusculus</i> (Binney).	<i>Pupa blandi</i> Morse.
<i>Thysanophora ingersolli</i> (Bland).	<i>Bifidaria pilsbryana</i> Sterki.
<i>Pyramidula strigosa</i> (?) Young.	

Miss Ellis also collected *Helicodiscus lineatus* (Say) in the Sandia Mts., but the exact locality is forgotten. The young *Pyramidula* doubtfully listed as *strigosa* may be a form of *P. hemphilli*. No *Ashmunella* was found.

It is somewhat surprising that the *Euconulus* of New Mexico is not the Texan race, but the Northern *fulvus*.

¹ Nautilus, 1890, p. 102, the pale greenish form. T. D. A. C.

Shells from recent flood debris of Arroya Pecos, Las Vegas, N. M.

A series of shells lately collected by one of us gives the following species. The source of the shells is unknown, until the Arroya is followed up and their station found. In wanting *Ashmunella*, and in the abundance of *Bifidaria*, the assemblage is unlike that of the adjacent mountains.

Vallonia cyclophorella Anc.	Bifidaria pilsbryana Sterki.
Cochlicopa lubrica (Müll.).	Vertigo ovata Say.
Pupoides marginatus (Say).	Zonitoides arboreus (Say).
Pupoides hordaceus (Gabb).	Euconulus fulvus (Drap.).
Pupa blandi (Morse).	Helicodiscus lineatus (Say).
Bifidaria armifera (Say).	Limnæa humilis Say.
Bifidaria holzingeri (Sterki).	Planorbis parvus Say.
Bifidaria hordeacella (Pils.).	Physa sp., broken.
Bifidaria procera (Gld.).	

The specimens of *Bifidaria armifera* vary in length from a trifle over 3 mm. with $5\frac{1}{2}$ whorls, to fully 4 mm. with $6\frac{1}{2}$ whorls.

CONUS CONSORS SOWB.

BY CHARLES LE ROY WHEELER.

My attention has been attracted to the above species while identifying a mixed lot of cones from Zanzibar, embracing about four thousand specimens, from the fact that many collectors, and some museums, have in their collections specimens labeled "*Conus consors* Sowb." that are far from what Sowerby evidently figured under that name. But Tryon's description appears to authorize the errors in identification. I, therefore, offer the following description :

Conus consors Sowb., Thes. Conch., f. 492.

Spire concavely elevated, with shallow channel and revolving striae, delicately tessellated with orange, apex acute and of pinkish tint; body-whorl slightly depressed in centre and inflated above, grooved toward the base; ivory white, with an orange band below the center, and one above sometimes reaching to the shoulder, the upper part of this band more or less broken; aperture white; epidermis velvety, light brown, tough and very adherent.

The entire absence of dotted revolving lines and the constant orange color are characteristic features.

Dimensions : height 60, diameter 32 mm.; of others 59x32, 58x31, 56x31, 50x32, and 50x27.

The illustration in Tryon's Manual, Vol. VI, plate 15, fig. 96, is a good representation ; but the list of synonyms should probably be either placed under *C. magus* Linn. or recognized as veritable species.

**A NEW SPECIES OF BULIMULUS FROM COSTA RICA AND A NEW
SPIRACULUM FROM ASSAM.**

BY HUGH FULTON.

***Bulimulus (Drymæus) inusitatus*, n. sp.**

Shell sinistral, elongate, narrowly perforate, thin, translucent, amber yellow throughout ; whorls $7\frac{1}{2}$, engraved with faint spiral lines ; nucleus with minute close-set crossed striæ ; aperture ovate ; peristome thin, lower portion slightly expanded ; columella reflexed at point of insertion nearly covering the umbilicus.

Alt. $29\frac{1}{2}$, diam. maj. 13, length of aperture $12\frac{1}{2}$ mill. Hab.: Costa Rica (Underwood).

Compared with *tropicalis* Morelet, the only other known reversed *Drymæus*. The present species is thinner, has half a whorl more and is easily separated by its different ground color and the absence of bands.

***Spiraculum assamense* n. sp.**

Shell discoidal, flat above, very broadly umbilicated, dark brown with a few oblique stripes of a lighter color, encircled by four rows of hairs arranged in tufts, one being at the periphery, one above, and two below, the latter two are often worn off in older specimens ; whorls $4\frac{1}{2}$, slightly convex above, last rounded ; tube erect, short, inclined towards the apex, situated 2 mm. from the margin of the aperture ; peristome white, somewhat thickened, bordered by a narrow flange ; aperture oblique, circular ; operculum shelly, whorls 5.

Diam. maj. 14 mm., min. 12 mm., alt. 5 mm.

Hab.: Khasi Hills, Assam.

In most respects this species is very like *nagaensis* Aust. & Bedd., but can be easily separated by the position of the breathing tube,

which in *assamense* is much nearer the aperture. The operculum of *nagaense* does not appear to have so many whorls as our species, a large part of the central portion being quite flat and smooth. These characters appear to be constant in the numerous specimens I have examined of both forms.

DESCRIPTIONS OF NEW JAPANESE LAND SNAILS.

BY HENRY A. PILSBRY AND ADDISON GULICK.

Diplommatina uzenensis Pilsbry, n. sp.

Shell dextral, cylindric-oblong, pale brown or nearly white, finely, delicately and evenly costulate. Whorls 6, very convex, the upper 3 forming a short cone, the last whorl contracted, a little distorted, ascending in front. Aperture subcircular, nearly vertical, the peristome continuous, flatly reflexed, duplicate, having a thin lamina or second peristome close behind the lip in quite mature specimens. Columella concave, ending in a tooth, as usual. Palatal fold less deeply immersed than usual, lying to the left of rather than above the aperture.

Alt. 2.6, diam. 1.4, alt. and diam. of aperture 1 mm.

Nishigo, Uzen (Mr. Y. Hirase). Types no. coll. A. N. S., from no. 510 of Mr. Hirase's collection.

This species is the most northern yet known, I believe. It is decidedly larger than *D. pusilla* Martens, somewhat smaller than *D. nipponensis* Möllidff., which is its nearest ally. The sculpture is about the same as in *nipponensis*, but the cone of the spire is not nearly so long, the later three whorls being large, while in *nipponensis* the last two are wide, the four or five earlier strongly tapering. The palatal fold is further to the left in *D. uzenensis* than in *D. nipponensis*, and the aperture is comparatively larger.

Eulota callizona var. *maritima* Gulick and Pilsbry, n. var.

This name is proposed for the race inhabiting Awaji Island and other districts mentioned below, specimens from Fukura, Awaji, being the types. These differ from *E. peliomphala* and its varieties *brandtii*, *herklotsi* and *nimbosa* in the more conoidal form of the spire; from *E. callizona* and its varieties chiefly in pattern of coloration. These are as follows:

(a) Purple-brown, with light buff streaks.

(b) Corneous and buff with red-brown streaks, a narrow band above the periphery or none, often a dark umbilical patch.

(c) Banded (bands 02345, 00345 or 00305) with deep brown on a pale ground, and generally streaked with opaque buff, or without such streaks.

(d) Corneous, with some opaque, buff streaks above, no bands.

Pattern (a) resembles that of *E. peliomphala nimbosa*; (b) that of *E. callizona congenita*; (c) that of *E. peliomphala* or *peliomphala brandtii*; and pattern (d) that of *E. callizona hickonis*.

Alt. 20-22, diam. 30 mm.

Alt. 19, diam. 25.

We regard the var. *maritima* as very near the original stock which gave rise to *E. callizona* and its varieties, and as a connecting link between these and *E. peliomphala*.

It inhabits Awaji Island, the adjacent shores of the Kii channel on the east, all of Shikoku Island, some parts of the east coast of Kiusiu, and the west end of Hondo, and intergrades on the shore of the Inland Sea with *congenita*, *hickonis* and *amaliæ*.

Eulota luhuana idzumonis Pilsbry and Gulick.

Shell large and solid, with the color-patterns of *E. quæsita* or *perryi*, dull, roughly sculptured with irregular growth-wrinkles, and differing from *luhuana* in the more capacious, less depressed form, and the umbilicus, which is decidedly wider and much more open inside than in *luhuana*. Alt. 30, diam. 43 mm.

Types from Takeya, Idzumo. It has affinities with *senckenbergiana* and the following variety.

Eulota luhuana* var. *aomoriensis Gulick & Pilsbry, n. var.

Shell smooth and glossy, pale buff with deep chestnut bands 00305 (or sometimes 00000, or with wide pale, diffuse bands in place of 2 and 4, as in *E. peliomphala herklotsi* or *E. quæsita perryi*), the spire moderately conoidal, whorls 5, the last capacious; umbilicus deep and more open within than in *luhuana* or *senckenbergiana*. Aperture oblique, the peristome white or reddish, nearly in a plane, but a little advanced sometimes at the termination of band 3.

Alt. 25, diam. 40 mm. (Chojamura.)

Alt. 20, diam. 32 mm. (Asanai.)

Chojamura and Gonohe, Mutsu; Asanai, Ugo (Mr. Y. Hirase).

A more globose and smoother form than *E. luhuana*, and more northern in distribution, inhabiting the northern extremity of Hondo, in Aomori *Ken* or prefecture.

It may be noticed in this connection that towards the north, *P. quassita* becomes smoother and more glossy than toward the southern limit of its range in middle Hondo.

Trishoplita goodwini var. *kyotoensis* Pilsbry, n. v.

Shell rather narrowly umbilicate, thin, somewhat translucent, pale brown throughout, glossy, striatulate, but without spiral lines. Spire low-conic; whorls 5, convex, the last rounded at the periphery, hardly descending in front. Aperture oblique, rounded, about one-fourth of its circumference excised at the parietal margin; peristome narrowly but distinctly expanded, thin, pale. Alt. $5\frac{1}{2}$, diam. $8\frac{1}{2}$ mm.

Kyoto (Mr. Y. Hirase).

This form resembles *T. goodwini* var. *fusca*, but the umbilicus is smaller, there is a half whorl less, and no spiral striæ, which in *fusca* are visible on the base. It is decidedly less conical than *Trishoplita conospira* Pfr. as defined by von Martens, and has a whorl less.

EULOTA MERCATORIA AND E. CALIGINOSA.

These species were treated as distinct in the *Manual of Conchology*, Vol. VI, but in dealing with them in the *Catalogue of Marine Mollusks of Japan* issued by Mr. F. Stearns and myself, I seem to have lost sight of the real differences between them, the intergradation I saw being a matter of color and size rather than of the details of form.

The receipt of a large series of specimens gives opportunity to correct the error I committed of lumping these really distinct species.

Eulota (Euhadra) mercatoria (Gray? Pfr.).

This species varies in size from 26 to 38 mm, diam., and in color from a pale yellowish-brown to red-chestnut and blackish-chestnut, always with a narrow dark peripheral band bordered with yellowish on each side. In some light forms there is a dark umbilical patch. The pattern therefore varies from that of the *E. succincta* group to the *perryi* or *herklotsi* pattern. The periphery is more or less angular; the base is evenly rounded, and the lower lip in consequence is regularly curved.

Pfeiffer's figure of his type is excellent (Conchyl. Cab. *Helix*, pl. 132, figs. 1, 2, copied in Man. Conch. VI, pl. 31, f. 26, 27). I have figured a smaller specimen in Catal. Mar. Moll. Japan, pl. 10, fig. 5 (by error said to be $17\frac{1}{2}$ mm. diam. in the text, p. 162). *E. mercatoria* occurs on Okinawa.

***E. mercatoria atrata* n. var.**

Much larger than *mercatoria*, very dark colored, and strongly ribbed or costulate; periphery subangular in front. Whorls $6\frac{1}{2}$ to $6\frac{3}{4}$, the last shortly deflexed in front; lip purple-brown, evenly arcuate, not sinuous. Alt. 35, diam. 50 mm.; alt. 32, diam. 46 mm.

Received from Mr. Hirase as from the Loo Choo Is.; from Mr. Stearns as from Okinawa. It is represented in the Cat. Mar. Moll. Jap., pl. 10, f. 4.

***Eulota (Euhadra) caliginosa* (Ad. & Rve.).**

This species differs from *E. mercatoria* in the narrower, more slowly increasing whorls, the last one more swollen below the suture; the flattened base, producing a straighter basal lip; in the different shape of the aperture, and especially in the narrower lip, which is sinuous below, being curved forward at the middle of the basal margin. It is not so solid a shell as *E. mercatoria*, is rounded at the periphery, and has much the coloring of the lighter specimens of *mercatoria*, though the ground is generally yellower. The pale border above the peripheral band is often not well developed, and sometimes it is yellow throughout except the peripheral band.

In the Catal. Mar. Moll. Jap., this species is excellently represented in figures 1, 2, 3 and 6 of plate 10.

It was supposed by Adams and Reeve to be from Mindanao, but there can be no doubt that it is a species of the Loo Choo (Okinawa) fauna.

ON A GENUS (PHYLLAPLYSIA) NEW TO THE PACIFIC COAST.

BY WM. H. DALL.

The Rev. Dr. Geo. W. Taylor, of Wellington, British Columbia, has recently forwarded to me some marine slugs which were found on floating sea-grass near Nanaimo, Vancouver Island. An examination shows that these animals represent a genus, *Phyllaplysia*, not hitherto known except in Southwestern Europe, and an undescribed species.

The animal in most respects differs very little from *P. lafonti* Fischer, the type of the genus. It is subtranslucent, smooth, of a uniform pale lemon-yellow color, very much flattened, resembling some of the Planarian worms. The specimens sent by Dr. Taylor are presumably somewhat contracted by alcohol, which may account

for the form of the rhinophores and tentacles, which are short, conical, and strongly transversely wrinkled, but without tuberculation or color pattern, being of the same pale yellow as the rest of the body. The "rainure" extending from the right tentacle to the branchial opening is a plain line barely perceptible; the branchial pit with two minute lobes is short and in about the same relative position as in *P. lafonti*. The body is much depressed and the margins thin, sharp and even. The eyes appear as conspicuous small black spots in front of the bases of the posterior tentacles. The general form is elongate oval, the ends of the rhinophores, unlike the tentacles, are blunt, and these organs are sulcate inferiorly as usual. The length of the largest specimen, as contracted in alcohol, is about 20 mm., and the breadth about 9 mm. I propose for it the name of *Phyllaplysia taylori* in honor of its discoverer.

Of the three other species known, *P. lafonti* is pale green, with darker bands and numerous violet spots; *P. depressa* is green-buff, variegated with black; and *P. limacina* is of a dusky green. All of these are from western and southern Europe.

A NEW SPECIES OF PLEUROBRANCHUS FROM CALIFORNIA.

BY WM. H. DALL.

Some time since Mrs. Oldroyd sent me two specimens of *Pleurobranchus*, from San Pedro, which I could not spare time to examine microscopically at the moment. I can now specify their chief diagnostic characters as follows:

***Pleurobranchus californicus*, n. sp.**

Animal when fresh of a waxy white, with a surface apparently smooth, or rather like the skin of an orange, not tuberculate, but, under a glass, showing obsolete distant pustules hardly raised above the general surface; body elongate-oval, the foot longer than the mantle behind. The gill short, its stem finely granular, not tuberculate, with ten or eleven alternate short vanes, the whole adnate nearly to the tip, medially situated, with the contiguous genital orifices just in front of its anterior insertion and the anus just over the posterior insertion between the gill and the mantle. Eyes, rhinophores, muzzle, jaws and teeth, as described by Pilsbry, for the Gulf of California species collected by Fischer (*Man. Conch.*, xvi, pp. 201-2). Shell rather long and narrow, subrectangular, longi-

tudinally obsolete striate on the left side, obscurely obsolete punctate near the anterior edge, and covered with a very thin periostracum which reflects nacreous tinges of color. The shell itself is white and thin, with a small spiral nucleus; the left margin somewhat recurved, the central part moderately convex; the whole extends more than half the length of the body and measures 12 by 6.5 mm.

This species differs from *P. digueti* Rochebrune in color, in the proportional size and number of pinnules of the gill, in having a larger and differently shaped shell, and in the position of the anal orifice. These remarks apply to the form described by Pilsbry anatomically; Rochebrune states that his species was scarlet above and whitish below, but gives no anatomical data.

GENERAL NOTES.

Dr. Jousseume publishes a monograph of the Clausilioid group *Nenia* in the current number of the Bull. Soc. Philomathique de Paris (1900). Among other novelties introduced in the same paper is a supposed new genus *Bomanius*, which seems to be the same as *Passamaella*, a curious Buliminoid group of Socotra.

MOLLUSKS IN GRASS.—Mr. Virginus H. Chase recently sent me from Valley township, Stark Co., Illinois, a piece of sod thickly covered with growing grass, and which was fairly alive with living pulmonates. The piece of sod was eight by four inches in size, and from it I picked the following specimens and species:

1. *Polygyra monodon* Rackett.
2. *Pyramidula striatella* Anthony.
136. *Bifidaria armifera* Say.
5. *Bifidaria contracta* Say.
1. *Bifidaria pentodon* Say.

The locality from which the sample came was a moist prairie. If this number was collected in a piece of ground less than a foot square, what must the whole prairie have contained!—FRANK C. BAKER.

In the early seventies Prof. Verrill dredged a minute bivalve off New Haven and gave the name *Gastranella tumida* Verrill to it. Since then it has been unknown until some of my minute materials

revealed one specimen from Summerside, P. E. I., and two specimens from Woods Holl, Mass. This indicates a wide distribution.—HENRY W. WINKLEY.

SHELL COLLECTING ON THE MOSQUITO COAST.—The following extract is from a letter to Mr. S. Raymond Roberts, from a former Ohio collector. *Wounto Haulover, Nicaragua, Sept. 27, 1900.* This coast, for twenty miles back from the sea, is a net-work of lagoons, rivers, creeks, channels. The "dry" land is mostly swampy, inundated, or partly so, during the wet season. In fact, this Mosquito Coast, which upon the map is so firm and solid-looking, is in reality a Dismal Swamp, multiplied by about five. Hence, so far as I am able to judge, it is not a good locality for *Bulimulidæ* and other land shells. Back from the sea, say twenty miles, and also south and west of Bluefields, where the land is more elevated, I believe there is better collecting. Right down here on the very coast I have found but four species, one of which I afterwards lost. *Bulimulus corneus* Sowb. I found plentiful at Bluefields. Also another lot, which I take for *Stenogyra octona* Linne, I found in abundance. Another shell, presumably a *Pupa*, was collected sparingly. These last two also in Bluefields. Here, Wounto Haulover, is a good locality for *Littorina columellaris* D'Orb., and Principulka, just twenty miles south of here, is an ideal place for superfine *Donax cayennensis* Lam.—WILLIAM H. FLUCK.

PUBLICATIONS RECEIVED.

A DESCRIPTIVE ILLUSTRATED CATALOGUE OF THE MOLLUSCA OF INDIANA, by R. E. Call, Ph. D. (24th Annual Rep. of the State Geologist for 1899, Indianapolis, 1900). "This catalogue is intended to be complete and to fully exhibit the present state of knowledge concerning the group of which it treats, as presented in the fauna of Indiana." It is accompanied by a bibliography, and illustrations of the species. The latter are reproduced from the Smithsonian series "Land and Fresh-water Shells of N. A.," except the Unionidæ, most of which were drawn by the author. The figures only rarely represent Indiana specimens, and are rather rough.

Fifty species of land shells are enumerated, 55 aquatic gastropods, and 110 bivalves. The table of distribution shows the Ohio and

Wabash basins to be by far the richest in species, the Lake Michigan basin poorest, though with a good representation of *Limnæidæ*.

The catalogue is interesting and useful, though it would be better, we think, if Dr. Call had followed modern classification, and had adopted the rectifications regarding many species which have been made in the last decade. He apparently thinks that progress in the anatomical and systematic study of Mollusks abruptly stopped fifteen or twenty years ago, as no innovations of later date are adopted, except a few, mostly wrong, made by himself. Aside from these matters, there are but few errors, and these not of grave consequence; a figure of *Strobilops* is given for *Zonites fulvus* (p. 376); *Tebennophorus dorsalis* is said to be "the most common slug in Indiana," though we think what he had was dark *Agriolimax campestris*. We note also that the descriptions of Lamarck's Unios are quoted not from the original but from the Deshayes edition, and the accents of the French remarks are badly "balled up."—H. A. P.

UNIONIDÆ OF INDIANA.—In Mr. Call's *Descriptive Catalogue of the Mollusca of Indiana*, the author repudiates the attempt at a natural classification of the Unionidæ made in Mr. Baker's *Mollusca of the Chicago Area*, and cannot realize that such a system is proposed seriously. He cannot understand why, for instance, such a form as *Unio trigonus* is placed in the same subgenus as *Unio plicatus*.

Now it is a fact that has been repeatedly demonstrated by Dr. Lea's, Dr. Sterki's and my own observations of the anatomy of these mollusks that *Unio trigonus* and the allied forms, the different species of the *Plicatus* group, *Unio pustulosus* and its allies, *Unio coccineus*, *U. subrotundus*, *U. kleinianus*, and the forms belonging to the *Chickasawhensis* group which have been placed in the genus *Quadrula*, all have the embryos contained in all four of the gills, and when they are thus filled they form thick, smooth pods. And there are certain conchological characters which hold good in all these species. Their shells are all solid, short, more or less inflated; they generally have a wide, flat hinge plate and almost invariably deep beak cavities. Many specimens occur among species belonging to the *Plicatus* group in which the plications are nearly or even wholly wanting, and the epidermis varies from greenish to brown and black. Such specimens are not far removed conchologically from the smoother forms of the *Pustulosus* group or from *U. subrotundus* and *U. kirtlandianus*.

The true Unios, which in the United States are well represented by such forms as *U. complanatus*, *U. buckleyi*, *U. crassidens* and *U. gibbosus*, have longer shells than the Quadrules, they are generally less solid, and as far as I have seen, the beak cavities are comparatively shallow, while the hinge plate is never wide and flat as in *Unio pustulosus*. In these the embryos are found in the outer gills only.

Mr. Call uses the time honored names *Unio*, *Margaritana* and *Anodonta* for the Indiana Unionidæ. These names are applied in a subgeneric sense, but he neglects to tell us what genus he places them under, whether it is *Unio* of Retzius or the *Margaron* of Lea. In his artificial key to the groups of *Unio*, excluding *Anodonta* and *Margaritana*, he places the species in groups, typified by *U. luteolus*, *U. ligamentinus*, *U. crassidens*, *U. tuberculatus*, *U. personatus*, etc. These groups have been recognized as natural assemblages by Lea, Lewis, Marsh, Wetherby, and most of the other American students of the Unionidæ. I consider them as natural and reasonable as any that can be made among large assemblages of nearly related species, and every amateur who gets together a collection of naiades begins to perceive them after a little study. Yet Mr. Call seems to consider them as mere artificial or laboratory devices of little value.

The *Anodonta edentula* of Say is placed by Mr. Call in the genus *Anodonta*. In this remarkable species there are more fully developed vestigial hinge teeth than in any of the true anodontas, and the hinge plate is incurved in front of the beaks, while in *Anodonta* proper it is evenly curved throughout. This species carries the young in the outer gills in short, distinct ovisacs running directly across the gill, instead of in long ovisacs running vertically, as in the true anodontas. These contain from 8 or 10 to 20 or more embryos and finally break out through the outer walls of the outer gills and are discharged entire, with their contents, into the water. After this the gills assume the ordinary unionoid form. It is probable that a few other species from the southern states which have been placed in *Margaritana* have similar marsupia. I have examined gravid specimens of most of our American anodontas and of the *A. woodiana* Lea of China, and in all of them the marsupia are radically different from that of *A. edentula*.

Mr. Call's synonymy of *Unio clavus* Lamarck is certainly astonishing, and includes species as different in shell characters as can be found among the North American unios.—C. T. S.

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No. 9.

NEW VARIETIES OF *PHYSA ANCILLARIA* SAY.

BY BRYANT WALKER.

Physa ancillaria var. *magnalacustris*.

Shell subglobose, thick, solid, semi-opaque; incremental striæ fine, stronger toward the suture and somewhat irregular; transverse striæ very minute or subobsolete; purplish-horn color, darker toward the apex, which is dark brown or black; body whorl with one or more broad white varicose bands, more or less suffused with white toward the lip and at the base; whorls 5, regularly and rapidly increasing, the first minute, the last very large, regularly rounded, not shouldered, the greatest width being in the centre; spire slightly elevated, acute; suture but slightly impressed, margined below with white; aperture large, expanded below so that the greatest width is below the centre; outer lip thin, sharp, more or less expanded and broadly rounded below; thickened within by deep yellowish-brown or liver-colored callus, which appears externally as a broad white band, extremities connected by a thin callus, which is broadly reflected over the body whorl; columella white, straight, scarcely twisted.

Alt. $12\frac{2}{3}$, diam. 11, length of aperture $11\frac{1}{2}$ mm.

Alt. $17\frac{1}{2}$, diam. $12\frac{1}{2}$, length of aperture, $14\frac{1}{2}$ mm.

Alt. $13\frac{1}{2}$, diam. $10\frac{1}{2}$, length of aperture $10\frac{1}{2}$ mm.

Types from Frankfort, Benzie County, Michigan. It has also been found at Charlevoix, Beaver Islands, Mackinac Island, Mackinaw City and Port Austin, Huron County, Michigan. These localities indicate distribution along the coast-line of the upper part of the lower

peninsula from Saginaw Bay on the Lake Huron shore to nearly as far south on the Lake Michigan coast. This form is the characteristic *Physa* of the lake shore, and is commonly found clinging to the large stones along the rocky or stony beaches. Its thick wine-colored or purplish shell with prominent white varicose bands, basally expanded aperture, and the regularly curved outline from the apex to the columella, give it an aspect peculiarly its own, and render it easily distinguishable from the typical form or any of the allied species. Specimens from the Beaver Islands, Lake Michigan and Mackinaw City on the mainland, while retaining the peculiar form, are thinner, more inclined to be horn-colored and have a narrower marginal band, which internally is red rather than brown, and in these respects seem to connect the variety with the typical form. Were it not for these intermediate examples, there would be good ground for considering the form worthy of specific rank.

Physa ancillaria var. *crassa*.

Shell oval or obovate, thick, solid, opaque, smooth, shining, longitudinal striæ very fine, transverse striæ minute or subobsolete; white, more or less tinged with vinous or pale purple; darker toward the apex, which is dark brown; whorls 4-5; regularly and rapidly increasing, the first minute, the last very large, roundly shouldered and frequently flattened laterally; spire short, scarcely elevated above the general contour of the shell; suture but slightly impressed, bordered below with white; aperture large, but slightly shorter than the shell; widest in the centre, somewhat narrowed below and slightly effuse at the junction of the basal lip with the columella; outer lip broadly rounded, thin, acute, thickened within by a strong callus which is yellowish-brown within and white externally; interior of body whorl light yellowish-brown or liver color; extremities of lip connected by a thin callus which is broadly reflected over the body whorl; columella strong, white, nearly straight, but slightly twisted.

Alt. $17\frac{1}{2}$, diam. $12\frac{1}{2}$, length of aperture 14 mm.

Alt. 16, diam. $12\frac{1}{2}$, length of aperture $13\frac{1}{2}$ mm.

Alt. 15, diam. 11, length of aperture $13\frac{1}{2}$ mm.

Higgins Lake, Roscommon County, Michigan.

This form, while related to the variety *magnalacustris* in its texture, differs entirely in its shape, which is quite similar to the typical form in the roundly-shouldered body whorl, and more elongated and

less expanded aperture. The lip joins the body-whorl at a more obtuse angle and lacks the basal expansion characteristic of the lake form. The spire is also less produced. Compared with the typical form, this variety is easily distinguished by its heavy, solid, opaque shell.

NEW PISIDIA.

BY DR. V. STERKI.

***Pisidium tenuissimum*, n.**

Rather small, little to strongly oblique, moderately to rather well inflated, with the edges usually acutish, elongated or rather short, rhomboid to oblong-ovoid in outline, hinge margin little, inferior moderately curved, posterior end rounded or subtruncate obliquely in a postero-anterior direction with a rounded angle above; anterior more or less curved, truncate obliquely with the rounded-angular end inferiorly, or the whole anterior part rather regularly parabolic, with the end in the longitudinal median line; beaks slightly posterior, somewhat broad, moderately elevated over the hinge line, somewhat mammillar; surface very finely, almost regularly striated, highly polished; color horn to smoky, or to greenish, or to light grayish; shell very thin, translucent; hinge very fine, plate very narrow, cardinal teeth very small, short, thin, scarcely or slightly curved; those of the left valve very close together, longitudinal-parallel, the upper little posterior; lateral teeth rather long, markedly straight, slender, thin, with short cusps; also the outer ones in the right valve quite distinct; ligament fine.

Long. 3.4, alt. 2.8, diam. 2.1 mill.

Habitat: Straits and Orchard lakes, in Oakland Co., Michigan,¹ collected by Messrs. Walker and Sargent; Pine Lake, Marquette Co., Mich. (Upper Peninsula), and other waters in the same state; also seen fossil.

As pointed out in the description, the species is very variable in shape, and extreme forms, if found separate, might well be taken for different species. The one from Pine Lake (collected by Mr. Walker) is especially notable: the beaks are narrower and more

¹ Close together, but at the heads of different river systems.

elevated; the anterior part of the mussel is more rapidly and directly tapering to a rounded point, the color is light grayish with concentric, irregular, narrow zones of a darker shade. Some forms have resemblance with *P. splendidulum*, the more rhombic ones, with a corresponding form of *P. pauperculum*, but in case of doubt, the thin shell and very fine hinge with the markedly straight, slender lateral teeth will distinguish our species.

Specimens have occasionally been seen for several years, from different places, both recent and fossil, yet it seemed not safe to establish a n. sp. upon them. The recent finds of Messrs. Walker and Sargent have put an end to all doubts.

Pisidium monas, n.

Minute, rather well inflated, oval in outline, without any projecting angles, except a very slight one at the scutum, and the slightly pointed, rather inferior, anterior end; beaks little posterior, broad, rounded, little elevated; surface with comparatively coarse, microscopic, rather regular striæ, tops of beaks smooth and shining; shell thin, hinge fine, cardinal teeth very small, almost straight, longitudinal, the posterior (upper) of the left valve sometimes almost obsolete; ligament small.

Long. 1.7, alt. 1.4, diam. 0.9 mill.

Habitat: Mountain Lake, Marquette county, Michigan, collected by Mr. Bryant Walker.

Among the specimens seen (some twenty), little variation was noticed; the species may be recognized by its minute size and its shape, the low, comparatively broad beaks, and the somewhat coarse striation. The latter is about as in *Pis. punctatum*, small forms of which are also of about the same size; but the latter *Pisidium* is more inflated, more angular in outline, its beaks are narrower and more elevated. *P. monas* is also smaller than *imbecille*, and less elongated, its striation is coarser.

Being known from but one locality, the species has been established only after a most careful examination and comparison with *P. punctatum*, *imbecille*, *harfordianum*, *handwerkii*, as well as with the young of the other species occurring in the same lot.

Pisidium streatori, n.

Of medium size, almost equipartite, short oval-rounded to almost circular, without any projecting angles, or with a slight, rounded one at the scutum, moderately inflated, lentiform; beaks slightly pos-

terior, low, rounded, scarcely or little elevated over the hinge margin, approximate; surface with moderate to rather coarse, irregular striae, and usually a few coarser lines of growth, shining; color light yellowish horn, to straw or slightly reddish; shell rather thin, somewhat translucent; hinge rather fine, plate narrow; cardinal teeth well formed, the right one strongly curved, or angular, its posterior part thickened, simple, or grooved, or split in two diverging parts; the left anterior is angular, the posterior is oblique, slightly curved, short to rather long; lateral teeth rather small, little projecting into the cavity of the mussel, but well formed, the cusps short, pointed; ligament moderate.

Long. 5, alt. 4.4, diam. 2.5 (New York and some Ohio exs.).

Long. 5.5, alt. 4.8, diam. 3.4 (large Ohio ex.).

Habitat: Canaseraga river, N. Y.; Garrettsville, Ohio, in a swamp.

A lot of good specimens, from the former place, were kindly sent by Mr. Hy. Prime, in 1894, and then regarded as new, yet retained, as it might have proved to be a local form of some other species. Last fall Mr. Streator and the writer collected some specimens of exactly the same *Pisidium*, in a dried up swamp near Garrettsville, Ohio, the mussels living and propagating in the damp muck, under dead leaves, etc. Later on we found that Mr. Streator had collected quite a number during several years previous.

Our species is well characterized, and can not be mistaken for any other *Pisidium*. *P. roperi*, with nearly the same color and surface appearance, is larger, more elongate, much more inflated, its beaks are higher and more voluminous in the adult. I take pleasure in naming the present species after Mr. Geo. J. Streator, an enthusiastic conchologist, who has, for many years, collected and studied the mollusca of northeastern Ohio.

**SHELLS OF THE MARL-DEPOSITS OF AROOSTOOK COUNTY, MAINE, AS
COMPARED WITH THE LIVING FORMS IN THE SAME LOCALITY.**

BY OLOF O. NYLANDER.

In the part of Aroostook county underlaid by the Aroostook limestone of Niagara age, there are many deposits of shell marl. I have only examined two localities: Barren Brook Bog, in Caribou, and Lovely Brook Bog, in Fort Fairfield.

Barren Brook Bog, in Caribou, is covered by vegetation; but the Lovely Brook Bog is wet, dangerous and difficult to approach, excepting in one place.

I have just received from Mr. Bryant Walker a paper upon the "Shells of the Marls of Huron County," reprinted from the Geological Survey of Michigan, Vol. VII, part II, pp. 247-252, in which comparisons are made with specimens from Aroostook county, Maine. To my knowledge there has been no extensive list published of the shells found in the marl deposits of Maine, and no comparison made with the living species in the same localities.

Samples of marls have been sent to me from Presque Isle, Limestone, California Town, in New Brunswick, Canada, and other places. The most abundant species are *Limnæa desidiosa*, *Planorbis parvus* and *Pisidium contortum*,¹ in all the localities.

Fossils in the Marl of Barren Brook Bog.

Vertigo sp. Fragments only.

Succinea obliqua Say. Rare.

Succinea ovalis Gld. Rare.

Physa heterostropha Say. Rare.

Limnæa desidiosa Say. Abundant.

Planorbis trivolvis Say. Common.

Planorbis companulatus Say. Rare.

Planorbis bicarinatus Say. Rare.

Planorbis parvus Say. Abundant.

Planorbis (?). One specimen related to *P. crista* Lin., probably a new species.

Ancylus parallelus Hald. Two specimens only.

Valvata sincera Say (?). Not common.

Anodonta fragilis Lam. Rare.

Sphærium simile Say. Rare.

Sphærium rhomboidium Say. Rare.

Calyculina securis Prime (?). Rare.

Pisidium adamsi Prime. Few.

Pisidium compressum Prime. Few.

¹ Dr. V. Sterki has kindly examined all the *Pisidia* in my collection. Some of the specimens are still held by him, pending the receipt of more material for comparison with specimens from other parts of America and Europe. I am under the greatest obligations to him, and also to Mr. Bryant Walker, for valuable information.

- Pisidium contortum* Prime. Abundant.
Pisidium pauperculum Sterki. Rare.
Pisidium rotundatum Prime. Not common.
Pisidium scutellatum Sterki (?). Rare.
Pisidium variabile Pme. Rare.
Pisidium ventricosum Pme. Common.
Pisidium walkeri var. *mainense* Sterki. Rare.

Living shells in Barren Brook, one quarter of a mile below the marl deposit, in a small pond on the brook, the land shells obtained at the water's edge.

- Succinea obliqua* Say. Rare.
Succinea ovalis Gld. Common.
Succinea avara Say. Rare.
Strobilops labyrinthica Say.
Bifidaria pentodon Say.
Vertigo ventricosa Morse.
Conulus fulvus Müll.
Zonitoides arboreus Say.
Zonitoides exiguus Stimp. Common.
Carychium exile Lea. Common.
Physa heterostropha Say. Rare and small.
Limnæa desidiosa Say. Small compared with the fossils.
Planorbis trivolvis Say. Abundant.
Planorbis parvus Say. Common.
Planorbis crista Linné, var. *cristata* Drap. Common.
Anodonta fragilis Lam. Rare.
Sphærium simile Say. Common in the brook below the pond.
Sphærium rhomboideum Say. One small living specimen.
Pisidium abditum Hald. Rare.

Pisidium compressum Prime. Few where the road crosses the brook.

- Pisidium rotundatum* Prime. Rare.
Pisidium splendidulum Sterki: Abundant; type locality.
Pisidium variabile Prime. Abundant.
Pisidium seminulum Sterki?. Few specimens referred to this

species.

- Pisidium ventricosum* Prime. Common.
Pisidium walkeri var. *mainense*. Common.

*Fossils in the Marl Deposit in Lovely Brook Bog,
Fort Fairfield, Aroostook County, Maine.*

- Physa heterostropha* Say. Large, specimens rare.
Limnæa desidiosa Say.
Planorbis parvus Say.
Planorbis hirsutus Gld. Rare.
Planorbis crista Linné, var. *cristata* Drap. One good specimen.
Pisidium variabile Prime.
Pisidium abditum Hald.
Pisidium splendidulum Sterki.
Pisidium ventricosum Prime.
Pisidium contortum Prime.

Living Shells in the Lovely Brook Bog.

- Physa heterostropha* Say. Rare.
Limnæa desidiosa Say. Rare.
Pisidium variabile Prime. Common.
Pisidium ventricosum Prime. Small but abundant, especially on the marl deposit.
Pisidium splendidulum Sterki. Common and very variable.
Pisidium medianum var. *minutum* Sterki. The type locality; small but very fine specimens.

Pisidium contortum Prime, so abundant among the fossils, is one of the rarest living *Pisidia*. Only a few specimens have been collected in Mud Lake, in the northeast corner of Perham, Aroostook County, Maine. It is dangerous to go near the water's edge, as the boggy shores break through and one sinks in the mud.

PUBLICATIONS RECEIVED.

CONTRIBUTIONS TO THE TERTIARY FAUNA OF FLORIDA, with especial reference to the *Silex* beds of Tampa and the Pliocene bed of the Caloosahatchie River; including in many cases a complete revision of the generic groups treated of and their American tertiary species. By WILLIAM HEALEY DALL, A. M. Transactions of the Free Institute of Science, Philadelphia, Vol. III, Part V, Dec., 1900.

This part contains about 270 pages, and 12 plates, treating of the families *Solenidæ*, *Donacidæ*, *Psammbiidaæ*, *Semelidæ*, *Tellinidæ*,

Petricolidæ, *Cooperellidæ*, *Isocardiidæ*, *Cardiidæ*, *Diplodontidæ* and the *Leptonacea*; in all 145 new tertiary species are described.

This interesting work on the tertiary fauna contains so many changes in nomenclature that also affect the recent fauna, that it is looked forward to with as much, if not more, interest by the Conchologist than by the Paleontologist — the numerous generic and specific references, distribution of species, and synopses of genera, forming a very valuable feature to the student.

The first family discussed is the *Solenidæ*, which follows closely the synopsis of the recent species, published by Dr. Dall, in the Proc. U. S. Nat. Mus., XXII, 107, which was reviewed in the NAUTILUS for Feb., 1900. In the *Donacidæ* the synonymy of the two common Californian species is given as follows:

1. *Donax Californica* Conrad, not of Carpenter and the majority of Californian authors, nor Deshayes. *Donax navicula* Hanley.

2. *Donax lævigata* Deshayes. *Donax Californica* Carpenter and several Californian authors, not of Conrad or Deshayes. *Donax obesa* Gould, not Orbigny.

The generic standing of the various genera constituting the family *Psammobiidæ* are fully discussed; the following genera being represented: *Psammobia*, Lam. (*Gari* of some authors), *Sanguinoluria*, *Amphichæna*, *Heterodonax*, *Asaphis*, and *Tagelus*; regarding the latter Dr. Dall says: "The genus *Tagelus* is distinguished from any of the *Solenidæ* by its long and distinct siphons."

A number of changes of familiar specific names have been made in the *Semelidæ*. For the *Semele reticulata* L. of authors (*S. orbiculata* Say) the name of *S. proficua* Pulteney, 1799, is adopted, the *reticulata* of Linné being based on an oriental species. *S. purpurascens* Gmel. has priority over both *obliqua* Wood and *variegata* Lam. *S. bellastrata* Conrad, 1837, is substituted for *cancellata* Orb., 1853. *Cumingia coarctata* Sowb. is recorded from Florida, the synonymy being given as follows: *Lavignon antillarum* and *petitiana* Orb.; *C. fragilis* and *sinuous* A. Ads., and *C. tenuis* H. and A. Ads.

An extensive discussion of the *Tellinidæ* is followed by descriptions of 51 new species.¹

Of the family *Petricolidæ*, four species are recorded from the

¹This family will be more fully discussed in a review of Dr. Dall's synopsis of the recent North American species.

Atlantic coast : *Petricola lapicida* Gml., *P. typica* Jonas, *P. pholadiformis* Say, and *P. dactylus*, Sowb. In referring to the latter Dr. Dall gives the following interesting note : "The curious little shell named in 1872 by Verrill *Gastranella tumida*, is certainly a *Petricola*, and I suspect it to be the young of *P. dactylus*, which has when very young and fresh a purplish tinge on the umbones in some individuals. The tinge is precisely the same in both. Carpenter similarly took the nepionic young of *P. denticulata* Sowerby for a *Psephis* and described it under the specific name of *tellimyalis*. This was the more excusable, since the fry are brightly colored with orange and purple, while the adult and adolescent stages of the *Petricolaria* are pure white. I have a series showing the latter with its purple umbones strongly contrasting with the white valves, but this condition lasts only a short time, the color fading entirely out in most specimens before they attain full growth."

A most excellent synopsis of the Cardiidæ is followed by a review of the species, of which 28 are new. *Cardium floridanum* Heilp, is a syn. of *C. emmonsi* Conr.; for *C. magnum* Born (not Linné), *C. robustum* Solander is adopted. *Cardium bullatum* of authors as of Linné not of Mörch, becomes *C. spinosum* Meuschen; *C. semi-sulcatum* Gray, has priority over *C. ringiculum* Sowb., and *C. Petitianum* Orb., *C. (Lævicardium) serratum* L., and *C. lævigatum* Lam., are considered synonymous.

A provisional table of the families and genera constituting the Leptonacea¹ is adopted. *Montacuta bidentata* Montg., and *Kellia planulata* Stimp., are both placed in the genus *Rocheportia* Vélain. *Lasæa rubra* (Montg.) is thoroughly discussed. Dr. Dall finds no permanent specific character to separate *L. bermudensis* Bush. "Small shells like *Lasæa* which attach themselves by a byssus to algæ, may be widely distributed by ocean currents. Differences of temperature and food cannot fail to make their mark upon the different colonies. When, in addition, we have a normal crudity and want of definition in the hinge characters throughout the genus, it would seem inadvisable to subdivide the type too minutely." *Montacuta elevata* Stimp, is placed in the genus *Aligena* H. C. Lea.

The work closes with the Diplodontidæ; a synopsis of the recent

¹ A synopsis of the Recent and Tertiary Leptonacea of North America and the West Indies, was published by Dr. Dall in the Proc. U. S. Nat. Mus., xxi, pp. 873-897, 1899.

species in the Jour. of Conch., ix, pp. 244-246, Oct., 1899, was reviewed in the NAUTILUS, xiv, p. 34. Dr. Dall states that this part carries the text so far that it seems certain that another part will conclude the work.

NOTICES OF SOME NEW JAPANESE LAND SNAILS.

BY H. A. PILSBRY.

A recent sending from Mr. Y. Hirase, of Kyoto, Japan, contained a number of novelties, some of which are briefly diagnosed below. Illustrations will follow later.

Eulota (Aegista) mimula n. sp. Shell thin, openly umbilicate, depressed, with low-conic spire; brown, lustreless, rather weakly striate, and bearing sparse cuticular processes, like short, prostrate and adnate hairs. Whorls $5\frac{1}{2}$, convex, the last a trifle angulated in front, slightly descending to the aperture, rounded beneath. Aperture oblique, subcircular, the peristome whitish, narrowly expanded, subreflexed below, scarcely thickened, the margins approaching. Alt. 5.5, diam. 9 mm. Kyoto.

Much like a miniature *E. aperta*, but the spire is somewhat higher, the umbilicus rather less open, the striation less strong, and the peristome not thickened within.

Trishoplita cretacea var. *bipartita* n. v. Somewhat smaller than *T. cretacea*, with conic spire, whitish above, brown or copiously streaked with brown below, a brown line ascending the spire bordering the suture above; surface striate and rather indistinctly granulate by the decussation of fine spirals. Aperture very oblique, rounded oval. Alt. 9, diam. 14.5 mm.; alt. 9.5 diam. 12.5 mm. Toyonishikami, Nagato.

In *T. cretacea* the minute granules are irregularly scattered, not produced by decussation as in this variety. In specimens from Ushirogawa, Tosa, Shikoku Island, which I refer to *T. cretacea* as a variety, the sculpture is also decussate, though very indistinctly so. *T. cretacea* v. *bipartita* reminds one somewhat of *Helicella pyramidata*, from the form of the spire.

Eulota (Platotropis) elegantissima var. *cara* n. v. Larger than *E. elegantissima*, more depressed, with wider umbilicus and more rapidly widening last whorl. Alt. 10, diam. 29; alt. 7, diam. $20\frac{1}{2}$ mm. Loochoo Is.

Clausilia euholostoma n. sp. An exceedingly peculiar *Euphædusa*. The shell is very small, alt. 7.6, diam. 2.4 mm., with broadly oval (not in the least pyriform) aperture, continuous white peristome, and only a single lamella, the inferior, developed. This lamella is shaped as in *Cl. monelasmus* Pils. The principal plica and the lamella spiralis are extremely short and lateral in position; short upper and lower palatal plicæ are developed. There are about $7\frac{1}{2}$ whorls, the surface densely striated. The clausilium is Euphædusoid. Hab., Mikuriya, prov. Suruga (No. 563 of Mr. Hirase's register).

Clausilia japonica var. *interplicata* n. v. A dark colored, glossy variety, with several palatal plicæ developed between the usual upper and lower palatals of typical *C. japonica*. Nishigo, Uzen (No. 403 of Mr. Hirase's register). Other specimens from Takeya, Izumo, are less glossy, and irregular in the development of the "interpalatal" folds.

The following species belong to the section *Hemiphædusa*:

Clausilia perpallida n. sp. General form of *C. aurantiaca* var. *erberi*; pale corneous, finely striate. Superior lamella moderate, inferior receding, subcolumellar deeply immersed; closing apparatus lateral, the principal plica long, upper palatal well developed, a low, broad, nodule-like lunella below but not joining it; no lower palatal fold. Length 11.5, diam. 2.5 mm. Nishigo, Uzen (460 b of Mr. Hirase's register).

Clausilia harimensis n. sp. Similar to *C. aurantiaca* or a little more slender, but with the weakly developed peristome of *C. awajensis*, the lunella and closing apparatus generally being similar to that species, and lateral, not ventral as in *C. aurantiaca*. Whorls about 10; color greenish-brown, when unworn. Length 11.5, diam. 2.7 mm. Kashima, Harima. Types no. 79133 coll. A. N. S. (306 a of Mr. Hirase's register).

Clausilia hokkaidoensis n. sp. About the size and general form of *C. monelasmus*, with which it occurred. Whorls about 10, the last two striate. General characters of the aperture as in *C. subaurantiaca*, the subcolumellar lamella deeply immersed, closing apparatus lateral, the upper palatal fold well developed, not connected with the straight low lunella; no lower palatal fold. Much smaller than the allied *C. subaurantiaca*. Length 11, diam. 2.5 mm. Kayabe, Ojima, Hokkaido I. Types no. 79321 coll. A. N. S. (546 b of Hirase's register).

Clausilia iotapyx var. *clava* n. v. General form of *Cl. iotapyx*, the spire being abnormally thick above, though attenuated for half the length of the shell. Whorls 12, the last with a crest or ridge behind the peristome. Superior lamella moderate, inferior receding, not visible in a front view, subcolumellar emerging. Principal plica long, upper and lower palatal plicæ developed, a rudimentary lunella between them, not connected with the upper plica. Length 12.5, diam. 2.8 mm. Senzan, Awaji Island.

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A CONTRIBUTION TO WEST COAST CONCHOLOGY.

BY HENRY HEMPHILL.

Between San Diego and Point Conception, a distance of about two hundred miles, there lies off the coast of Southern California (not Lower California) a number of islands generally called the Santa Barbara group. In all, there are eight of these islands, varying in length from one to thirty miles and from one to six or eight miles in width, the nearest being about twenty-five, and the most distant about seventy-five miles from the mainland.

All of them bear the name of some saint whom tradition, superstition and religion have invested with supernatural power for good or evil toward men. Beginning with the most northerly island of the group and ending with the most southerly one, their names run as follows: San Miguel, Santa Rosa, Santa Cruz, Anacapa, San Nicolas, Santa Barbara, Santa Catalina, and San Clemente.

Here is an array of saintly names that should satisfy the most devout, and, if there is any virtue in a name, it should bring peace, hope and quiet rest to those whose lot might be cast upon these rock-ribbed and storm-beaten islands. But this does not seem to have been the case, for when they were first discovered by the old Spanish or Portuguese navigators, colonies of peaceful and, perhaps, happy Indians inhabited them, whose time and occupation in life was principally devoted to securing something to eat and very little to wear. Soon after the advent of the white man these poor creatures began to disappear, decreased in numbers, and finally became extinct. There still remain evidences of their home life, the shell heaps on their old

camping-grounds, an occasional broken stone-implement, and a few shell ornaments that have been over-looked by the white man in his search for curios or prehistoric relics.

Several theories have been advanced by scientists and others in regard to the origin and age of these islands, but I can add very little to these flights of the imagination. How often, if more than once, all or some of them have been submerged and raised above the sea level, or whether those of the group which are composed principally of metamorphic rocks are the remains of the highest peaks of a range of mountains that once formed or ribbed the most western part of the continent, it is quite impossible to say.

San Nicolas Island, however, is of sand-stone formation, and contains beds of marine fossils, the forms being similar to those now living all along the coast of the mainland, and I think we are safe in suggesting that this island was thrown up at or about the time the general elevation of the coast line and adjacent mesa-lands took place.

There are always some curious expectations associated in the human mind with thoughts of the islands of the sea. To the conchologist these expectations are often greatly multiplied, and these little isolated patches of land become intensely interesting, and especially so to the student of terrestrial mollusks, for the islands of the sea the world over are noted for their richness in land shells.

In this respect, our Californian islands are no exception to the general rule. While the number of so-called species found upon them, so far as we know them at present, is not very numerous, several are peculiar to these islands and not found elsewhere, while their coloring, varied through closely related forms, adds unusual interest and makes them very desirable for study, especially by those who are interested in problems of evolution.

The origin of the land shells of these islands and of the west coast generally has been the subject of speculation by various writers on the distribution of animal life for some years. In their attempts to account for the affinities and resemblances, in a few instances, between our land shells and some forms found in Asia, they have bridged over Bering Strait, or "Behring Straits," several times had bands of snails, or perhaps single ones "in pairs," as Pat would express it, cross this bridge into America, travel southward to Cape Horn, establish colonies all along this long line of travel, and subsequently spread eastward over the continent, and finally cross another imagin-

ary bridge into the West Indies; and the present shell fauna of this whole region is supposed to be the descendants of those Asiatic emigrants.

We are also to infer from these theorists and their writings, I suppose, that during the time this "dispersion" of Asiatic snails took place there was not a native terrestrial mollusk in all this land, no matter what other kind of organisms may have originated and existed here at that time.

In order to have a clear and comprehensive conception of life, the origin and development of the material forms of organisms, and their distribution over our planet, we must study them all from a fundamental standpoint, and I will here briefly allude to the fundamental as I understand it.

Time and space are infinite. Existing within the infinite there are elements that possess the properties of attraction and repulsion (energy—life), which, by their combinations, form two great factors that enter into and produce all the phenomena we see around us. These we know as energy and matter. Their relations to each other may be more clearly understood by stating that without energy matter could not be formed, and without matter energy could not demonstrate its presence, as it would have nothing to act upon, hence both are necessary to a demonstration of any kind, and must be regarded as equals in every respect. Development is a principle inherent in the elements—the hand-maid of life itself. Evolution, diversity and variation are natural processes belonging to development. These constitute the fundamental; they are coexistent and immortal, eternal, without beginning and without end. The fundamental alone is immortal; all the phenomena arising from the fundamental, the superficial and complex, are evanescent, fleeting and constantly passing away, even as the grass of the meadows and the forests of the plains, and are replaced by other similar phenomena, though varied in form. Development is the regular order of nature, and the regular order of development is from the simple to the complex and *vice versa* (disintegration). Wherever matter, heat, moisture and air exist together, there life (omnipresent energy, Howison), with her hand-maid development, will be found industriously refining and preparing inorganic matter, from which they will evolve organic forms in due course of time.

As the form and structure of terrestrial mollusks are not of a very

high or complicated nature, we may suppose that not many centuries would pass, after the Rocky, Sierra Nevada Mts. and the adjacent territory rose above the "Mesozoic Sea," before these creatures would originate, perhaps in many places at or about the same time; and as they multiply in numbers quite rapidly, under favorable conditions, there would have been a large native population of terrestrial mollusks existing here long before those Asiatic stragglers could have reached Cape Horn and the West Indies via Bering Straits bridge. If the present land shells of America are the descendants of Asiatic emigrants, what has become of the land shells that have originated here?

"Westward the course of empire takes its way" is as true as it is poetical, and if animals obey the same general laws that human beings do in this respect, then the snail emigration must have been the other way. We can as readily imagine bands of snails from America crossing this bridge at Bering Strait and establishing colonies on the other side as *vice versa*, and thus we could account for these resemblances and affinities by a westward movement as well as by an eastward emigration of these slow-moving creatures, if there were no causes or conditions in the environment in both countries to produce similar results in the organic structure of the same class of animals, which I believe is the case.

Without having investigated the matter very closely, I am under the impression that the resemblances and affinities of the West Coast shells, as well as those of America generally, are as close to those of Europe as they are to the shells of Asia. Compare the following American and European shells:

<i>American.</i>	<i>European.</i>
Helix nickliniana Lea.	Helix arbustorum Linn.
Helix kelletti Fbs.	Helix aspersa Müll.
Helix levis Pfr.	Helix pisana Müll.
Helix inflecta Say.	Helix personata Drap.
Patula striatella Anth.	Patula rudrata Stud.

Compare the entire *Zonitidæ* of both continents. Many of *Limnæidæ*, *Physidæ* and *Planorbidæ* on both sides of the Atlantic Ocean are identical, or so near alike that they could hardly be separated if mixed together.

I think, then, we may reasonably conclude that if the emigration

of animals is generally toward the setting sun, it would be more reasonable and more in harmony with this general law to base the distribution of animal life on a westward movement across each continent, spreading north and south as food and climatic conditions were found to be favorable to the existence of each class of creatures, rather than upon a haphazard exodus of animals from Asia via Bering Strait bridge.

Undoubtedly a few shells have been introduced into America from other continents, but, after two centuries of close commercial intercourse between America and Europe, we can count all the known introduced land shells on the fingers. I venture to suggest that the distribution of animal life is determined by the laws of attraction and repulsion as much as the revolutions of the earth in its orbit around the sun. There are life centres on each continent around which animals revolve, and from which they radiate and to which they return, with possibly a westward tendency of these life centres. In obedience to this law of attraction birds return each spring to their old nesting places; some fish, like the salmon, return each season to the rivers and creeks in which they were hatched to deposit their spawn, and many other circumstances of a similar kind might be cited in support of such a theory.

I have visited all of the islands off the coast of Southern California, except San Miguel and Anacapa, for the purpose of collecting shells, but before presenting a complete list of the land shells, I will offer descriptions of some forms that seem to be undescribed.

In referring to the Helices I use the general term "Helix," under which genus they have been described, and which, it seems to me, is quite as suggestive, and certainly as useful, as the long cumbersome names that have been recently adopted; leaving to others the choice of half a dozen or more genera and subgenera to which they have been referred from time to time by several distinguished eastern and foreign conchologists.

[*To be concluded.*]

A NEW AMNICOLA.

BY BRYANT WALKER.

Amnicola letsoni.

Shell small, elevated, solid, thick, white; subimperforate, whorls

$4\frac{1}{2}$, more or less flattened laterally and inclined to be shouldered; smooth; suture deep; spire short, less than one-third of the entire length, apex obtuse; aperture small, ovate, angled above, rounded below, flattened on the parietal margin, which is quite oblique to the axis. Peristome thick, continuous, entirely free from contact with the body-whorl in fully mature specimens.

Alt. $3\frac{1}{2}$, diam. $2\frac{1}{4}$, length of aperture $1\frac{1}{2}$ mill.

Alt. 3, diam. 2, length of aperture $1\frac{1}{2}$ mill.

Habitat: Goat Island, Niagara River, N. Y.

Amnicola sheldoni Pils. is the only species with which this can be compared. The present species, however, is to be distinguished by its flattened, shouldered whorls, deeper suture and more acuminate spire. Six mature examples were found which, though differing somewhat in the relative proportions of length and width, are, as a whole, quite uniform. In four of them, the peristome is distinctly separated from the body-whorl; in one, while continuous, it is so close as to be almost adnate, while in the remaining specimen, the parietal margin, although somewhat broken, seems to have been appressed to the body-whorl for a short distance. Associated with these specimens were two other examples quite similar, but much more cylindrical in outline, less solid, and with the aperture less angled posteriorly. Neither is quite mature, judging from the thinness of the lip. In view of the considerable variation in these particulars in other well-known species of the genus, such as *Amnicola lustrica* Pils. and of the few specimens now at hand, it is not deemed advisable at the present time to do more than call attention to the fact. Dr. Pilsbry, to whom some of the specimens were submitted, suggests that, like *Pyrgulopsis mississippiensis* Pils., it is probably an extinct species, and will be found in some quarternary bed along the Niagara or some tributary creek.

The type specimens were collected by Miss E. Jennie Letson, of Buffalo, N. Y., and the species is named in her honor.

EXOTIC MOLLUSKS IN CALIFORNIA.

BY JOSIAH KEEP.

In a recent pamphlet, Mr. R. E. C. Stearns speaks of twelve exotic species of mollusks that have been found in California. Sev-

eral of these are increasing rapidly. Recently two bright lads of our "Isaac Lea Chapter," Masters Doe and Gifford, brought me fine specimens of *Modiola plicatula* Lam. which they had found on the southwestern shore of San Francisco Bay. They also guided me to numerous colonies of *Urosalpinx cinereus* Say. on the Alameda shore, which they had naturally mistaken for the native *Ocenebra circumtexta* Stearns. They showed me several dead valves of *Venus mercenaria* Linn. which they had picked up on the same shore, but of which they had not been able to find living specimens. We cannot, therefore, certainly add this species to Mr. Stearns' list, but it is quite probable that living forms of the same will soon be found in deeper water.

Of the land species included with the twelve, two at least are becoming quite common. *Zonites cellarius* Müll. appeared abundantly the past season in the college garden, and *Helix aspersa* Müll. I have artificially propagated with much success, using a frame like a board-covered hot-bed, and feeding with cabbage leaves and similar vegetables. I have now introduced several native species into the frame and am awaiting the spring-time with much interest. *Helix californiensis* Lea does not thrive, as it evidently sighs for the sands of Monterey and the toothsome rattle-weed; but its near neighbor, *Helix dupetithouarsii* Desh., from Cypress Point, seems quite at home, and is as happy as if it were shaded by the venerable trees on that rocky promontory. Possibly it is because the frame is sheltered by a hedge of tall cypresses, lineal descendants from the trees on Cypress Point. I have often wished that the long and cumbrous name of this species could be changed to the short and highly-suggestive one, *Helix cupressa*, the cypress snail. But I suppose that the law of priority is like the law of the Medes and Persians, "which altereth not."

Mills College, Cal.

NOTICES OF NEW JAPANESE LAND SNAILS.

BY HENRY A. PILSBRY.

Clausilia Hiraseana n. sp. A *Megalophædusa* with the size and general form of *Cl. japonica*, but *strongly sculptured with rib-striæ*, far coarser than in any other known Japanese species. The sub-

columellar lamella is immersed and there are four strong palatal plicæ. Length 29, diam. 6 mm. Okinoshima, prov. Tosa (Y. Hirase).

Trishoplita Smithiana n. sp. Shell about the size and color of *T. goodwini* (Smith), but much more depressed, the spire low, convexly conic, whorls $5\frac{1}{3}$, the last angular at the periphery, descending in front; sculpture of slight growth-wrinkles and extremely fine, crowded spiral striae. Aperture transversely oval, oblique; peristome thin, expanded, reflexed below, the margins approaching, parted by a parietal wall in length about one-fifth the circumference of the peristome. Umbilicus open. Alt. 8, diam. 13, width of umbilicus 2 mm. Arakura, prov. Tosa (Mr. Hirase). Much more depressed than *T. goodwini*, with lower spire and wider umbilicus. named for Mr. E. A. SMITH, who has given us several valuable papers upon Japanese mollusks.

Ganesella myomphala var. *omphalodes* n. v. Similar to *G. myomphala* in color and texture, but much depressed and openly umbilicate, the columellar lip but slightly overhanging the umbilicus. Alt. 19, diam. 32, width of umbilicus 3 mm. Omikado, prov. Inaba (Mr. Y. Hirase). Specimens in the collection of Mr. Addison Gulick show that in true *myomphala* the umbilicus is not always wholly closed, but, unlike this variety, the columellar lip is flattened and spreading.

Ganesella Wiegmanniana n. sp. Shell deeply and (for the genus) openly umbilicate, much depressed, thick lens-shaped, angular at the periphery, encircled by a faint reddish-brown band above the periphery, surface somewhat glossy, sculptured with oblique growth-wrinkles, but without spiral striae other than a few rather coarse, irregularly-developed spirals sometimes visible on the base. Spire low, convexly conoid; whorls $5\frac{1}{2}$, moderately convex, the last angular at the periphery, somewhat convex beneath, but slightly descending in front, more or less constricted behind the lip. Aperture oblique, irregularly lunate-oval, the peristome white, narrowly expanded, thickened within, the basal margin straightened, thickened or obsoletely toothed in the middle; columellar end dilated, slightly overhanging the umbilicus.

Alt. 11, diam. $18\frac{1}{2}$ to $20\frac{1}{2}$ mm.; width of umbilicus 2 mm.

Kochi, prov. Tosa (Y. Hirase).

This species is clearly distinct from the strongly carinated form of

G. japonica called *patruelis* or *tabuensis* by some authors, but which is probably not really that species. The much depressed form like a thick lens, the open umbilicus and want of spiral striæ are its more prominent features. It is named in honor of FRIEDRICH WIEGMANN, of Jena, author of numerous and valuable works on the anatomy of land snails.

A NEW LYROPECTEN.

BY W. H. DALL.¹

The group of Pectinidæ named by Conrad *Lyropecten*, of which *P. Heermanni* Conrad is the type, is known to have its precursors in the Oligocene, to be in its developed form characteristic of the Miocene of the Northern Hemisphere on both sides of the Atlantic, and to be represented in succeeding horizons only by degenerate types which can hardly be referred to the same section of the genus, though apparently descended from it.

The Pacific coast species hitherto known are *P. Heermanni* Conrad, 1855 (+ *P. estrellanum* Conrad, 1856, not 1857); *P. magnolia* Conrad, 1857 (+ *P. crassicardo* Conrad, 1862). The first mentioned is a species of moderate size with no analogue in the Atlantic Miocene; its exact horizon is still doubtful. The second, which corresponds in the West American fauna to *P. Jeffersonius* Say is found in the upper or San Pablo horizon of California. From the still newer (?) horizon of Rio Dell on the Eel River, California, Mr. J. S. Diller of the U. S. Geological Survey has obtained a new form of which this preliminary notice is given, not only as a new species of interest but as one of the largest species of *Pecten* yet known. It will be illustrated later in the Survey publications. It is the analogue of *P. Madisonius* Say.

Pecten (*Lyropecten*) *Dilleri* n. sp.

Shell large, rather compressed, nearly orbicular with a relatively short, straight hinge-line, dorsally rectangular, nearly smooth, subequal ears, the posterior with three small riblets; a well marked though shallow byssal fold; and moderately thick valves. The right valve is somewhat more convex and strongly sculptured, bear-

¹ By permission of the Director of the U. S. Geological Survey.

ing 29–30 high, narrow, T-rail-shaped ribs, flattened above, overhanging narrower, deep, nearly smooth channels; and with marked concentric imbrication, feeble on top of the ribs but articularly scaly at their sides. The sculpture of the left valve is less pronounced, hidden in the matrix, but apparently similar. Alt. 192, lat. 175, diam. about 35 mm. The lateral edges are slightly defective, the submargins very narrow.

GENERAL NOTES.

HOLOSPIRA MINIMA v. Martens.—In my opinion the northwest Mexican forms referred to *Holospira pfeifferi* by Crosse and Fischer and von Martens, are distinct from that central Mexican species; and as the varietal name *minor* is preoccupied (*H. teres* v. *minor*), the name *minima* of von Martens may be used.

Dr. von Martens describes var. *minima* as “dense tenuiter lamelloso-costata, length $11\frac{1}{2}$ mm. only, 4 in the largest diameter; aperture $2\frac{1}{2}$ mm.; whorls 11, distinctly convex; color reddish-yellow, the costæ white.” The locality was not known, but the figure shows the angular early whorls of the N. W. Mexican form described as a variety of *pfeifferi* by Fischer and Crosse, and I do not doubt that the type came from that region.

The shells collected at Hermosillo, Sonora, by Rémond, are larger, alt. $12\frac{1}{2}$ to $13\frac{1}{2}$, diam. of penult. whorl 4 mm. The riblets are rather stout and crowded, though not quite as wide as their intervals, and number 32 to 34 on the penultimate whorl. These ribs, or many of them, have the peculiarity so strongly developed in *Urocopsis elliotti* and some other species, of being hollow, and therefore easily broken down, showing only the edges of the two lateral laminae. There are $12\frac{1}{2}$ whorls, and the color is nearly uniform. The internal column is perfectly simple and the lumen of the whorls is free from folds or lamellæ of any sort.

Specimens sent by Mr. Fred L. Button, exact locality not given, are a little smaller, alt. $11\frac{1}{2}$ diam. above aperture 4 mm., have 11 to $11\frac{1}{2}$ whorls, and decidedly coarser ribs, 23 to 26 on the penultimate whorl.

Evidently the species is a variable one, and the varieties are probably local.

Tryon's figure of *H. pfeifferi* (Amer. Journ. of Conch. iii, pl. 15,

fig. 34) is a bad copy of Pfeiffer's figure of typical *H. pfeifferi* in the Conchylien Cabinet, pl. 6, f. 31; but the specimens before him were the N. W. Mexican form from near Hermosillo, collected by Rémond.

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE FAMILY TELLINIDÆ AND OF THE NORTH AMERICAN SPECIES. By WILLIAM HEALEY DALL. Proc. U. S. Nat. Mus. vol. xxiii, pp. 285-326, 1900.

Some interesting notes on distribution and a list of the works referred to by dates in the text, is followed by a synopsis of the genera, subgenera and sections, an annotated list of the species, and description of new species, illustrated by three plates.

From the eastern coast are recorded: *Tellina interrupta* Wood, *T. laevigata* L. *T. lineata* Turt. (*T. brasiliiana* Lam.), *T. radiata* L., *T. crystallina* Wood, also on the Pacific coast. *T. lintea* Con., *T. æquistriata* Say, *T. americana* Dall (n. sp.), *T. fausta* Donovan., *T. alternata* Say, *T. angulosa* Gmel. (*T. punicea* Orb.), separated from pink var. of *alternata* by the pallial sinus reaching the anterior adductor scar. *T. georgiana* Dall (n. sp.). *T. squamifera* Desh., *T. Gouldii* Hanley, erroneously referred to the Pacific coast by author. *T. martinicensis* Orb., *T. magna* Spengl., *T. tenera* Say, *T. tenella* Verr., *T. texana* Dall (n. sp.), *T. versicolor* Cozzens, *T. sybaritica* Dall, *T. polita* Say,¹ *T. pauperata* Orb., *T. tampaensis* Conr., *T. mera* Say, *T. promera* Dall (n. sp.), *T. simplex* Orb., *T. flagellum* Dall (n. sp.), *T. similis* Sowb. (*T. decora* Say), *T. iris* Say, *T. exilis* Lam., *T. candeana* Orb.; *Strigilla carnaria* L., *S. rombergii* Mörch, almost identical externally with the preceding, but the pallial sinus does not reach the anterior adductor scar. It seems to be more plentiful than *carnaria* on the Florida coast. *S. flexuosa* Say, and *pisiformis* L.; *Tellidora cristata* Recl. The left valve is the flatter; in *T. burnetti* Sowb. from the Pacific coast the reverse is the case. *Metis intastriata* Say; *Macoma constricta* Brug., *M. krausei* Dall. (n. sp.) *M. balthica* Linn., circumboreal, *M. calcarea* Gmel., also on the Pacific coast, *M. inflata* Stimp., *M. cerina* C. B. Ad. *M. leptonoidea* Dall, also on the Pacific. *M. mitchelli*

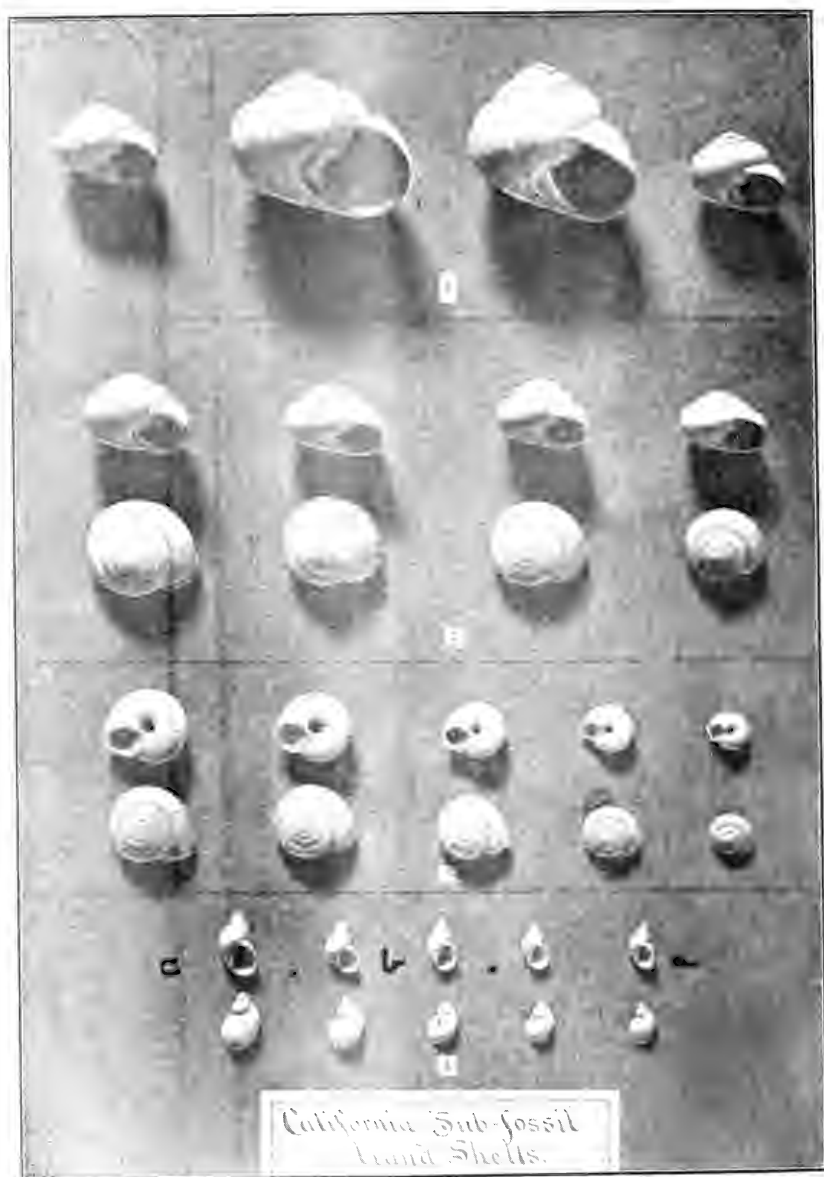
¹ This name being preoccupied, Dr. Dall has adopted the MSS. name of *Sayii*, proposed by Deshayes, see Trans. Wagner Inst., Vol. iii, pt. 5, p. 1034.

Dall, *M. phenax* Dall (n. sp.), *M. tenta* Say, *M. orientalis* Dall, *M. Tugeliformis* Dall (n. sp.), *M. brevifrons* Say, *M. limulu* Dall, *M. extenuata* Dall (n. sp.).

The species of the western coast are: *Tellina cumingii* Hanley, *T. idæ* Dall, *T. lyra* Hanl., *T. lamellata* Cpr., *T. reclusa*, Dall. (n. sp.), *T. declivis* Sowb., *T. pacifica* Dall (n. sp.), *T. pristiphora* Dall (n. sp.), *T. rubescens* Hanl., *T. viridotincta* Cpr., *T. ochracea* Cpr., *T. broderipii* Desh., *T. cognata* C. B. Ads., *T. salmonea* Cpr., *T. merophis*. "This is the *T. gouldii* Cpr. 1865, not of Hanley 1846." *T. pazina* Dall (n. sp.), *T. amianta* Dall (n. sp.), *T. macneilii* Dall (n. sp.), *T. suffusus* Dall (n. sp.), *T. carpenteri* Dall, "This is the *variegatus* Cpr. 1864, not *variegata* Gmel. 1792," *T. cerrosiana* Dall (n. sp.), *T. recurva* Dall (n. sp.), *T. modesta* Cpr., *T. virgo* Hanley, *T. buttoni* Dall, "This is the var. *obtusus* Cpr. 1864, not *T. obtusa* Sowb. 1818." *T. lutea* Gray, *T. bodegensis* Hinds, *T. santarosæ* Dall (n. sp.), *Strigilla fucata* Gld., *S. sincera* Hanl., *S. cicerula* Phil., *S. lenticula* Phil., *Metis alta* Conr. "This is the *Scrobicularia biangulata* Cpr., and is also the *Lutricola alta* of the same author." *Macoma middendorffii* Dall, this is *M. edentula* Midd. 1851, not of Brod. & Sowb. 1839. *M. incongrua* v. Mart., *M. Krausei* Dall. This is *Tellina lutea* Krause, 1885, not of Gray, 1828. *M. edentula* B. & S., *M. sitkana* Dall (n. sp.), *M. inflatula* Dall, *M. nasuta* Con., *M. carlottensis* Whiteaves, *M. liotricha* Dall, *M. expansa* Cpr., *M. yoldiformis* Cpr., *M. ataskana* Dall (n. sp.), *M. undulata* Hanl., *M. secta* Conr., *M. indentata* Cpr., and var. *temirostris* Dall (n. v.), *M. elongata* Hanl., *M. panamensis* Dall (n. sp.), *M. aurora* Hanl.

TWO NEW CYPREIDÆ. By MRS. AGNES F. KENYON.—Proc. Mal. Soc. of London, vi, 68, Aug., 1900. *Cypræa kanilau* is a new species from the Hawaiian Islands. The description and figure seem very close to a large sized (28 mill.) *C. helvola* L.; specimens of this species from Hawaii differ considerably from those of the Indo-Pacific region. *Trivia acutisulcata* is described without habitat.

DESCRIPTION OF TWO SPECIES OF CYPREÆ, BOTH OF THE SUBGENUS TRIVIA. By JAMES COSMO MELVILL.—Annals and Magazine of Nat. Hist., Aug., 1900, p. 207. Both species were received from Mr. Fred L. Button. *C. (Trivia) galapagensis* from Albatross Isl., Galapagos, is a new peculiar form having a "shining + named callosity over the whole centre of the dorsal region, completely obliterating the sulcus if any exists." *C. (Trivia) Buttoni* is a small globular straw-colored species with few, continuous ribs. Its habitat is unknown.



FOSSIL LAND SHELLS OF SAN NICOLAS ISLAND, CAL.

Figs. 1. *Helix byronii*, vars. *major* and *minor* Hemph. Figs. 2. *Helix furialis* Hemph. Figs. 3. *Helix ulahis* Hemph. Figs. 4 a. *Succinea araya* Say.; b. *S. a. recurva* Say.; c. *S. a. guadalupensis* Dall.

THE NAUTILUS.

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No. 11

A CONTRIBUTION TO WEST COAST CONCHOLGY.

BY HENRY HEMPHILL.

Helix var. *feralis* Hemphill.

Shell imperforate, smooth, compact, globose, white (faded), consisting of five convex whorls, the last with an obscure band at the periphery, and slightly descending at the aperture; spire elevated, somewhat pointed; sutures well impressed; aperture oblique, cramped, not effuse, about as wide as high; peristome reflected, thickened, its face rounded, the basal portion in some of the specimens slightly appressed to the body, its terminations very little approached. Subfossil.

Diam. 18, alt. 13 mm.; diam. 16, alt. 11 mm.; diam. 15, alt. 11 mm.; diam. 10, alt. 8 mm.

Habitat: San Nicolas and Santa Barbara Islands.

The Santa Barbara Island specimens measure as follows: Diam. 15, alt. 10 mm.; diam. 14, alt. 9 mm.; diam. $12\frac{1}{2}$, alt. $7\frac{1}{2}$ mm.

This shell appears to be somewhat rare. Thirty-five specimens all told—good, bad and indifferent—were all I found in the week I had on San Nicolas Island, and about ten occurred on Santa Barbara Island.

The lot shows considerable variation in the elevation or depression of the spire, as well as in size, as will be seen by the measurements.

I regard it as a variety of the very variable *H. ruficincta* Newe., but perhaps the species-makers would be better pleased to call it distinct.

Helix var. *sodalis* Hemphill.

Shell umbilicated, very variable in size, white (faded), globosely depressed; whorls 5, the last flatly convex above and beneath, smooth, under a good pocket lens appearing very minutely granulated, falling slightly at the aperture; spire a little elevated, obtusely pointed; sutures distinct and moderately impressed; peristome roundly thickened and reflected, its terminations approached and joined by a thin callus, the basal one crowding the umbilicus; aperture subcircular, about as broad as high; umbilicus quite variable in width, showing a portion of the penultimate whorl in some of the specimens. Subfossil.

Diam. 14, alt. 8 mm.; diam. 12, alt. 6 mm.; diam. 10, alt. 5 mm.; diam. $8\frac{1}{2}$, alt. 4 mm.; diam. 7, alt. 4 mm.

Habitat: San Nicolas Island, California.

If this interesting little shell was found in Colorado, New Mexico, or along the eastern line of Arizona, it would very probably be called an *Ashmunella*; if it had been collected in the Ohio Valley it certainly would be called a *Polygyra*; but as it is found away out here on the western limits of the continent, conchologists will be highly delighted to call it *Epiphragmophora* (*Micrarionta*) *ruficincta sodalis* Hemph. Sometimes there is certainly a great deal (of length) in a name.

Besides the extreme variations in size, as shown by the measurements, the larger forms show about the same extremes in the width of the umbilicus. In the living state it must have been of about the same color as *H. ruficincta* Newc., as a few specimens retain the rufus-colored lip and a very faint trace of a peripheral revolving band.

At my request, Dr. Dall compared a series of this shell with his types of *H. guadalupiana*, and has kindly sent me the following notes on the differences of the two forms:

"The fossil helices are interesting. They are nearly related to the recent *catalinae*, and yet not quite the same. The large specimens of No. 3 from San Nicolas are nearest, but have a different shaped mouth, are more rounded at the periphery and rather more elevated. The small form of No. 3 seems to be the same as your No. 2, which are labeled *guadalupiana* var. *sodalis*. No. 1 is very near *guadalupiana* Dall, but more solid, more rounded and with the upper and lower lips on the body further apart than in the *guadalupiana* proper." "I regard *Gabbi* as distinct, as the umbilicus is

closed and the shell more compact; it is very close to *facta*." "Doubtless all are branches of one stem."

It will be seen by Dr. Dall's remarks that our shell stands closely related to his *catalinae* and *guadalupeana*, with very great differences in size, besides those he has pointed out, which entitle our shell to a name as a variety. As they are "doubtless all branches of one stem," and as we have the stem in *Helix ruficincta* Newc., let us be consistent, follow nature, and call all of them branches (varieties) and not distinct stems.

Helix Tryonii major Hemph.

This variety is very much larger than any of the very many specimens that I have collected. One of the specimens is globose depressed, with an effuse subcircular aperture and a prominent tubercle on the basal portion of the peristome near the termination of the columella. The peristome is thickened, not reflected, the ends not approaching, but they are joined by a heavy callus. The other specimen is narrower, with a conical elevated spire; the aperture is very oblique, laterally expanded, and wider than it is high; the peristome is greatly thickened near the columella, but without a tubercle, not reflected; the ends are very much approached, no perceptible callus joining them.

Diam. 30, alt. 23 mm.; diam. 27, alt. 26 mm.

Habitat: San Nicolas Island, Cal.; subfossil.

Helix Tryonii minor Hemph.

The shell is very much smaller than the types, and shows about the same differences in the elevation and depression of the spire and in the form of the aperture as var. *major*. There is no tubercle on the basal lip, which is very little thickened.

Diam. 17, alt. 13 mm.; diam. $16\frac{1}{2}$, alt. $13\frac{1}{2}$ mm.

Habitat: San Nicolas Island, Cal.; subfossil.

This small form is very close to *Helix* var. *feralis*.

Helix Tryonii maculata n. color-var.

Ground color ashy white, lighter beneath than above; the body whorl and spire speckled with darker spots, banded or bandless at the periphery, form variable in size; spire elevated or depressed.

Diam. 25, alt. 19 mm.; diam. 20, alt. $16\frac{1}{2}$ mm.; diam. 22, alt. 15 mm.

Habitat: Santa Barbara Island, Cal.

I now offer a complete list of the land shells, their varieties, and their range over these islands, as far as I know or have collected them myself, with the single exception of *Helix ayresiana*, from San Miguel Island :

Selenites Duranti Newc. Santa Barbara, San Clemente Islands.

Selenites Duranti catalinensis Hemph. Santa Catalina Island.

Zonites Shepardi Hemph. Santa Catalina Island.

Ariolimax columbianus stramineus Hemph. Santa Cruz Island.

Binneya notabilis J. G. Cooper. Santa Barbara Island, recent and sub-fossil.

Helix ayresiana Newc. San Miguel, Santa Rosa, Santa Cruz Islands.

Helix intercisa W. G. Binn., with varieties *minor* Hemph., *elegans* Hemph., *nepos* Hemph., *albida* Hemph. San Clemente Island.

Helix Tryonii Newc. Varieties *varius* Hemph., *nebulosa* Hemph., *fasciata* Hemph., *californica* Hemph., *albida* Hemph., *maculata* Hemph. Santa Barbara Island.

Helix Tryonii var. *major* Hemph., *minor* Hemph. San Nicolas Island.

Helix Tryonii var. *subcarinata* Hemph. Santa Barbara Island.

* * * * *

Helix ruficincta Newc. Santa Catalina Island.

Helix ruficincta feralis Hemph. San Nicolas, Santa Barbara Islands.

Helix ruficincta Gabbi Newc. Santa Catalina, San Clemente Islands.

Helix ruficincta facta Newc. Santa Barbara Island.

Helix ruficincta catalinæ Dall. Santa Catalina, Santa Barbara Island.

Helix ruficincta sodalis Hemph.

* * * * *

Helix kelletti Fbs. Varieties (a) *castaneus* Hemph., *nitidus* Hemph., *multilineata* Hemph., *frater* Hemph., *californica* Hemph., *Forbesii* Hemph., *bicolor* Hemph. Santa Catalina Island.

Helix kelletti var. *redimita* W. G. Binn., *hybrida* Hemph., (b) *castaneus* Hemph., *clementinæ* Dall. San Clemente Island.

Pupa clementina Sterki. San Clemente Island.

Pupa californica catalinaria Sterki. Santa Catalina Island.

Pupa californica elongata Sterki. San Clemente Island.

* * * * *

Succinea avara Say.*Succinea avara vermeta* Say.*Succinea avara guadalupensis* Dall.*Succinea avara oregonensis* Lea.*Succinea avara rusticana* Gld.

This completes the list of the land shells of these islands so far as I know them.

The above arrangement of the *Succineas* may not meet the approval of some conchologists, but these subfossils, as well as the recent forms, go through those successive changes in the development of the shell.

[To be concluded.]

A NEW SPECIES OF SUBEMARGINULA FROM CALIFORNIA.

BY W. H. DALL.

Subemarginula Yatesii n. sp.

Shell large, coarse, strong, whitish gray, or pale olive green on the fresher portions, especially a very narrow margin about the base; sculptured with strong, not dichotomous, radial ribs, of which about 20 are primary, between each two of which lie from one to four secondary riblets, most numerous at the sides of the shell; besides these there is a very strong anal fasciole, higher and stronger externally than any of the ribs, extending from the apex, and ending in front at a notch about 3.5 mm. deep and rounded above and behind; the radiating sculpture is sharply and irregularly imbricated by the rude and profuse incremental sculpture, which is too close and irregular to form reticulation; apex small, pointed, not much elevated, situated three-fifths of the way from the front to the posterior margin; the fasciole descending from it swerves a little to the right of the median line of the shell; interior white, the extreme margin pale olive green but almost linear; anal furrow deep, extending nearly to the apex, where it is lost in a very pale olive deposit of shelly matter; margins crenulated by the sculpture; muscular impressions strong, the two recurved scars unequal, the right one larger. Lon. of shell 51, lat. 36, alt. 13 mm.

This shell was received from Dr. L. G. Yates, of Santa Barbara,

who obtained it from a dealer at Monterey, Cala., who asserted it to have been obtained alive from the bay of Monterey. Two specimens were obtained, which the possessor would neither lend nor sell; but finally Dr. Yates succeeded in obtaining one of them, which he courteously forwarded to the National Museum for examination.

It can only be compared with *S. gigas* von Martens, of Japan, in which the furrow is obsolete, and there are no secondary ribs, and the primary ribs are feeble, low, wide, and obsolete on the anterior part of the shell. If the locality is confirmed, the species is a notable addition to the Californian fauna.

VARIATIONS IN ODOSTOMIA.

BY REV. HENRY W. WINKLEY.

The question is frequently asked, why do we not have an up to date work on New England shells? The answer can be made, but only by one who is in the work. New England shells are fascinating to study, very difficult to obtain and presenting curious resemblances. Much work has been done, but there remains considerable more before the small forms can be determined in such a way as to give a true list of species. Such genera as *Bela*, *Turbonilla* and *Odostomia* represent some of the problems of the New England fauna. During the past two years the writer has been located at Branford, Conn., and opportunity is thus afforded for consultation with Prof. Verrill and his assistant Miss Bush. These two have handled the great mass of materials dredged by the Fish Commission, and one would suppose all the fauna of New England would be exhausted. On careful examination of the writer's cabinet some half dozen new species have been detected—several of these are *Odostomias*. One is from Woods Holl, another from an isolated colony in Maine, one from Prince Edward's Island, etc. As these species will be described in due time by Prof. Verrill we will not anticipate his work. Other changes in the genus *Odostomia* will be noted by him, among them some based on the following facts which the writer has been led to observe. "Binney's Gould" gives the species *O. impressa*, *bisuturalis* and *trifida* as distinct species. Let us study the three. *O. impressa* from Florida is a thick, deeply grooved shell, and at first sight

appears as a very good species. Side by side with New England specimens there is practically no difference except in the thickness of the shell. That counts for nothing in determining a species. For example take New England *Purpura lapillus* and see the thin paper shell from one region and the heavy robust one from another locality. Add now *O. bisuturalis* and *trifida*. What determines the species? Revolving lines are interesting marks, but we have no standard, variety is everywhere. I take a few examples from my own cabinet; for convenience I will number the grooves from suture to the shoulder on the last whorl 1, 2, 3, 4. Here are some results:

Branford specimens vary thus: 1000-1004-1200-1204-1234.

Woods Holl: 1000-1004-1200-1204.

Sheepscoote River, Maine: 0000-1000-1200-1234+.

Prince Edwards Island: 1000-1234+.

The plus sign means that additional lines appear, usually less conspicuous, between the more usual grooves. Perhaps this list may be altered, but I let it stand. There is so much difference, some deeply grooved while others are faintly marked. The above is the result of using a good lens and strong light across the lines. It looks as if these three species would have to shake hands and be one. I may add that the specimens from Maine and Prince Edward's Island are more deeply marked than the shells from southern New England.

NOTICES OF NEW JAPANESE LAND SNAILS.

BY HENRY A. PILSBRY.

Helicina osumiensis n. sp.

Shell depressed, convex above and below, bluntly angular at the periphery, rather thin, red; striatulate, and under a strong lens showing fine spiral striæ. Spire low-conic, the apex obtuse; whorls 4, scarcely convex, the last somewhat flattened above the peripheral angle. Aperture oblique, irregularly semicircular, the peristome very slightly expanded, upper margin nearly straight; a moderately thick, smooth callus on the base. Alt. $2\frac{1}{2}$, diam. 4 mm.

Kikai, province Osumi, southern Kiusiu (Mr. Y. Hirase).

Closely related to *H. verecunda* Gould (*Otia Conchologia*, p. 105) from the Loo Choo Islands, but much smaller, with the basal callus smooth, not roughened or pitted as in that species.

H. verecunda is cream-white with reddish streaks, or red with or without whitish streaks; the color "*luteo-virens*" described by Gould being due to the dried animal which shows through in places with a dark green tint. The half dozen specimens of *H. osumiensis* before me are uniform red.

Mr. Y. Hirase has distributed *H. verecunda* as No. 470, from Loo Choo (Riu Kiu, or Ryu Kyu). The specimens agree with one of Gould's original lot, in the collection of the Academy. I suppose they are from Okinawa Island. So far, we know scarcely anything of the snail fauna of the other islands of the group. Recent subsidence and breaking up into islands, of a ridge running from Okinawa to Kiusiu is suggested by the close alliance of the southern Kiusiu and Loo Choo faunas.

The *Helicina hakodadiensis* of Hartman (1890) has been rediscovered by Mr. Hirase at Kayabe, Ojima, Hokkaido Id. (No. 595). It is quite a distinct species, more angular at the periphery than other Japanese forms, and with the ruddy color of *H. osumiensis* and the American *H. occulta*. *H. hakodadiensis* is, next to the last-named species, the northernmost of its genus, its locality lying in about 42° N. Lat., while *occulta* extends to about 44° N.

Helicina Reinii var. *uzenensis* n. var. Shell differing from *H. reinii* Kobelt in being larger, pink or whitish-pink under a yellowish chestnut-colored cuticle, which remains in shreds and streaks only, and in the closely and deeply striated surface. Alt. 12, diam. 15 to 16 mm. Nishigo, Uzen.

Vertigo Hirasei n. sp. A minute, ovate, glossy-brown species with $4\frac{1}{2}$ whorls, the aperture having a parietal and a columellar lamella, and two palatal folds, the lower larger, elongate, the upper tuberculiform, sometimes obsolete. Alt. 1.5, diam. 1 mm. Yanagawa, prov. Chikugo, Kiusiu Id. (Mr. Hirase, No. 570).

Buliminus callistoderma var. *ogasawaræ* n. v. Similar to *callistoderma* in texture, sculpture and color, but distinctly longer, with 7 whorls, the spire perceptibly attenuated below the thick, obtuse apex. Length 13, diam. $5\frac{1}{2}$, length of aperture 5 mm.; length $12\frac{1}{2}$, diam. $5\frac{1}{3}$, aperture $5\frac{1}{3}$ mill. Ogasawara or Bonin Is. (Mr. Y. Hirase, No. 602).

Buliminus eucharistus n. sp. Shell rimate, high-conic, solid, purplish-brown, closely streaked with whitish or yellow. Spire straightly conic, the apex obtuse; whorls $8\frac{1}{2}$ -9, moderately convex,

sculptured with growth-wrinkles and in places faint spiral striae. Aperture slightly oblique, ovate, purplish-black within, the peristome white or flesh-colored, reflexed; parietal callus transparent; columella not perceptibly folded, oblique above, brown within. Length 26.5, diam. 11, length of aperture 10.3 mm.; 25.5, 11, 11 mm. Loo Choo Is. (Mr. Y. Hirase, No. 597). This is by all odds the handsomest Japanese *Buliminus*, being remarkably rich in color for the genus.

Buliminus luchuanus n. sp. Shell dextral, rimate, oblong-fusiform, rather thin, dark brown, copiously streaked with ragged cream-white stripes; obliquely wrinkle-striate and very minutely striated spirally. Outlines of the spire a little convex, apex obtuse, whorls $8\frac{1}{2}$, moderately convex. Aperture ovate, slightly oblique, orange-brown within, the peristome white, reflexed; columella oblique, the margin dilated; parietal callus transparent and thin. Length 21, diam. 7.5, length of aperture 8 mm. Loo Choo Is. (Mr. Y. Hirase, No. 598). Streaked like the sinistral Chinese *B. Fultoni* S. & B., or like *B. fasciolatus* Oliv., of Rhodes.

Eulota (Ægista) Martensiana n. sp. Somewhat similar to *E. Friedeliana*, but more elevated, the whorls larger in calibre, more slowly increasing, color darker, and sculpture stronger and more dense. Spire low-conic, whorls almost 7, convex, the last slightly carinate, shortly descending in front; sculpture rasp-like, consisting of *densely crowded*, short, erect scales, which are not shaggy. Umbilicus open, its width contained $3\frac{1}{2}$ times in that of the shell. Aperture oblique, subcircular, one-fourth excised by the parietal margin, lip narrowly reflexed, white. Alt. $10\frac{1}{2}$, diam. $17\frac{1}{2}$ mm. Sedake, Osumi, Kiusiu Id. (Mr. Y. Hirase). Named in honor of Prof. E. von MARTENS, of Berlin, whose wide-spread labors include several valuable papers upon the mollusks of Japan.

Eulota (Plectotropis) inornata n. sp. Shell umbilicate, the diam. of umbilicus contained about 6 times in that of the shell, low conoid with convex base, thin, somewhat translucent, pale corneous, sculptured with slight growth-wrinkles and fine, close spiral striae. Whorls $5\frac{2}{3}$, somewhat convex, the last with an acute, submarginate, smooth, peripheral carina; hardly descending in front. Aperture oblique, angular, the peristome thin, very narrowly expanded and subreflexed below, dilated at the columellar insertion. Alt. 6.3, diam. 12.5 mmf. Loo Choo Is. (Mr. Y. Hirase).

GENERAL NOTES.

VALLONIA PULCHELLA.—You may remember that in '97 I sent you a note concerning the sudden appearance of *Vallonia pulchella* in immense numbers in Pittsburg, Pa. A similar case has just been brought to my attention by a friend who lives about 6 miles out of town. Sometime in September he found his front walk (stone) covered with "thousands of small shells," and about two weeks later they appeared again. He saved a few for me and they prove to be *Vallonia pulchella*. Are such occurrences common?—G. H. CLAPP.

AN ADDITION TO THE U. S. LAND SNAIL FAUNA.—For the past three years I have had three adult and three young examples of a *Truncatella* from Key West, Fla., collected by Hemphill, which I had labeled, provisionally, *T. bilabiata* (they were sent as "*T. pulchella* var."), but which I was satisfied, from the very coarse and widely-spaced ribs, were something else. Your Bermuda paper has put me on the right track, as they agree *perfectly* with the "key" to and figure of *Truncatella clathrus* Lowe, so we must add this species to the U. S. fauna.—G. H. CLAPP.

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE NAIADES, OR PEARLY FRESH-WATER MUSSELS. By Charles Torrey Simpson. viii + 544 pp. (Proc. U. S. Nat. Mus. xxii, 1900.) This work presents an epitome of the author's studies during many years upon the *classification* of the fresh-water mussels, the *synonymy of the species*, and their *geographic distribution*. It is, in fact, a continuation of the famous series of synopses issued by ISAAC LEA; an *arrangement* of the mussels, not a work for the determination of species.

The classification of the family *Unionidæ* is almost completely original with Mr. Simpson, and it need not be said, must appear strange to those acquainted with the old arrangement of the group. The treatment of *Mutelidæ* is less revolutionary. The fundamental division of the *Unionidæ* rests upon the modifications of the ovisacs, or modified gill pouches of the female carrying the embryos; the sculpture of the beaks of the shell also affording characters of great value, being shown to be correlated with features of the soft anatomy.

Some 63 genera are recognized in the *Unionidæ*, over two-thirds of them being formed from the old genus *Unio* of authors, while *Margaritana* has also been dismembered. *Anodonta* is retained in nearly its old limits, except that the South American forms have been transferred to the genus *Glabaris* of the *Mutelidæ*, a change made by Dr. von Ihering some years ago. While a large portion of the genera are based upon the peculiarities of the ovisacs or other internal organs, Mr. Simpson finds that "when these are once discovered and understood, it will be found on careful examination that there are minor shell characters that correspond with those of the marsupia" so that a vast number of species unknown anatomically can be correctly grouped generically by the shells alone, although in some cases the record is not thus easily to be read. This is about the way the case stands in the *Helicidæ*; and in fact tallies with conclusions reached by workers on widely diverse groups of mollusks. The people who decry "mere shell characters" as valueless, are those who know little about them; but the fact remains that without knowledge of the internal anatomy, the real significance and comparative value of the shell characters could never have been discovered. Practical conchologists should give Mr. Simpson's system the test of rearranging their species by it. We hazard little in saying that once this is done, the naturalness of his generic groups will win general acceptance for the new classification. In many cases one cannot but be struck by the happy grouping of species which never before seemed to fit in anywhere.

Regarding the synonymy, Mr. Simpson seems to have exercised fair and temperate judgment. He is no species-splitter, but on the other hand, he has steered clear of an equally dangerous reef, which has wrecked several promising investigators. In other words, he has never allowed the reaction toward extreme "lumping" of species, which followed the era of Lea, to warp his judgment. As it is, the list of synonyms under some species, such as *Unio complanatus*, *tuomeyi*, *obesus*, etc., is appalling. The treatment of the *Lampsilis parvus* group is particularly commendable.

In the geographic relationships of the genera, a close affinity between the groups of southeastern Asia and tropical Africa is stated to obtain. This accords with the distribution of *Ampullariidæ*, *Viviparidæ*, and many land shells such as *Zonitidæ* and *Streptaxidæ*. The faunal relation between the mollusks of eastern Asia and

America, so conspicuous in land snails, also seems to hold in *Unionidæ*. The discussion of the dispersal and migration of the *Unionidæ* is one of the most interesting chapters. Mr. Simpson believes that the earliest Uniones had radial beak sculpture and carried the embryos in the inner gills; but these characters now persist chiefly in austral species, such as the South American genera (*Hyriancæ*) which have been replaced in the north by forms with external ovisacs and concentric beak sculpture (*Unioninæ*). The genus *Truncilla* ("*Unio triangularis*," etc.) marks the highest differentiation of Naiad life. Space denies further discussion of this topic, which, though highly theoretical, is handled with firm grasp of the facts and probabilities in the case.

Mr. Simpson's synopsis is destined to work a revolution in the study of fresh-water mussels, though there will naturally be opposition to the new ideas and methods among some reactionists. It is to be hoped that a sufficient edition has been prepared to enable all interested in the subject to obtain copies, and that a way will be opened for Mr. Simpson to continue his work to its logical end in a fully illustrated monograph of the "naiades."

FRANCIS C. BROWNE.

It was only recently that the editors of THE NAUTILUS learned with regret of the death of one of their old correspondents, Francis C. Browne, which occurred at his home in Framingham, Mass., Jan. 9, 1900, in the 70th year of his age.

He graduated from Harvard College in 1851, and the same year went to Florida, where he joined Prof. Agassiz's party at Key West. He camped in the Everglades and upon the Miami River, and secured many rare and valuable specimens. Later he visited Labrador and obtained many rare specimens of birds. For several years Mr. Browne would frequently send us boxes of shells for verification or determination, and his enthusiasm and appreciation made the work always a pleasure. He was also a devoted lover of birds, being an associate member of the American Ornithologists' Union and an occasional contributor to "The Auk" and "Nuttall Bulletin."

He leaves a daughter, to whom we are indebted for the facts of this brief sketch.

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DESCRIPTION OF TWO NEW SPECIES OF GLANDINA FROM JAMAICA.

BY HENRY VENDRYES.

Glandina (Varicella) Taylora, n. sp. Fig. 1.

Shell much elongated, oblong-fusiform. Not very shining, often semi-pellucid, of a brown color, deeply-tinted with rose orange; with narrow dark, reddish-hued or chestnut transverse streaks, crossing completely over all the whorls but not always extending to the base of the last whorl, but always coincident with and bordering the varices, of which there are four to five upon each whorl. Shell sculptured with fine transverse striæ, which become more apparent on the upper shoulder of the body whorl, next to the suture. Whorls 7, slightly convex, but in most cases perceptibly flattened or constricted at the periphery; the last whorl more than one-half the entire length of the shell. Suture impressed, the edge somewhat crenulated at one margin by the intrusion of the transverse striæ. Spire with the outlines somewhat curvilinear, rather pointed at the summit. Aperture not large, semi-ovate; labrum sharp, slightly produced towards the middle and below that point, gradually retreating, expanding and rounding off to meet the twisted, arcuated and obliquely truncate columella. Length 23 to 25, greatest diam. 7, or slightly less. Length of aperture 9, largest diam. 4 mill.

FIG. 1.



Habitat: Half Way Tree Pen, Parish of St. Catherine, Jamaica.

This shell resembles *G. nemorensis* in form but is considerably larger. In the outline of the spire it comes between *G. nemorensis* and *G. similis*, but it is larger than either of these species. The

strigæ are slightly broader than in *nemorensis* and not nearly so broad as in *similis*. In color it differs from both.

The shell is named in honor of Mr. C. B. Taylor, well known for his work on the birds and for his attainments in the general natural history of Jamaica, and by whom the species was first collected.

Glandina (Varicella) deflorescens, n. sp. Fig. 2.

Shell elongated, sub-fusiform, turreted, shining; color rather pale brown, generally with dark chestnut-brown, somewhat arcuated streaks, a set of which run coincidentally with the varices completely across each whorl. The painting of the shell is singularly varied; each successive whorl presents at the start a semi-transparent, sharply-defined and pure white stripe, which gradually passes into pale brown, then slowly deepens in color as the whorl progresses, into a warmer tint and finally merges into an intensely dark-brown stripe, covering the varix forward, which varix marks the termination of a stage of growth. This gradually changing color scheme is always repeated between the several varices, but it is less noticeable upon the upper part of the spire, although actually traceable almost to the apex. Shell regularly sculptured with not very crowded rib-like striæ. Whorls 8, very slightly convex and obsolete angular just below the upper margin, which is crenulated by the passing over of the striæ. Suture moderately impressed. Last whorl a little more than one-third the entire length. Outline of spire slightly curvilinear; apex pointed. Aperture ovate, oblong, considerably dilated at right side of base; labrum not sharp. Columella white, straight, well truncated with a strong callosity deeply impressed and folded by the entering striæ and varices which pass to and over it from the shell.



Total length, 17 to 18½ mill., diam. 5. Length of aperture 6, diam. 2 mill.

This remarkable species is named in allusion to the singular character of its painting. I am indebted for examples to Mr. P. W. Jarvis, who received them from Mr. Geo. Nutt, by whom they were for the first time collected at Moore-Town in the Parish of Portland, Jamaica.

The peculiarities of the columellar callus, impressed with the

marks of the sculpture of the shell, and of the dilation of part of the labrum on the right side of the base of the aperture, allies this species with *Glandina leucozonias* and *dominicensis*, both of which occur in the Parish of Portland in the extreme eastern part of the island.

POLYGYRA STENOTREMA WITHOUT A LIP-NOTCH.

BY HENRY A. PILSBRY.

Mr. Bryant Walker has sent me for examination a specimen agreeing with *Polygyra stenotrema* in the main, except that the basal lip is without the usual median nick or notch. The parietal lamella is strong and high, as usual in the species. Form rather elevated. Alt. slightly over 6, diam. 8.7 mm. It was taken by Mr. Walker at Dalton, Georgia; being the only *stenotrema* collected at that place.

In the collection of Mr. Geo. H. Clapp are two specimens, formerly in the James Lewis collection, labeled "East Tennessee," which agree with Mr. Walker's Georgia shell in lacking the lip-notch, although in one a slight wide sinuation of the lip in place of it, is perceptible. They measure 8 and 8.5 mm. diam., one with high, the other moderately low spire. All of the specimens show hairs or their traces, as in *P. stenotrema*, though not very conspicuously.

The lip-notch in the *stenotrema* species corresponds of course to the space between the lip-teeth in *Triodopsis*, the thickened ledges on each side of the notch being homologous with the basal and outer teeth in such species as *P. tridentata*. These notchless shells therefore represent cases of confluence or concrescence of teeth, a somewhat rare occurrence in Helices.

The question arises, are these shells merely abnormal forms produced by some mantle injury or other abnormal condition, or do they represent a rare race of which the notchless lip is characteristic? The former alternative seems most probable, except that the shell and lip seem quite without trace of any evidence of a diseased condition of the mantle, which is usually manifested by some roughness in the deposition of lime at the lip, or irregularity in the cuticle behind it.

However, the question is not one to be decided off-hand, but by the examination of more material; and I would ask collectors to go over their specimens of *P. stenotrema* and allied species, and report

full results to THE NAUTILUS. Locality of specimens and number examined from each locality should be given, as well as the occurrence of specimens without the notch. Any other notable variation might also be noticed; and negative results, so far as regards the matter of the notch, will be useful. The entire results can then be collated and published in THE NAUTILUS.

A CONTRIBUTION TO WEST COAST CONCHOLOGY.—*Continued.*

BY HENRY HEMPHILL.

As the original locality, "Santa Barbara," given for *Helix kelletti*, Fbs., is undoubtedly a mistake, some writers on our land shells have referred that shell to Santa Barbara island, which is equally as erroneous. Santa Barbara island is about one or one and one-half miles long and perhaps one mile wide, and quite easy of exploration. On my first visit to it, 25 years ago, I was left there alone for seven days, while the vessel went to San Pedro to be cleaned and repaired. During that time I explored every part of the island, collecting the land shells, which was the especial object of my visit. Last August I made another visit to that island for the same purpose, and gave four days more to collecting the land shells, and during these eleven days not a single specimen of *Helix kelletti* was found, and as dead *Helix tryonii* may be picked up by the thousands, and as no shell of that description was mentioned in Forbes' report of the "Herald and Pandora" surveying expedition or voyage, during which time the original *kelletti* was collected, we may reasonably suppose that the vessels of that expedition did not even visit Santa Barbara island.

It is quite interesting and instructive to note the various opinions that have been expressed from time to time by distinguished conchologists on this matter. In the Am. Jour. of Conch., vol. 4, pl. 4, p. 214, 1868, Dr. J. G. Cooper writes: "Kellett's specimens were probably from one of the small islands off the coast of the peninsula (Lower Cal., H. H.), though credited to "Central America," and were a dwarfed form, the species attaining its highest development on Catalina island, within this state (Cal., H. H.), not Santa Barbara island, as stated by Newcomb, where *tryonii* replaces it."

"Prof. A. Wood found specimens on the summit of a mountain twelve miles east of San Diego, and at one or two thousand feet ele-

vation, which although much smaller were finely colored, more like the original type, or like Mr. Gabb's *stearnsiana*."

In his Manual of American Land Shells, p. 150, Mr. W. G. Binney credits *H. kelletti* Fbs. to San Diego, Santa Catalina Island, San Nicolas Island in the California region; "also 12 miles east of San Diego at 2000 feet elevation," and remarks, "The specimen figured is from Catalina Island. I am positive it is correctly referred to *kelletti*." "Forbes' original figure is copied in Terr. Moll., V." On turning to Terr. Moll. v., I find the figure identical with the one in his Manual, on page 149, which is undoubtedly the Catalina Island form. I may add here that I found no specimens of *H. kelletti* on San Nicolas Island, but my time and operations were limited while there to the south end of that island.

In a paper published in the Proceedings of the Academy Nat. Sciences of Philadelphia, 1900, entitled, "Additions to the Insular Land-Shell Faunas of the Pacific Coast," etc. Dr. Dall writes of *H. kelletti*, "the typical *E. kelletti* is that found in the vicinity of San Diego. It has six whorls and they are well rounded. It differs from the Catalina Island form, in its less flattened and more inflated whorls, more dome-like spire, smaller size and browner aspect, the contrast between the upper and lower sides of the last whorl being less marked. Specimens from Coronado Islands are like those from San Diego. The National Museum has this species only from the above-mentioned three localities authentically. "Santa Barbara," frequently mentioned as a locality, should read "Santa Barbara Islands," as it is improbable that the shell occurs at the town of Santa Barbara on the mainland. A lot in the National Museum are labelled, "Oregon City," Shumard, which is, of course, an error.

If the San Diego and Coronada Islands forms are accepted as the typical *H. kelletti* Fbs., as suggested by Dr. Dall, then *H. stearnsiana* Gabb. must fall into the synonymy of that species, notwithstanding the former is said to have six, and the latter five whorls; and then the Catalina Island form would be undescribed or rather unnamed. Some of the Catalina specimens are an exact imitation of San Diego and Coronado Island examples in coloring, as well as in size. *H. stearnsiana*, at Santo Tomas, and on Todas Santos Islands, lower California, attains a greater size than any specimens of *H. kelletti* that I have ever seen, and associated with them individuals occur as small as the San Diego or Coronado Island forms.

Mr. R. E. C. Stearns, in his usual thorough manner, ventilates this matter of the locality of *H. kelletti* in a paper published in the Annals of the New York Academy of Sciences, May, 1881, entitled, "*Helix aspersa* in California." He quotes the following from Dr. Carpenter's Report on the Mollusks of the West Coast of North America. "Among the wasted opportunities of obtaining very valuable information on geographical distribution must unfortunately be recorded the surveying voyage of the Herald and Pandora, Capt. Kellett, R. N. C. B., and Lieut. Wood, R. N."

"Here was an exploration in competent hands on the very incognita itself; and yet, alas! Prof. E. Forbes further states that unfortunately the precise locality of many of the individual specimens had not been noticed at the time, and a quantity of Polynesian shells mingled with them have tended to render the value of the collection, as illustrative of distribution, less exact than it might have been."

The following also from Dr. Carpenter's report refers to the locality of some of the land shells:

"*Helix pandoræ* Forbes. Santa Barbara, as per box-label. San Juan del Fuaco, teste Forbes.

"——— *kelletti* Fbs. Allied to *H. californiensis* Lea, same locality.

"——— *aspersa*. Marked Santa Barbara, probably imported."

To the above Dr. Stearns pertinently remarks: "The closing line of Dr. Carpenter hardly justifies the previous remark, 'an exploration in competent hands.'"

Dr. Stearns further remarks: "Binney, in the volume quoted, properly credits *H. pandoræ* to 'Margarita Bay, Lower California.' Forbes' habitat of this species is only seventeen hundred miles too far north, and of *kelletti*, eleven hundred."

"Another distinguished author has placed the Lower Californian *Helix levis* on the Columbia River—about fifteen hundred miles too near the north pole."

As *Helix stearnsiana* Gabb is so closely related to *H. kelletti* Fbs., I will add the following:

Mr. Binney, in the Manual Am. Land Shells, says of *H. stearnsiana*: It has 5 whorls, the measurements are given as, greater diam. 22, lesser 17 mm., height 12 mm. Tryon, in his Manual Conchology, writes, whorls 5, diam. 22 mm.

Mr. Gabb describes the shell in the Am. Jour. Conch. as having

$5\frac{1}{2}$ whorls, gives no measurements, and remarks: "As compared with *H. kelletti* Fbs., this shell has not the peculiar flat sloping top to the whorls so characteristic of Forbes' species, the mouth is much less oblique, the umbilicus is not covered, nor are the ends of the lip connected by either callus or plate over the body whorl. I have made minute comparisons of a large series of the present species, with specimens in the collection of Dr. Newcomb labeled *Kelletti* Fbs., and sent to him by Hugh Cuming."

"Another point of difference is the locality. Forbes' species has never been found farther south than San Diego, and its true habitat is probably on one of the islands of the coast, while our species is essentially a Lower Californian, being found under stumps of Maguey from St. Tomas to a little beyond Rosario."

I may add here that the form we call *stearnsiana* is very variable in size, though quite constant in general coloring. To show these variations in size I add the measurements of two specimens I collected myself at Santo Tomas, in Lower California, Gabb's original locality. The largest measures, great diam. 31, alt. 23 mm.; smallest specimen, great diam. 22, alt. 16 mm.

I have quoted from these eminent conchologists not only to show how much they differ in their opinions about the locality and form of *H. kelletti*, Fbs., and *Helix stearnsiana*, Gabb, but because their writings have become a part of the history of this shell (*H. kelletti*) "without a country."

One fact is sure, the exact locality of *H. kelletti*, Fbs., is lost, and suppositions, probabilities and surmises count for nothing in this case.

As Catalina Island is the nearest point to Santa Barbara, one of Forbes' localities for *kelletti*, where that shell is known to exist, and as it has been largely distributed as the typical form, I think it will be wise to let it remain so, and not attempt any change. If we make the San Diego shell the typical *kelletti*, then *stearnsiana* must fall into the synonymy of that species, for no one with a good series of these shells to study from can by any character whatever separate them. Even some of the Catalina Island shells are an exact imitation in general coloring of the San Diego and Coronada Island *stearnsiana*, and with the same number of whorls.

While upon this chapter of errors, blunders and mistakes, I will call attention to such expressions as the following that occasionally appear in print: "Californian conchologists call such a shell 'so and

so.'” “West Coast conchologists are in error,” etc., etc. One esteemed correspondent quite recently wrote me, “Some West Coast conchologists are a little mixed.” When we understand that most all West Coast conchologists have depended on the “Wise men of the East” for the names and all that pertains to the study of conchology, and that many of their mistakes are simply a reflection back to the East of the blunders that have been sent out to the West by Easterners, we can see just where the smile comes in. My own experience of thirty-five years “on these lines” has two sides to it, one very pleasant and the other very exasperating. I fear there have gone out of my shell den some expressions for which I cannot be held responsible, for in my way of thinking the provocation has been very great.

The fact is we all make blunders and mistakes, and West Coast conchologists do their share; but when we follow monographs published by Eastern conchologists that contain mistakes, and when we depend on Eastern conchologists for the names, and many of these names prove to be erroneous, it seems hardly fair to refer to West Coasters in such a way that those who do not know all the facts would think that West Coast conchologists were nothing but a lot of blunderers. “Wise men of the East,” please take a rest, and pick the beam out of your own eye!

NEW NORTH AMERICAN SPHÆRIA.

BY DR. V. STERKI.

During the last seven years I had chances to examine tens of thousands of Sphæria and Calyculinæ, alongside with the Pisidia, owing to the efforts and the kindness of many conchologists and partly to my own collecting. Yet I refrained from publishing anything on the subject before I should have acquired some knowledge about the range of variation of the several species, almost endless in some instances. There are some new forms, however, so very different from those published that they must be named and described.

Sphærium crassum, n. sp. Mussel large, strongly inflated, almost equipartite, somewhat rhomboidal in perpendicular outline; beaks a little anterior, large and full, slightly flattened on top, prominent over the hinge line; superior margin rather strongly, inferior mod-

erately curved; scutum and scutellum distinct with slight projecting, rounded angles at their terminations, the one at the scutum being less marked in full-grown specimens; anterior and posterior ends almost equally, obliquely truncated, especially in specimens not quite mature, while in the adult the posterior end forms more a regular curve from the beaks down to the rather low-situated rounded end; surface with rather sharp, fine and crowded sulcations, usually somewhat coarser on the beaks, dull or with a slight gloss; a few strongly marked lines of growth; color grayish or whitish-brown in the young, and the same in slightly marked marginal zones of older specimens plumbeous in half grown, and reddish or brownish, or smoky-brown, in the adult, with narrow, darker zones on the lines of growth; shell thick, muscle insertions distinct, nacre white, almost porcellaneous, with bluish zones corresponding with the lines of growth; hinge strong, plate rather broad, cardinal teeth comparatively large, the right strongly curved, emarginate at the free edge, its posterior part thick, slightly to deeply grooved; the inferior in the left valve short, curved, the superior shorter to longer than the inferior, moderately posterior, oblique, little curved; lateral teeth strong, those of the left valve with very high pointed cusps, ligament rather large, covered.

Size: long. 15, alt. 11.5, diam. 9.5 mill.

Long. 14, alt. 11.5, diam. 9 mill.

Habitat: Carp Lake, near Mackinaw City, Michigan, collected by Mr. Bryant Walker.

This is a remarkable *Sphaerium*. It stands near some large forms of *stamineum*, yet by its shape, large diameter and very large beaks, is different; *S. solidulum* is more rounded in its outlines, less inflated, its beaks are smaller, and the sulcation is coarser. In its surface appearance, sulcation and color, our species resembles *S. simile*, but is much shorter, comparatively, its beaks are higher, the hinge margin is more curved and the hinge very much stronger.

Sphaerium walkeri n. sp. Mussel small, well inflated, almost equi-partite; beaks little anterior, rather broad, rounded, not high, somewhat projecting over the hinge margin; the latter rather short, little curved; scutum and scutellum scarcely marked, with slight, projecting rounded angles; inferior margin slightly curved; anterior end well rounded, passing into the inferior without any indication of an angle; posterior slightly truncated obliquely, passing into the inferior with a low situated, rounded angle; surface with very fine, some-

what irregular striation, also on top of the beaks, shining; color yellowish to brownish horn; shell thin; translucent; muscle insertions slightly marked; hinge rather short, slightly curved, fine, plate narrow; the right cardinal tooth little curved or almost straight, thin; the left inferior, short, slightly curved, the superior longer, rather posterior and curved down at the posterior end; lateral teeth fine, the outer ones in the right valve quite small, those in the left valve with short sharp cusps; ligament small.

Size: long. 5.3, alt. 4.5, diam. 3.4 mill. (largest specimen, long. 4.6, alt. 4, diam. 3.2 mill. and probably full grown.)

Habitat: Lake Michigan, off New York Point, in deep water, dredged by Mr. Bryant Walker, at 24 meters.

The present *Spharium* ranges under the group *Corneola*, with *Sph. rhomboideum* Say and *occidentale* Pr., but is quite distinct from both, not only by its small size; from the former it is distinguished by its well-rounded anterior part, from the latter, by its broader, less prominent beaks and the oblique posterior end. It has some resemblance, in shape, with some forms of *Sph. corneum* Lin. of Europe, but is very much smaller, its beaks are somewhat different and so is the surface appearance.

The specimens were first seen in November, 1894, and then regarded as representing a new species, and named in honor of Mr. Bryant Walker, the indefatigable scientist and collector to whom we owe so much conchological knowledge.

A NEW PINNA FROM CALIFORNIA.

BY WM. H. DALL.

No species of the *Pinnidæ* has hitherto been known from California, or reported from any point more northerly than the Gulf of California on the Pacific coast. It was therefore a surprise when I received from Mr. and Mrs. Oldroyd a specimen taken alive by fishermen in 25 fathoms, San Pedro Bay. This is rather an exceptional depth for a species of its solid and heavy character, the deep water *Pinnidæ* usually belonging to the small, delicate and spinose forms, and the coarse imbricate species being more commonly found gregariously, at no great distance below low water mark, where their sharp edges have often been referred to as injurious to small boats landing in the shallow water. The present form belongs to the genus

Atrina, characterized by the absence of any slit in the umbonal part of the shell, such as is found in all the typical *Pinnas*.

Atrina oldroydii n. sp.

Shell solid, heavy, blackish-gray, subtriangular, rather inflated; umbonal end slender (somewhat defective in the specimen); hinge margin straight; ventral margin contracted in front, convexly arcuate behind; posterior margin arched; exterior smooth, except for more or less concentric wrinkling on the ventral side and numerous rather fine imbricate elevated ridges (about 38) radiating from near the umbo on the dorsal and middle portions of the valve, not extending to the ventral surface and obsolete over the distal fourth of the valve; the scales or spines are worn off, but appear to have been numerous and small; interior of a livid dark olive gray, with a lurid iridescence over the visceral area, the ventral edge of which extends in a zigzag line almost directly anterior from the ventral edge of the rather small adductor scar, leaving more than a third of the ventral surface of the inside of the valve exterior to the visceral area. Length of ventral margin 238; of dorsal margin 175; of the distal margin 156; maximum diameter of the valves 63 mm. Length of the visceral area from the umbo 172 mm. The byssus is quite small and of a dark blackish-brown color.

The form of the visceral area, which in these shells is generally regarded as a pretty constant character, is entirely different from that of any of the other described Pacific coast species. In the form which, as described, comes nearest to *A. oldroydii* (*A. tuberculosa*), has the posterior margin of the visceral area forming a straight line from the dorsal nearly to the ventral margin of the valves.

The present species appears to be an analogue of our Atlantic coast *A. serrata* Sowerby, but as regards the exterior characters probably submits to a variation which only the study of a larger number of specimens will enable us to determine.

Though not a particularly handsome shell, this is one of the most notable among the many additions made to the mollusk fauna of California in recent years.

ALASMODONTA MARGINATA, SAY, AND *A. TRUNCATA*, WRIGHT.
—In his "Synopsis of the Naiades," Mr. Simpson says the former is from "Lower St. Lawrence, southward in streams draining into the

Atlantic to South Carolina;" the latter, "Upper Mississippi drainage, Ohio, Cumberland and Tennessee systems; Michigan, Upper St. Lawrence drainage."

In his description (Jour. Acad. Nat. Sci., I., p. 459) Mr. Say gives the Scioto river as the locality of the types of "*Alasmodonta marginata*," and states that the types are in the Academy collection. There is one good specimen in the collection of the Academy, of the *truncata* species, labeled *A. marginata*, Say, from the Scioto river. Mr. Say must have been familiar with the eastern form. Did he decide to change the name of the western truncate form to "truncata" and let "marginata" cover the eastern form? Probably no one living can answer this question, but we can imagine it answered in the affirmative, and label the Atlantic slope shell "marginata, Say," and the Ohio shell "truncata, Wright," in accord with Mr. Simpson's magnificent synopsis.—CHARLES LEROY WHEELER.

GENERAL NOTES.

TRIVIA PAUCILIRATA Sowb.—Some months ago, upon looking over some small shells labeled "Sarasota Bay," which have been for many years in my collection, unidentified and collector unknown, I noticed a very small *Trivia* which seemed to correspond to Sowerby's description of *T. paucilirata*, a well-marked species. Upon sending it to Mr. Melvill, he has confirmed my opinion and pronounces it an undoubted representative of that species, the habitat of which seems to have been hitherto unknown, at least so far as the monographs would indicate.—FRED L. BUTTON.

EPIPHRAGMOPHORA FIDELIS (GRAY) IN CENTRAL CALIFORNIA.—During a short yachting cruise south, on San Francisco Bay, we anchored during the night of Feb. 16, 1901, at Point San Mateo, San Mateo Co. As it rained quite heavily during the night I anticipated that snails would be out in force on the heavily wooded slope of the point, so landed for a hunt in the morning. I saw under the eucalyptus and pine trees hundreds of specimens of *Epiphragmophora arrosa* Gld., *Epiphragmophora californiensis nickliniana* Lea, and *Circinaria vancouverensis* Lea, of which I secured numerous fine specimens. I also found, to my great surprise, two fine specimens of *Epiphragmophora fidelis* Gray, hitherto recorded as being found from Humboldt and Shasta Cos., Cal. to Vancouver Island.—EDWARD W. GIFFORD.

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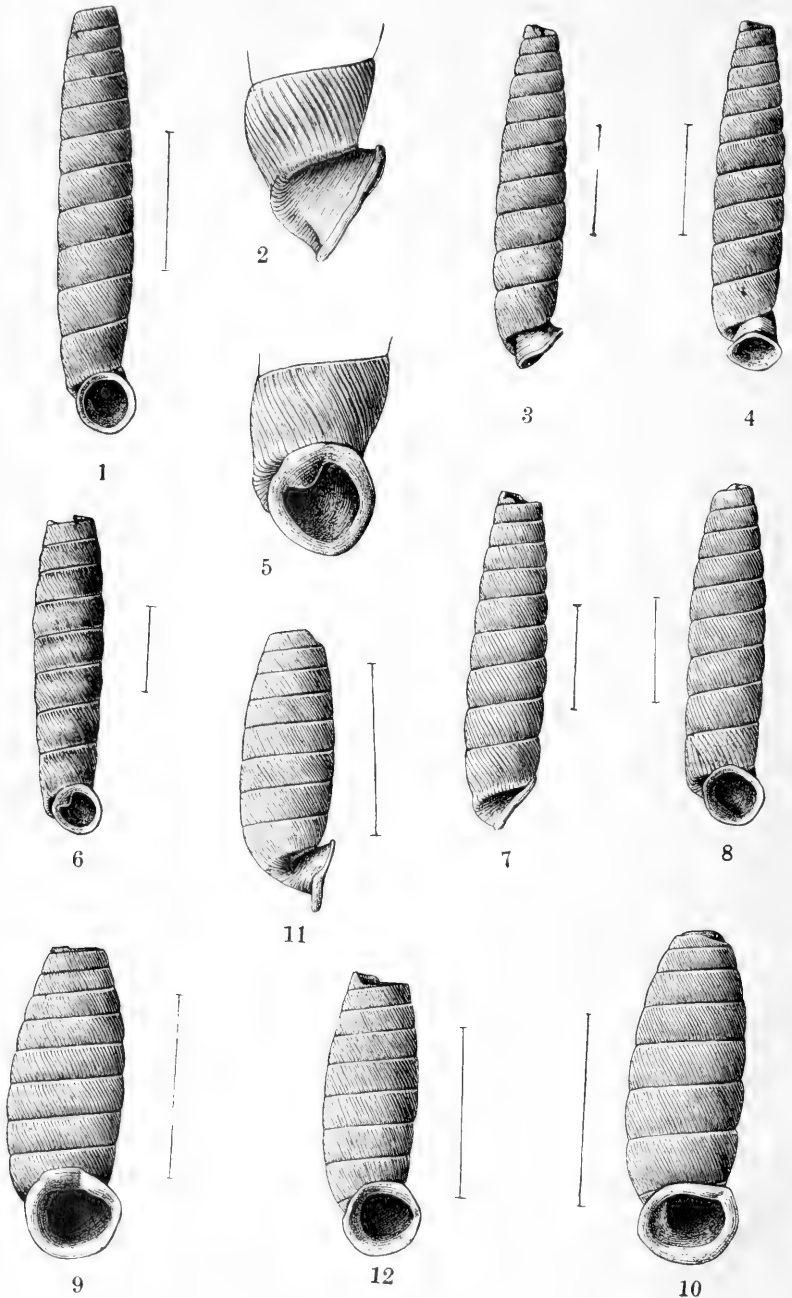
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No. 1.

NEW JAMAICAN UROCOPTIDÆ.

BY HENRY VENDRYES.

Cylindrella (Anoma) inusitata, Vendryes. Pl. I, figs. 1 and 2.

Shell much elongated, cylindrical, rimate, somewhat shining and transparent, color light brown; spire slightly tapering both above and below its greatest diameter, which is about the middle; truncate with the loss of 7 to 8 whorls, whorls remaining 11 to 12, planulate, shouldered by an early obsolete angle, the last detached and descending, strongly carinated at the base, the carina extending to the back of the aperture; striæ waved, strong and compact, crossing the whorls obliquely and continued up to and many crossing over the edge of the suture, which appears fringed here and there by their intrusion; aperture like that of *Dunkeriana*, but rather larger in proportion to the shell, and less oblique than in that species, well produced over the penult. whorl. Height 18 mm., greatest breadth above the middle of the spire, $3\frac{1}{2}$ mm.; aperture, 3 mm. high, $2\frac{1}{4}$ mm. wide.

This species is remarkable for its produced and detached aperture, placing it in the same group to which *princeps* belongs. Specimens were received from Mr. Bancroft, who collected them on the mountains at Upper Leighton, near Spring Garden estate in the parish of Saint George.

Cylindrella (Anoma) cognata, Vendryes. Pl. I, figs. 3, 4.

Shell rimate, cylindrical, elongated, color very light pale brown; spire tapering from the last whorl to the summit; apex truncate, with the loss of 7 to 8 whorls, whorls remaining 11 to 12, subplan-

ulate, slightly shouldered, the last detached and descending, strongly carinated at the base, carina continued to the back of the aperture; striæ very strong and compact, irregularly spaced and waved here and there, some crossing over the sutures from one whorl to the other; aperture as in *invisitata*, but less elliptical, well produced beyond the penult whorl. Height, 15 mm.; greatest breadth, 3 mm.; aperture, $2\frac{1}{2}$ mm. high, $2\frac{1}{4}$ mm. wide.

I am indebted for specimens of this shell to Mr. Hart, at one time Superintendent of Public Gardens and Plantations in Jamaica, and now occupying a similar position in Trinidad, by whom they were collected at the government cinchona plantations in the mountains of Saint Andrew, about 5,500 feet above sea level.

One of the specimens being alive, I obtained the radula, but failed in securing the buccal plate. The teeth are of the type common to MM. Crosse & Fischer's first group A. of *Cylindrellæ*. The animal is very small in proportion to the shell. It is spiral behind the mantle, short, of a pearly-white color, slightly mixed with green, and marked with close-waved, narrow, longitudinal brown lines, not extending to the lapping of the foot; head short, with a simple labial appendage, apparently incapable of much projection; eye peduncles short, slender, of a deep bistre color, except on the lips, where the color is like that of the body; eyes very black, placed on the bulb-shaped tips of the peduncles; tentacles short and very slender; foot broad and lance-shaped behind. The animal is very active for a *Cylindrella*. It progresses by extending forward the forepart of the foot and drawing the afterpart up to it in a sort of wave. Part of the shell drags lightly on the ground and is carried forward with each fresh advance of the foot.

Cylindrella (Anoma) propinqua Vendryes. Pl. 1, figs. 7, 8.

Shell rimate, cylindrical, nearly white, under a light brown epidermis, which becomes paler towards the apex; the spire widens very gently from the base of the penult whorl to about one-third above it, where the greatest diameter is reached, and thence it tapers to the truncate apex; apex truncate with the loss of 8 to 9 whorls, whorls remaining 10, less deep and less flattened than on *Dunkeriana*, the first two above the base subangular about the periphery, the last more strongly carinated than in *Dunkeriana*, with the carina continued down to the base of the aperture; striæ very strong, compact and

wavy, extending across the whorls to the very edge of the well-impressed suture; aperture oblique like that of *Dunkeriana*, but the peristome is thinner and is appressed above to the penult whorl. Height 13 mill., greatest breadth at the slender part of the spire 3 mill.

The shell comes near to *Dunkeriana*, but it has 10 whorls which are less planulate than on that species, and the striation is rather coarser and less regular; the color of *Dunkeriana* is also different. Gloyne, in Journ. de Conch., vol. —, reports it as *similis* from Bellevue. Bland had identified them with great doubt as *similis*. On closer examination they turned out to be unlike *similis* or any other Jamaican species of *Anoma*.

Hab.: Bellevue, near Stony Hill, in the parish of Saint Andrews, (!) Vendryes. (!) Gloyne.

Cylindrella (Thaumasia) sanguinea Pfeiffer, var. *perplexa* Vendryes. Pl. I, figs. 11, 12.

This variety was collected at (!) Water House, an abandoned sugar estate, now turned into a grazing pen and negro provision grounds, in the upper northern portion of the Liguinea plain, where the limestone hills of the Red Hills range begin to rise. The aperture is produced and the peristome is detached all round; whilst in the typical *sanguinea* the peristome above is closely soldered to the body-whorl, and often so much attenuated at the point of attachment as to form a thin film. The shell is of medium size and dark colored; there is a narrow line of a deeper tint than the ground color, but rather dingy, running next to the suture along the lower part of it and extending to within it. This form is very persistent in the locality mentioned.

Cylindrella (Anoma) abnormis Vendryes. Pl. I, figs. 5, 6.

Shell deeply rimate, cylindrically elongated, color brown with a very slight tint of yellowish-red, shining; spire broadly truncate with the loss of — whorls, whorls remaining 9, the last and the three following it are more drawn out and consequently deeper than the remaining ones, the last is slightly narrower in diameter than the second, the second than the third, and the third than the fourth, thence the remaining whorls become less deep and gradually diminish in diameter to the truncated apex, so that the outline of the shell presents the form of a long, narrow, drawn-out purse, somewhat

bulging about the middle, and thence tapering towards the bottom; whorls slightly convex, obtusely angulated at the periphery, sculptured with strong, thick lamella-like costulae crossing the whorls obliquely, generally curvilinear, irregular in some places and wavy here and there, extending to the very shoulder of the whorls, the last whorl with a prominent carina which extends to the back of the base of the aperture close to the peristome; suture well incised; aperture inclining to the right, the plane very oblique, peristome thick, nearly white, smooth and shining, reflected all around, with a very large, strong, elevated knob close over the spot where the columellar lip should merge into the columella, and apparently arched over the space of the entering rima beneath. Total length, 11 mm.; greatest breadth at middle of spire, 3 mm.; next above the aperture, 2 mm.; at the truncation, 2 mm.

This shell was collected by me among fine earth and vegetable debris taken from the roadsides near to Brown's Town, in the parish of Saint Ann. Unfortunately, as its presence was only revealed to me when searching this debris some time afterwards at home, no note was kept of the exact habitat and station. It is as yet unique in my collection. It is unlike any species of *Anoma* with which I am acquainted, and its peculiarities would seem to warrant the creation of a new subgenus, or at least of a special section to receive it. The reasons for this appear to me to be as cogent as were those which led to the creation of the subgenus *Chittya* for *Geomelania sinuosa*.

Cylindrella (Thanmasia) instabilis Vendryes. Pl. I, figs. 9, 10.

Shell ovate-cylindrical, solid, rimate; color dark-sanguineous, not unlike that of some specimens of *Cyl. sanguinea*, but the surface of *instabilis* exhibits in most specimens semi-hydrophanous, more or less wide, transverse patches sparsely and irregularly occurring, and apparently produced by some indistinct lesions of the very thin epidermis; spire describing a well-drawn-out ovate outline; apex broadly truncate with the loss of 6 to 7 of the earlier volutions, whorls remaining 7 to 8, almost entirely plane in some examples, or moderately convex in others, subarcuately, obliquely and closely costulate striae; the last whorl not detached in some examples, and detached and produced in others, and generally more strongly sculptured than the penult and other whorls, with a well-pro-

nounced carina at the base; suture lightly impressed and submarginated; aperture slightly oblique, circular in some examples or transversely narrowed in others; peristome slightly tinged with the prevailing ground color of the shell, well expanded all around and reflected, not continuous above, but attenuated or reduced to a mere film and appressed to the body whorl in some examples, or in others detached and continuous, and produced outward near the upper part of the right side of the aperture and with a sinus or notch on the produced part. Long., 24 to 25 mm.; diam. at middle of spire, 9 to 10 mm.; aperture with peristome appressed, 8 mm. high and wide; when produced and with peristome detached, 6 mm. high, and 6 to 7 mm. wide.

In several of its characters this species is rather inconsistent. In specimens found side by side and manifestly of the same brood, some examples show strong affinities with *Thaumasia sanguinea*, others with *Thaumasia cylindrus*, others again with *Gongylostoma lata* (? *Thaumasia lata*), in so far that it becomes often very difficult to locate them decisively.

In the two specimens figured, one has the lip appressed, as in *sanguinea*; in the other it is detached and expanded towards the right side of the aperture and bears a notch or sinus. In one the sculpture is decidedly like that of *sanguinea*, on the other it is like that of *cylindrus*, but stronger. In specimens with the aperture but slightly produced and the peristome *uninterrupted* by attenuation and adhesion to the body whorl, or produced and *not* bearing a sinus, the resemblance to *lata* is very great.

Habitat: (!) Phoenix Park, near the Monarque in the parish of Saint Ann; (!) environs of Brown's Town in the same parish.

NOTES ON MESESCHIZA GROSVENORII LEA.

It is now over thirty-seven years since Mr. Lea described this species, and additional specimens have not been reported. In his Monograph of the family Strepomatidæ, Mr. Tryon says, in a foot-note page 350, "every specimen examined shows evidence of diseased growth." In the description, the location of notch is stated to be inconstant or wanting. Admitting then that the notch of this species is a deformity, where should the specimens described by Mr. Lea be placed? The notch being a deformity, the genus would not stand, because that

is the distinguishing point of the genera, like the fissure of *Schizotoma*. I am of the opinion that Mr. Lea's specimens are young *Angitrema armigera* Say, for the following reasons: The young of *armigera* is generally smooth, is fusiform, thin, obtusely conical and of various shades and markings, from a light straw-color to purple, occasionally seven banded while six is common; the aperture is large and rhomboidal, obtuse longitudinal thickenings are common on body whorl, a light line under the suture is also common in banded and purple specimens, base channel well defined. Polar point of the operculum well removed from the margin. There is no other species found in the Wabash that has so many points of resemblance; about the only point of difference is the number of whorls, five to six in the young *armigera* I have, while Mr. Lea's description says seven.

There are some other species I think must be referred to *Angitrema armigera*, but additional specimens from other localities are needed to fully determine the identity.—A. A. HINKLEY.

THE SUBSPECIES OF *PYRAMIDULA ALTERNATA*.

BY HENRY A. PILSBRY.

Pyramidula alternata knoxensis, n. v.

A more robust, larger shell than typical *P. alternata*, with more widely open umbilicus; dull rusty brown, with comparatively inconspicuous or much-reduced flame-markings. Whorls $5\frac{1}{2}$, not carinated. Sculpture of fine and even rib-striae, but little weaker on the base, the whole covered with a secondary sculpture of fine wrinkles, partially cuticular, and running a little more obliquely than the rib-striae. This minute wrinkling is barely visible to the naked eye, but is much stronger than in other forms of *P. alternata*, and gives the surface a peculiarly dull appearance.

Alt. 11, diam. 23, width of umbilicus $6\frac{1}{2}$ mm. (Knox Co., Tenn.).

Alt. 11, diam. 23, width of umbilicus 7 mm. (Laurel Creek Gap).

Alt. 13, diam. 25, width of umbilicus $7\frac{1}{2}$ mm. (Hazel Creek).

This remarkable race of *P. alternata* belongs, so far as we know, to the valleys of the western slope of the Great Smoky mountains, extending into the valley of East Tennessee. It was first found by Mrs. George Andrews, in Knox county, Tenn. During the past summer Mr. Jas. H. Ferriss found it in Cade's Cove, at Laurel Creek,

Gap and Hazel Creek. We saw nothing of it on higher elevations in the Great Smokies, the localities mentioned lying below 2000 ft. elevation. In the collection of Geo. H. Clapp there is a single shell from the Jas. Lewis coll. labeled "Philadelphia, Monroe Co., Tenn.," probably collected by Miss Law, and measuring: Alt. 13, diam. 24, umbilicus $7\frac{1}{2}$ mm.

No intergrades with typical *P. alternata*, *P. a. carinata* or *P. a. costata* have been observed. It is remarkable for the strong development of the secondary sculpture, with fine primary sculpture of rib-striae, the unkeeled, capacious whorls, wide umbilicus, and dead, rusty surface. Messrs. Clapp and Ferriss agree with me in considering this a strongly differentiated subspecies.

The following subspecies of *P. alternata* are now recognized:

P. alternata (Say).

P. alternata fergusonii (Bld.). N. Y. to Md.

P. alternata varinotata Pils. Texas.

P. alternata carinata Pils. Pa. to Tenn., in western division of the Appalachian Mt. system.

P. alternata knoxensis Pils. Knox, Blount and Monroe Cos., Tenn.

P. alternata costata 'Lewis' Clapp. Great Smoky Mts.

P. alternata mordax (Shuttl.). Great Smoky Mts. (?)

The last variety has not yet been rediscovered; the "*mordax*" in collections being referable, so far as I have seen, to a strongly-ribbed form of *P. alternata*, which has not been named; and not fulfilling the requirements of Shuttleworth's diagnosis. *P. alternata carinata* includes strongly angular or keeled, but finely striate shells of the mountainous region from western Pennsylvania to Tennessee. It was defined in my paper on Rhoads' Tennessee shells; and is not known to occur in the Tenn.-N. C. boundary ranges. I have never seen any true intergrades between *P. alternata* and *P. cumberlandiana*, and consider the latter a well-defined species.

There is also a color var. *alba* Tryon, of *P. alternata* (Amer. Journ. of Conch. ii, p. 261, and Monog. Terr. Moll. U. S., p. 49). This occurs abundantly in certain localities within the area of typical *alternata*. Thus in Philadelphia, *alba* is found along the Wissahickon Creek, while in other localities in this vicinity the ordinary *alternata* is found. This color-var. is not really white, but merely albinistic; it lacks the spots and flames of the typical form. It is also found in Michigan, etc.

GENERAL NEWS.

POLYGYRA THYROIDES SANCTISIMONIS n. var.—Spire more conic than in *thyroides*, composed of $5\frac{1}{2}$ whorls which are more closely coiled; body-whorl decidedly more depressed; umbilicus open. Aperture smaller than in *thyroides*, transversely elliptical, being much less rounded than in *thyroides*. Shell rather solid, with opaque cuticle, often more yellow than in *thyroides*. Alt. 15, diam. 23 mm. St. Simon's Island, Georgia.—H. A. PILSBRY.

HELICOSTYLA CARINATA Lea, and H. DACTYLUS Brod.—In the Manual of Conchology, viii, p. 22, I showed that Lea's *Bulinus carinatus* is identical with and was published prior to *Bulinus dactylus* Brod., and consequently should be accepted in place of the latter. This decision must now be reversed, on account of the earlier *Bulinus carinatus* Perry, 1811, which preoccupies Lea's name, and which I was not aware of when the ruling was made.—H. A. PILSBRY.

NOTE ON TWO SPECIES OF CANTHARIDUS.—It has not been noticed, I believe, that *Bulinus eximus* Perry, Conchology, pl. 30, f. 2 (1811), is identical with *Cantharidus badius* Wood (18—), and *Bulinus carinatus* Perry, f. 1, is *C. peronii* Phil. (1850). Perry's figures are very good, for him, and quite recognizable. He gives Van Diemen's Land as locality for the former, New Holland for the latter species. So far as I can see, his names will stand for these species.—H. A. PILSBRY.

AMPHIDROMUS LÆVUS (Müll.).—In my account of this species in the *Manual of Conchology* (1900) the "*Helix læva*" of Müller was called *Amphidromus lævis*. Mr. G. H. Chadwick has called my attention to the mistake, Müller's word being the adjective *lævus*, left, referring to the sinistral or "left-handed" coil of the shell.—H. A. P.

A NEW TRIASSIC CHITON.—Mr. Otto Jaekel describes (*Zeitschr. der Deutschen geologischen Gesellschaft*, vol. 52, 1900, p. 9) a new form from Rüdersdorf as *Trachypleura triadomarchica*. All of the

valves are preserved in place, with fragments of the girdle. The valves lack insertion-plates, and also otherwise have the general characters of the modern *Lepidopleurus*, while the girdle is armed with spines which are believed by Jaekel to have been calcareous. The length, without girdle, is about 16, breadth 9 mm. The genus is evidently extremely like *Lepidopleurus* in hard parts, and so far as the figures and description show, indistinguishable from the recent genus except in the character of the girdle armature. It is quite unlike any of the known Palæozoic genera.—*H. A. P.*

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE FAMILY CARDIIDÆ AND OF THE NORTH AMERICAN SPECIES. BY WILLIAM HEALEY DALL. PROC. U. S. NAT. MUS. VOL. XXIII, PP. 381-392, 1900.—As Tryon and Pilsbry's "Manual of Conchology" does not yet include Pelecypoda, the necessity for monographs giving the latest investigations in systematic changes is apparent. Students are deeply indebted to Dr. Wm. H. Dall for his recent monographs on several families of bivalve mollusks, including the Maत्रacea, Diplodontidæ, Leptonacea, Psammobiidæ, Solenidæ, Tellinidæ and Cardiidæ.

In the bulletin on Cardiidæ there are no plates, but there is a bibliography followed by a synopsis of the family which includes a "subdivision of the family included as a whole." The "brackish water forms associated with *Adacna*" are no longer included in this family.

The principal changes in nomenclature of the East American species since Dr. Dall's "Marine Mollusks of the South Eastern Coast," are as follows:

Cardium magnum Born is included under the name of *C. (Dinocardium) robustum* Solander, which is the older name; this does not include *C. magnum* Linnæus, which Dr. Dall thinks is probably *C. (Trachycardium) leucostoma* Born. In subgenus Papyridea, *spinosum* takes the place of *bullatum*, or *bullata*, of "many authors but not of Linnæus," and *P. petitianum* Orbigny is a synonym of *P. semisulcatum* Gray. *Liocardium lævigatum* is a synonym of *Cardium (Lævicardium) serratum* Linnæus.

The West American species include *Cardiums* found in the Gulf of California and ranging further south. This adds to the number of West Coast species.

Collectors who have readily detected a varietal difference in the lighter weight of shells sent out as *Cardium nuttallii* Conrad, may regret that these shells are not recognized even as a variety, but are included in the synonym of *Cardium (Cerastoderma) corbis* Martyn. *Cardium blandum* Gould is a synonym of *C. (Cerastoderma) californiensis* Deshayes. *Cardium (Cerastoderma) ciliatum* O. Fabricius (*C. islandicum* Chemnitz (a synonym) and *Serripes grönlandicus* Gmelin are Arctic sea species that are found on the Atlantic and Pacific shores. *Cardium aspersum* Sowerby is listed as a variety of the eastern coast *Cardium (Papyridea) spinosum*.

Dr. Dall says *Cardium (Lævicardium) elatum* Sowerby "is the largest species of the genus." We have often noted the variation in shape of some of the large cardiums of the West Coast; he says of these oval and rotund forms that they may possibly be correlated with sex.—M. B. W.

DESCRIPTION OF A NEW SPECIES OF UNIO FROM THE CRETACEOUS ROCKS OF THE NANAIMO COAL FIELD. By J. F. Whiteaves (Ottawa Naturalist, XIV., Jan., 1901). *Unio nanaimoensis* n. sp. *Unio hubbardi* Gabb is stated to be from the Cowgitz coal mine, on Graham Island, one of the Queen Charlotte Is., and probably did not come from Vancouver Island, as originally reported.

NOTES ON SOME LAND AND FRESHWATER MOLLUSCA FROM FORT CHIMO, UNGAVA BAY. By J. F. Whiteaves (Ottawa Nat., XIV., March, 1901). The specimens were collected by Mr. W. Spreadborough in 1896, and comprise *Limnaea palustris* var. *vahlii* *Planorbis arcticus* ("which may be only a synonym of *P. parvus*,") *Valvata sincera* and *Pisidium steenbuckii*. Notices of previous records of non-marine mollusks of Labrador are given.

ADDITIONS TO THE MARINE MOLLUSCA OF THE BERMUDAS. By A. E. Verrill and Katherine J. Bush. THE NUDIBRANCHS AND NAKED TECTIBRANCHS OF THE BERMUDAS. By A. E. Verrill. (Trans. Conn. Acad. of Sci., X., 1900). The additions to the fauna recorded in these articles are mostly from the collection made at the Bermudas in April and May, 1898, by the Yale scientific party under Professor Verrill. In the first paper about 80 species are recorded for the first time from the Bermudas, 25 of

them being described as new, among them a new *Siphonaria*, 6 *Eulima*, several *Odostomia* and *Cæcum*. In dealing with the *Terbonillidæ*, the groups *Mumiola* and *Mormula* (Adams, 1864) are subordinated to *Pyrgostelis* (Monterosato, 1884), though Adams' names have priority. The dentition of *Synaptocochlea picta* is figured, and its operculum said to have few whorls.

In the second paper, Prof. Verrill records *Aplysia dactylomela*, *A. Willcoxi* (?) and *A. megaptera* n. sp. The latter is a fine species a foot long. *Pleurobranchopsis* is a new genus for *P. aurantiaca* n. sp., a form with no shell, mantle-edge free throughout, gill sessile; the radula and jaws are not described. 6 species of *Dorididæ* are described.

TRANSACTIONS OF THE WAGNER FREE INSTITUTE OF SCIENCE, III, *Contributions to the Tertiary Fauna of Florida*.—We have more than once in these pages alluded to the importance of this publication to the general student of recent mollusks, no less than to the paleontologist. The production of such a work is evidence of an enlightened appreciation of the value of these investigations, on the part of the Trustees of the Wagner Institute, no less than a high ideal of scientific work on the part of the author, Professor Wm. H. Dall. The esteem in which the *Transactions* are held by foreign students is shown by a recent letter from the Australian conchologist, Charles Hedley, an extract from which we venture to print:

“I am most gratified at receiving the volume on the Tertiary Mollusca of Florida, but in thanking you for the copy I must also thank you for the labor you have placed at the disposal of every student. I cannot sufficiently express what a boon to me is the generic revision of the various groups. After struggling with the scanty and perplexing literature of bivalve hinge structure, I can greet your work as a ship-wrecked mariner might greet the shore. For instance, I have had a quiet little fight with *Mysella* and have drawn the hinges ready for publication. But I had laid aside the notes and sketches till I could better comprehend the matter. My unsuccessful struggles at least enabled me to appreciate the cost of labor and talent in producing the synonymy of *Rocheportia*. Those who have daily intercourse with fellow workers, who can consult great museums and splendid libraries, will thank you in their turn. But as a scientific exile, without these advantages, allow me to tell you how your Mollusca

of Florida smooths my path, so that I may do with accuracy and speed what I formerly did slowly and painfully."

Apology is due to Mr. Hedley for this unauthorized use of a private letter, and also to Professor Dall.—EDS.

CORRESPONDENCE.

EDITORS NAUTILUS: In the remarks of our friend Hemphill, on pp. 139-140 of the April number, some of us are called to order for a phraseology which is not altogether agreeable to him and other workers on the Pacific coast, and may properly be modified in the interest of their feelings. I refer to expressions which refer to the habitual nomenclature of some shell under discussion, in the cabinets of collectors on the Pacific shores, as in error. I suppose I have been one of those whom he criticises; for being familiar with most of the West coast collections, lists and nomenclature, it has often seemed useful to refer to the name in common use on the other side of the continent, when in the course of monographic revision it has been found to be untenable.

But I should like to assure Mr. Hemphill and all others who have been displeased by such expressions that nothing was farther from my mind than to reflect on the care or desire for accuracy of West Coast workers. I have been of and among them so many years that I feel entitled to claim a place in their ranks, and a large part of the work I have done has been intended to assist them to the extent of my ability. No one is infallible, at least outside of the Vatican. No one can correct the errors of a nomenclature at one fell swoop, so to speak. I have named many thousands of shells for West Coast correspondents, and I have named many of them wrong. That is, I have given names which were at the time in current use, but which subsequent researches have shown to be untenable. If Methuselah was a conchologist, he probably did better toward the end of his career, and the heirs of his original correspondents profited thereby. But alas! these are degenerate days, and in forty years or so one does not ferret out all anterior mistakes. Therefore if one's gratuitous service does not prove infallible, and one's expressions not invariably happy, let our West coast friends hold fast to the theory of friendly intent, and believe we at the East mean to do our best by them every time.

—W^M. H. DALL.

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No. 2.

COLLECTING IN HAITI.

J. B. HENDERSON, JR.

On the 30th of November last, Mr. C. T. Simpson, of the Smithsonian Institution, Mr. Robert T. Hill, of the Geological Survey and myself, sailed from New York for Haiti with the intention of making as thorough conchological exploration of that island as a time limit of two months would permit. Although Haiti has been visited by Bland, Sallé, Rolle, Weinland and others, it may yet be considered almost a *terra incognita* to the collector of land shells. Many of its great mountain ranges and deep valleys have never been reached by naturalists; even its more accessible regions have been but superficially examined. Imagination gilds the unknown, and we debarked at Cap Hatien eager to get into the field without a moment's delay.

Cap Hatien is situated upon the coastal margin of an extensive plain; but just back of the town rises an isolated group of high hills which appear to have no connection with the northern main range of mountains. These hills are composed of hard, flinty rock, resembling the formation of the Blue Mountains of Eastern Jamaica. In the absence of limestone they support a scant molluscan fauna, and our first day's collecting proved a bitter disappointment. Not more than fifteen species rewarded our most diligent labors, but among these were some interesting finds—notably a *Lucidella* of decided Jamaican affinities.

Leaving Cap Haitien we made our first interior journey horseback to Milot, at the foot of the main range, where amid the ruins of the famous palace of Sans Souci and in the dungeons of the old

fortress of La Ferrière we hoped to discover the habitat of that prince of American Helices—*Pleurodonte gigantea*. At an elevation of about 3000 feet, we came upon the first evidences of our game in the numerous dead shells of that superb species. Scattered about the bases of huge limestone fragments which were heavily draped and festooned in richest tropic verdure were thousands of dead *P. gigantea*, but not a trace of a living animal. We remained several days at Milot, but captured only three living examples of *gigantea* and took not more than a dozen fairly good cabinet specimens. Although disappointed in this respect we were cheered by a splendid bag of *Cylindrellas*, *Helicinas*, smaller Helices, *Stenogyra* (s. s.) *Opeas*, *Subulina* and several *Tudora* and *Chondropoma*.

One of the finest Helices of the West Indies is the large and exceedingly handsome *P. undulata*. This species is abundant about the foot of the mountains near Milot. Swarms of half naked children followed us about, often annoying us to the point of desperation, but these bright little urchins proved to be clever collectors. Finding that we rejected all dead shells of *P. undulata*, they brought us worn and useless specimens into the apertures of which they had carefully inserted large slugs. As this method failed them they recovered some living but immature specimens which we had thrown away, and extracting the animals, they reset them in dead shells and solemnly offered them to us again. The most notable catch on the mountain of La Ferrière is a small operculate with free whorls all in the same plane, probably a new genus.

Returning to Cape Haiti we took a steamer for Port au Prince, where we remained a full week, collecting most industriously in the neighborhood. The excessive dryness of the season caused living land shells to be scarce, but we succeeded in making a remarkably good catch, notwithstanding adverse conditions. In this part of the island the larger Helices disappear; *P. undulata* is replaced by the smaller *P. crispata* and a larger proportion of operculates is apparent. *Macroceramus* is encountered and *Cylindrella* is more abundant.

The prevailing type of operculate in this part of the island is represented by the well-known *Chondropoma semilabre*, barrel-shaped, whitish in color and with a descending and slightly free last whorl. This last characteristic runs through nearly all the Cyclostomacea of the island. As a persistent feature it finds no counterpart elsewhere in the West Indies.

Perhaps the particular feature of our Haitian journeys was our trip to Lake Assuei, one of the two great interior lakes of Haiti and Santo Domingo. The fauna of this large body of water is wholly unknown and there can be no doubt that its clear depths would furnish many treasures to the zoölogist provided with a good dredge. But we had neither dredge nor boat. An examination of one-half mile of shore line revealed a Hydrobia and a Physa, but no trace of Naiades or Sphæria. Amid the grandest scenery, we collected over the mountains north of the lake with fairly good success. One Chondropoma (evidently new) should receive some name signifying "splendid."

In a grove of very large trees near the lake we experienced several hours of the keenest delight in gathering *Liguus virginea* and *Pleurodonte bizonalis*. The former is no doubt the most beautiful of all land shells; the latter is considered a rarity. I know of no more thrilling experience than our sudden discovery of a hundred of these exquisite Liguus.

At St. Mark, Jeremie and Jacmel we toiled like madmen to exhaust those regions of their special faunæ; our catch from the last two stations being principally in *Cylindrella*, *Helicina*, *Glandina*, *Eutrochatella* and the smaller helices of the *Cepolis* group. The collection about Jeremie is exceedingly rich, but the unfriendliness of the natives is more pronounced at that city than elsewhere in the island.

One can scarcely picture a more promising-looking region for snail life than the environs of Jacmel. There are mountains and deep valleys, shaded and cool, sparkling streams, moisture and limestone, everywhere. We were amazed, however, to find the region almost barren of mollusks, a fact that seems wholly unaccountable.

Fortunately time seems to magnify in the mind the pleasant features of rough travel, while disagreeable episodes gradually fade from the memory. The oppressive climate, the wretched food and accommodations, the unsanitary condition of the cities, the vermin and larger insect pests, the stupid ignorance and arrogance of the official classes, the difficulties of interior travel, render Haiti all but impossible. We left Jacmel for Kingston, Jamaica, rejoicing in our flight from that land of dark superstition and filth.

Our material has not yet been overhauled, but I may, with due caution, state that Haiti is not so rich conchologically as Jamaica or

parts of Cuba, though richer probably than is Porto Rico. The distribution of its shells is far more general than as recorded in Crosse's list, and the affinities between the faunas of North Haiti and Cuba and South Haiti and Jamaica are not so decidedly marked as heretofore supposed.

The presence of a large number of the *Thaumasia* group of *Urocoptidæ* in the Southern peninsula is significant, yet we encountered *Lucidella*, *Stoastoma* and a probable *Sagda* in the north.

ALASMIDONTA MARGINATA SAY.

In the April number of the *Nautilus* Professor Charles Le Roy Wheeler calls attention to the above species and is in doubt whether this name should be applied to the somewhat solid, inflated, rhomboid western shell, or the less inflated, thinner, triangular form from the Atlantic drainage. I am glad Professor Wheeler has called attention to this, because at the time I made up the account of Say's species for the *Synopsis* I overlooked the fact that it had just been published in the *Journal of the Academy of Natural Sciences*. In Dr. Dall's copy of the paper on *Conchology* by Say in the third edition of *Nicholson's Encyclopedia*, Say says: "Found in the river—" leaving it to be understood that he was not certain where it was found. Immediately after the dash there is written in ink "Delaware."

The description is not very clear, but I was inclined to believe that it applied better to the eastern than the western form. Say says that his shell is transversely oblong-suboval, and this outline applies best to the eastern shell, which is often irregularly obovate, while the western form is almost invariably rhomboid. He states that it is bluish-white within, with a white margin. The eastern form is sometimes colored within in this way; in the western specimens the border is generally darker than the rest of the interior. The length given, $2\frac{1}{2}$ inches, agrees better, I think, with the eastern shell than with the western one, which runs from 3 to $4\frac{1}{2}$ inches, though of course Say might have had a young specimen of the heavy rhomboid form before him.

He says that it was communicated to him by Mr. Lea, who found it in the Scioto River. I am doubtful whether Dr. Lea ever col-

lected in that river. Most of his shells from Ohio were collected by Mr. T. G. Lea or other resident collectors in the State.

It is probable that Say's type is lost. I could not find it when I went over the Academy's collection and made notes on his species, and since the publication of Professor Wheeler's note Mr. Vanatta has kindly made a search for it, and fails to find it.

I confess that I am in doubt as to what Mr. Say had before him when he described his *Alasmidonta marginata*, though I am inclined to think it was the eastern form. In case it should be shown that Say's name applies to the western shell, the name *Alasmidonta varicosa* Lamarek, could probably be used for the Atlantic drainage species.

NEW VARIETIES OF FRESH WATER SHELLS.

BY FRANK C. BAKER.

Limnæa reflexa jolietensis, n. var.

Limnæa reflexa attenuata, Baker (non Say), Trans. St. Louis Acad. Sci., Vol. IX, p. 20, pl. 1, fig. 4, 1901.

Shell with an attenuated spire, the whorls, seven in number, being very convex and the sutures very deeply impressed; aperture about a third the length of the entire shell, ovate, thickened on the inside by a heavy callus; peristome thin; columella covered by a heavy callus and with a prominent plait; color light horn, frequently blackened by the carbon dioxide in the water, aperture of same color, the internal callus edged with dark brown or red.

Length 24.00; width 8.00; aperture length 9.50; width 5.25 mill.

Length 23.00; width 7.75; aperture length 9.00; width 5.00 mill.

Length 22.00; width 7.00; aperture length 8.75; width 4.75 mill.

Length 29.00 mill. (Bryant Walker collection).

Distribution: Joliet, Illinois (J. H. Ferriss); Saginaw River, Michigan (Bryant Walker).

Remarks: In the publication mentioned above the writer was led into the error of identifying the Joliet specimens as *attenuata* Say. Mr. Bryant Walker, to whom specimens were sent, has called the writer's attention to the true characters of *attenuata* and to the fact that the Joliet specimens are a distinct and undescribed variety of *reflexa*. The peculiar loosely coiled whorls, attenuated spire and labiate lip will easily distinguish this variety.

In Bull. No. 3, Vol. II, of the Chicago Academy of Sciences, the writer published an account of the anatomy of *Linnæa emarginata* var. *Mighelsi* in which several errors appeared. The first was the position of the kidney and ureter as figured on plate VI. K. U. An examination of a larger and more perfect specimen shows the shape and position to be different, the ureter really proceeding from the anterior end and extending in a straight line to the edge of the mantle. It is needless to add that the renal organs, as figured on this plate, do not exist in the fresh water pulmonates.

On plate III of the same paper is given a figure of the genitalia in which a flagellum is described (E. F.). This is the vas deferens and the duct thought to be the vas deferens is the penis retractor muscle.

NEW LAND SHELLS FROM THE LOO CHOO ISLANDS AND JAPAN.

BY HENRY A. PILSBRY.

Mr. Hirase, continuing his researches, has recently taken steps to procure shells of the Loo Choo Islands; some of the first-fruits being noticed below. He writes: "I have sent two able collectors, in the hope that I may procure for study the land shells of Kiushiu and Loo Choo. They were sent at first, on February 23d last, to Yaeyama, in the Loo Choos, for a stay of two months; but because of malaria they were obliged to leave, and thus spent only twenty days there. They are now working in the neighboring island of Nawa, in the Loo Choo group."

Among the species sent from Yaeyama are *Clausilia hyperoptyx* Pils., *C. Stearnsii* Pils., *Bifidaria armigerella* Reinh., and *Georissa japonica* Pils. The last two species were originally described from the main island of Japan, Hondo; and their occurrence in the middle Loo Choo group extends their distribution notably. The specimens are, however, quite typical. The finding of a typical species of the Chinese group *Buliminopsis*, *B. meiacoshimensis* A. & R., which Mr. Hirase sends from Yaeyama Island, and a species of *Tornatellina*, is extremely interesting. The latter genus has not been reported nearer than Luzon, so far as I know: Of *Buliminopsis* two species have been described from the Loo Choo Is., *B. meiacoshimensis* Adams and Reeve, described as a *Bulimus*, and

hitherto referred to *Stenogyra*, and *B. turritus* Gude, described as *Ganesella*, though Mr. Gude suggests that it may be a *Buliminopsis*. Although I formerly thought *turrita* a *Ganesella*, the sculpture of fresh specimens is so similar to *Buliminopsis* that I have now little doubt that Gude's surmise was correct. It resembles the Chinese *B. buliminoides* Hde. in shape, but the latter, from a specimen received from Pere Heude, is narrower and less acutely keeled. Dr. Fritz Wiegmann has recently shown that *Buliminopsis* has essentially the organization of the genus *Eulota*, and therein is perhaps nearest to *Cathaica*. His investigations show that there are no important anatomical differences between the numerous subgenera which I have subordinated to *Eulota*. The characters intergrade by easy stages. Even *Buliminopsis* is anatomically an *Eulota*.

At Shunashiri, Loo Choo group, a form of *Eulota* (*Plectotropis*) *scepasma* Pfr. occurred, having $6\frac{1}{2}$ whorls and a more depressed contour, being thus more acutely carinate. It measures, alt. $10\frac{1}{2}$, diam. 21 mm., and is densely covered, like the typical form, with short, triangular, cuticular scales. *Plectotropis pachysoma* Ehrmann, is evidently a synonym of typical *E. scepasma*.

Trishoplita collinsoni var. *casta* nov. Shell rather openly umbilicate, depressed, with conic spire; white with a brown line at the periphery, showing above the suture on the spire. Surface shining, minutely striate, rather faintly decussate beneath, microscopically papillose. Whorls 6, slowly widening, the last very obsoletely angular at the periphery, becoming rounded towards the aperture, convex beneath. Aperture oblique, shortly oval, slightly lunate, the penultimate whorl excising a segment of about one-fourth the circumference of the peristome; lip white, narrowly expanded above, the outer and basal margins reflexed.

Alt. 8.6, diam. 12.5; length of aperture 5.5, width 6.3 mm.

Alt. 10, diam. 12; length of aperture 6, width 7 mm.

Obi, Prov. Hyuga, in eastern Kiushiu (Mr. Y. Hirase).

This species is somewhat more conical than *T. tosana* Gude,¹ with an umbilicus of about the same width or a little smaller. It has about the form but not the coloration of *T. cretacea* var. *bipartita*, and is apparently allied to *T. collinsoni* (A. Ad.) and *T. lischkeana* (Kob.), both of which have similar coloration. *T. collinsoni* was described from "Tago," which I take to be Tako, a place at the west-

¹ The name *tosana* Gude has three days priority over *suprazonata* Pilsbry.

ern end of Shikoku Island. It has not been figured, but is said to be "globoso-conica," "late perforata," with a wide peripheral band and lunate aperture. None of these terms would I apply to the shells before me, though it is by no means impossible that my species is a variety of that of Adams. *T. lischkeana* is from Hagi, on the north coast of western Hondo. It is a smaller shell than *T. casta*, with narrower umbilicus. When these forms of *Trishoplita* are better known, I believe they will be seen to fall under a few specific heads, like the *pelionphala* group of *Euhadra*. It is likely that *collinsoni*, *casta*, *lischkeana*, *bipartita* and *cretacea* are varying races of one species, and will be found to intergrade on the confines of their several areas. *T. collinsoni* is the senior name for the group, which has about the distribution of *Eulota callizona* var. *maritima* G. & P.—Shikoku, eastern Kiushiu and western Hondo.

Trishoplita hiugensis n. sp. Shell depressed, rather narrowly umbilicate, brownish yellow, the suture bordered below with a narrow white band; very glossy, finely striatulate. Spire low-conic, the apex obtuse. Whorls $4\frac{3}{4}$, convex, the last slightly deflexed in front, indistinctly angular at the periphery in front, becoming rounded on the latter portion. Convex beneath. Aperture shaped like that of *T. tosana*, the lip expanded, reflexed below. Alt. 6.4, diam. 9.4–9.8 mm.

Obi, Prov. Hyuga, Kiushiu (Mr. Y. Hirase).

A smaller, less conoidal form than *T. tosana* or *T. dacosta*, with fewer whorls. It is No. 601 of Mr. Hirase's collection.

Kaliella Austeniana n. sp.

Shell distinctly perforate, turbinato-conic, thin, light reddish brown. Surface very minutely sculptured with densely crowded rib-striae, which give it a silken luster, and give place on the more glossy base to slight growth-wrinkles and fine spiral striae. Whorls nearly 6, very convex, the first one sculptured with much more spaced rib-striae; last whorl obtusely subangular at the periphery, quite convex beneath. Aperture oblique, rather broadly crescent shaped; peristome simple and thin, the columellar margin dilated above. Alt. 2.7, diam. 5.2 mm.

Yaeyama Island (Mr. Y. Hirase, no. 627).

In this species the minute striae continue below the periphery, and form a silken band around the base, the central two-thirds of which is more glabrous. This has been noticed in *Jucomulus*, *Guppja*,

etc.; also. The spaced costulation of the initial whorl is a characteristic though not invariable feature of *Kaliella*.

It is named in honor of Lieut.-Col. H. H. Godwin-Austen, whose work on the Indian *Zonitidæ* is destined to become a malacological classic.

Kaliella yaeyamensis n. sp.

Shell narrowly perforate, rather low conic, thin, reddish brown. Surface slightly shining above, glossy beneath, sculptured with rib-striæ comparatively coarse for a *Kaliella* (but still very fine), continuing on the first whorl, obsolete on the base, and excessively minute spiral striæ. Whorls $4\frac{3}{4}$, moderately convex, the last angular (but not acutely so) at the periphery, not very convex beneath. Aperture oblique, broadly crescentic, the lip thin and simple, dilated at the columellar insertion. Alt. 2, diam. 3 mm.

Yaeyama Island (Mr. Y. Hirase, no. 625).

With *K. nahaensis* Gude, this makes three species of *Kaliella* now known from the Loo Choo Islands. *K. nahaensis* has fine, almost subobsolete striæ, and a peripheral keel, thus differing decidedly from the two species described above.

Kaliella ruida n. sp.

Shell perforate, in shape resembling *Microcystina ceratodes* (Gude). Acutely keeled, thin, brown, somewhat translucent, sculptured above and in a band around the base, below the periphery, with sharp, close and regular rib-striæ; the rest of the base glossy, with very minute spirals only. Whorls $3\frac{1}{2}$, moderately convex above, the last quite convex beneath. Aperture wide-crescentic, peristome thin, fragile. Alt. 2, diam. 3.5 mm.

Gojo, Prov. Yamato, Japan (Mr. Y. Hirase, no. 607).

I am disposed to believe this shell, of which but two specimens were sent, is not full grown, and will be found to attain a larger size; but the sculpture is so conspicuous and so unlike any known species of similar shape, that its recognition will be easy.

Georissa luchuana n. sp.

Shell small, globose-turbinate, dull red, composed of nearly $3\frac{1}{2}$ very convex whorls, the first glossy and smooth, with rather large apex, the rest rapidly increasing, closely and regularly striated or lirulate spirally. Last whorl large and obese. Aperture oblique,

half-circular; outer lip simple; columella heavily calloused, wide and somewhat flattened. Length 2.1, diam. 1.85 m.

Yaeyama Island, Loo Choo group (Mr. Y. Hirase, no. 623).

A species relatively much shorter and wider than the related *G. japonica* Pils., which occurs also on Yaeyama.

Dr. v. Möllendorff has recently redescribed *G. japonica* as a new species, not knowing of my earlier description. He used the same specific name (Nachrbl. 1901, p. 45).

Diplommatina insularum n. sp.

Shell minute, imperforate, amber-colored or corneous, cylindrical-oblong, the penult whorl widest, those above forming a gradually tapering spire, sculptured with delicate, rather close rib-striae. Whorls $6\frac{3}{4}$, convex, the last narrower than the preceding, ascending to the aperture, somewhat constricted in front. Aperture circular, the peristome continuous, outer lip doubled; columella acutely toothed; palatal fold short. Length 2.8, diam. 1.4, alt. of aperture with peristome 1 mm.

Yaeyama, Loo Choo Islands (Mr. Y. Hirase, no. 620).

This is a decidedly more tapering species than *D. cassa*. *D. nipponensis* is less slender and smoother, and *D. kobelti* is larger and more pyramidal. All of these are dextral forms. *Paxillus lyratus* Gld. may be closely allied, possibly identical; but the description is not sufficient for critical comparison.

Cyclotus Hirasei n. sp.

Shell broadly and openly umbilicate, subdiscoidal, yellowish-green in color, the first two whorls subtranslucent and deep amber colored; rather glossy, very irregularly and roughly wrinkled or even subpliate, in the direction of growth-lines. Whorls $3\frac{3}{4}$, the first $1\frac{1}{2}$ strongly projecting, teat-like, following whorls tubular, the last whorl slowly descending, barely in contact with, or slightly free from the preceding whorl, at the aperture. Aperture circular, slightly oblique. Peristome circular, unexpanded and acute, continuous. Operculum multispiral, with sunken central nucleus, the edges of the whorls projecting a little. Alt. 4.5, diam. 8.5, diam. of aperture 3.3 mm.

Loo Choo Is. (Mr. Y. Hirase, no 612).

Related to *C. swinhoei* and *C. minutus* H. Ad., of Formosa, but differing in sculpture, the present species being wrinkled but without spiral striation.

Diplommatina cassa n. sp.

Shell dextral, imperforate, oblong, rather thin, reddish-amber colored or whitish-corneous, composed of $6\frac{1}{2}$ very convex whorls, the last one narrower, strongly ascending. Surface densely and regularly costulate-striate. Aperture subcircular, the peristome continuous, thin, rather broadly and flatly reflexed, its face concave; there is a sharp, high and narrow crest close behind the outer and basal margins. Subcolumellar tooth strong; palatal fold short, situated to the left of the adjacent margin of the peristome. Length 3.1, diam. of penult. whorl 1.7, length of aperture 1.2 mm.

Kodakari, prov. Hida (no. 604), and Kyoto (no. 452), Y. Hirase.

This species is related to *D. nipponensis* Mlldff., *D. insularum* Pils., and *D. Kobelti* Ehrm. The conical part of the spire is much shorter than in the former of these, judging from specimens from the Hakone Mts., collected by Mr. B. Schmacker.

D. Kobelti is a species slightly longer than *D. cassa*, finely costulate-striate, composed of $7\frac{1}{2}$ whorls, of which only the last two are of equal diameter, those above tapering regularly, forming a very long conic spire. The aperture is about as described for *D. cassa*. Length 3.4, diam. 1.6, aperture 1.16 mm. It is thus slightly longer than either *nipponensis* or *cassa*, with one whorl more, and a longer more pyramidal spire. It is from Kashima, prov. Harima, where it occurs with *D. cassa* (no. 305 b of Mr. Hirase's collection).

These species are all distinctly smaller than *D. collarifera* S. & B. and *D. tenuiplica* Pils., and larger than *D. uzenensis* Pils.

D. minutissima Mlldff. 1901, is a synonym of *D. pusilla* var. *omiensis* Pils., published eight or nine months previously. Both were based on Mr. Hirase's no. 487.

Tornatellina inexpectata n. sp.

Shell umbilicate, pyramidal, thin, brown, glossy, smooth except for slight growth-lines. Spire straightly conic, the apex obtuse. Whorls $5\frac{3}{4}$, slightly convex, the last rounded at the periphery, convex below. Aperture subovate, armed within with a low entering lamella on the middle of the parietal wall. Peristome thin, the margins remote, columellar margin broadly dilated and reflexed. Length 3, diam. 1.7 mm.

Yaeyama Island (Mr. Y. Hirase, no. 626).

Carychium cymatoplax n. sp.

Shell minute, corneous-whitish, slender, cylindric-fusiform, almost

smooth. Whorls 5, moderately convex, the penult. and last of about equal diameter. Aperture small, somewhat oblique; peristome well expanded, much thickened within, the outer lip broad, with a blunt tooth above the middle, columella truncate at base; parietal lamella strong. Axial lamella becoming a very wide spiral plate within, bent into strong waves. Length 1.84, diam. .64 mm.

Yaeyama Island (Mr. Y. Hirase, no. 618).

This species is smaller and more cylindrical than *C. noduliferum*, is smooth, and the internal axial lamella is more strongly waved. *C. noduliferum* was described from Misaki, and has been sent by Mr. Hirase from Nishigo, Prov. Uzen. It is a strongly tapering shell, finely but sharply and regularly striate, and in most adults has a palatal nodule within the outer lip, though this is variable in development. It is larger than *C. cymatoplax*, length 2.2 mm.

NEW PUBLICATIONS.

DIGESTA MALACOLOGICA, No. 1. A Summary of the American Journal of Conchology. By E. R. Sykes.¹ Under the above caption Mr. Sykes proposes to issue a series of digests, prepared after the model of those in the Zoölogical Record. "It has been a constant source of difficulty for many years past to ascertain what work has been done by our predecessors, relating either to a special genus or to some faunal district. With the idea of rendering some assistance to students, the present work has been undertaken." The number before us deals with the *American Journal of Conchology*, and commences with a table of dates of publication, followed by a list of titles arranged by authors. The contents of the articles are then referred to under the heads of Anatomy, Distribution, both geographical and geological, etc. The systematic portion is arranged by families, every species described being referred to by volume and page. It is, therefore, easy to ascertain what the series contains relating to the mollusks of any given region, or of any special family or genus, whereas otherwise this information could be obtained only at the expense of much time and labor, or found only by accident. All who have occasion to use the *Journal* should possess themselves of this aid to its use. The Digest is well gotten up, and seems to contain but few mistakes or misprints.

¹ London, William Wesley & Son, 28 Essex St., Strand, 1901. (Price, \$1.50; to subscribers to the series, \$1.25.)

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THE AMERICA PHYSÆ.

BY O. A. CRANDALL, SEDALIA, MO.

The members of this genus are the most beautiful shells of all of our fresh-water snails, and, were they properly understood, would be the most sought for by collectors. It has been the custom of authors to attempt to establish species upon slight variations in form until the multiplicity of varieties and synonyms has caused such confusion that even our most experienced conchologists hesitate to venture an opinion as to many of the described species, while amateurs, being unable to obtain satisfactory information upon which to correctly label their "finds," have become so careless about collecting them that they are rarely offered for exchange.

To remedy this evil, and as far as possible to simplify the determination of species, I have given my spare time for several years past to the study of this genus, and now give to the public the result of my observations.

In determining the species of this genus it is not only necessary to observe the characteristic form of the shell, but something of its life-history must also be known. Some species grow to maturity in one season, while others require two or more seasons of growth to mature.

In central Missouri, *P. gyrina* Say is the first to appear in the spring and the last to disappear in the fall. I have seen them crawling on the ice in March and depositing the ova as late as the first of October. They begin depositing eggs early in May and continue throughout the season; and as the young are continually

hatching, all sizes may be found in the fall, none of which will be full grown. The members of this species require more than one year in which to mature, while other species deposit the ova early in May and the young attain full size the same season. Having a knowledge of which species mature—respectively in one, two and three seasons of growth—greatly simplifies the determination of species.

It is unnecessary to watch the growing snail, as I have done, to learn this fact, for every shell carries unmistakable evidence of the number of periods of growth it has required to attain its present size. This evidence is the white and brown lines upon the last, and next to the last whorl, called variceal lines, or bands. At the end of the season, or when the pond dries up, or when from any other cause the shell ceases to grow, the snail strengthens the shell by constructing a triangular-shaped rib within the sub-margin of the lip. In forming this rib the coloring matter which exudes from the mantle of the animal is withheld until the structure is complete, thus leaving a white or light-colored line on the outside of the shell immediately over the rib. Sometimes the line will be shaded with brown or some dark color on one side, rarely on both sides. As the ribs are never removed, the lines always remain visible on the outside of the shell, and mark the periods of growth.

For brevity in describing this feature I may be permitted to coin the word *annuan*. It is derived from the Latin word *annus*, year, and the suffix *an*, pertaining to, and signifies pertaining to one year, or period of growth.

In examining shells, first determine whether the example is an *annuan*, *bi-annuan* or *tri-annuan*; then examine the general form and appearance of the shell, the texture, sculpture, the form of the sutures, showing how the whorls are joined together, and the aperture. Color, height of spire, proportionate length of aperture and size of the shell are so variable that they have but little weight in determining species, except in a few cases.

The most reliable characteristics are, in the order here given, texture, structure and sculpture; in fact they are the only ones not changed by environment.

Texture relates to the weight and to the fineness and coarseness of the layers of which the shell is made. The viscid matter secreted by the mantle is deposited on the edge of the shell as the snail grows,

and hardens. In some species the exudation is continuous, or nearly so, while in others it seems to be deposited at intervals. When the deposit is frequent and small, or continuous, the lines of growth will be fine and the surface smooth and shining, as in *P. heterostropha* Say. When made at longer intervals, and large, the lines will be coarse, as in *P. gyrina* Say.

Structure refers to the general plan of the shell, but more particularly to the manner in which the whorls are joined together. In some forms, like *P. ancillaria* Say, the whorls lap over each other like shingles on a roof; in others, like *P. forsheyii* Lea, they rest against each other. This distinction is constant in all species, and to a great extent is carried through the varieties.

Sculpture is the markings on the surface of the shell, and consists of the lines of growth, striæ crossing the lines of growth, as in *P. oleacea* Tryon, ribs, as in *P. costata* Newcomb, and such other markings as may be found constant in a species.

It must be remembered that while these characters are always found in typical members of species having one or more of them, they become modified in the varieties and forms, and the greater the departure from the type the greater will be the modification.

Species are supposed to be founded upon permanent characteristics which are not influenced by change of location or environment. Varietal changes are many and frequent, and it is doubtful if a single variety described forty years ago can now be found living and identified, while species should be found in the habitat of the type with but slight variations in its characterization.

No member of the animal kingdom is so susceptible to local influences as fresh water snails. Every change of environment changes the Physa, and so long as environments continue to change new forms will continue to occur; but they will not necessarily be new species nor varieties, but new forms of the same species, having the same characteristics upon which it was founded, with some of them more or less modified.

Another cause for variations is the probably frequent occurrence of cross breeding, producing hybrids. It is often that forms are presented to conchologists for identification having some of the characteristics of two different species, neither of which is sufficiently strong to control, and the life history not being known, they are described as new species. The forms being hybrids, when the crop disappears

the species disappears with it, and so we have a large list of described species in our literature with but few living forms to represent them.

To simplify the study of the genus I discard all sub-genera and divide the genus into species, varieties and forms.

Species are forms having some characteristics which remain constant for ages.

Varieties are forms having the ruling characteristics of the species to which they belong, with modifications that remain constant for years.

Forms show temporary variations caused by environment or hybridization, and are transient. New forms are appearing every year. I would not attempt to refer all the living forms to their respective progenitors, but leave the collector to attach the label to suit his own taste.

Where a form can now be found that substantially bears the description given forty or fifty years ago, it should be considered a species, if originally founded on sufficient differences from other described species to entitle it to rank as such; but where no specimens of a species has been found since it was described many years ago, it is likely to have been only a local form, and to have become extinct.

Many of the early described species are found now bearing the same distinctive characters as when first described. It is these typical forms that must be our guide, and not the varieties.

The result of my examination of all the described species occurring east of the Rocky Mountains will be found in the following paper.

Physa heterostropha Say.

Synonyms: *P. Philippi* Küster, *P. plicata*, De Kay.

This species was described by Thomas Say in 1817 from forms taken in the Delaware River, and the same forms are found there yet. The water having become polluted, they are covered with a dark coating and many of them distorted. The type is not inflated nor elongated, yet the larger part of the specimens of the species now accepted by conchologists are more or less inflated. Some even go so far as to include under this head all the varieties of *P. ancillaria*, Say, *P. lordi* Baird, and *P. sayi* Tappan. While there are some good reasons for bunching all the American Physæ into one species with a vast number of varieties, I do not believe such a course would be conducive to the best interests of science. Species should be

founded on some distinct and constant characters, and reduced to the minimum.

The shell described by Say is symmetrical, of fine texture, smooth and shining surface, lines of growth scarcely visible even with a lens, whorls four, convex, sutures impressed, spire elevated and acute, and the inner wall of the aperture straight. It is an annuan, rarely taking a second growth, and when it does the growth appears to be an addition to a mature shell.

Distinguished by its symmetrical form, smooth and shining surface, convex whorls, impressed sutures, elevated and acute spire and straight or perpendicular axis, thus forming a straight inner wall to the aperture.

Physa philippi Küster, is an inflated variety bearing all the characteristics of the type, except that it is inflated and the columella is slightly curved. This is the first inflated variety described, and should cover all inflated forms.

Physa plicata DeKay. This form is admitted a species by Tryon, but Binney, Pilsbry, and others, place it amongst the synonyms of this species, where it evidently belongs, unless it is raised to a variety. It being the only elongated form of this species ever described, it may well be considered a variety to which all elongated forms should be referred.

Physa heterostropha alba, n. v. Shell ovate, symmetrical, not inflated, porcelain white, whorls four, convex, sutures impressed, spire elevated and acute, surface smooth and shining, columella slightly curved. Diameter $\frac{2}{3}$ the length. This beautiful little shell was sent to me by Mr. Albert Baily, of Capachet, N. Y., he having taken it from Cedar Lake near that place. It is distinguished by its color.

I have recently seen in Mr. Bryant Walker's collection some very fine forms of this species that seem to be of frequent occurrence in Northern Michigan. They are slightly more elongated than the type, and are marked with a dark-brown apex. This marking does not appear in any of the eastern forms, so far as I know, but it is not sufficient variation to found a variety upon.

Further forms are: *Physa striata* Menke, *P. charpentieri* Küster, *P. fragilis* Mighels, *P. lata* Tryon, *P. primeana* Tryon, and many other slight variations which have not been named.

This species extends from the Potomac and Ohio rivers north and

east over New England and Canada, and as far west as Indiana and Michigan. West of the Alleghanics it gradually gives way to *P. sayii* Tappan. I have never seen a well authenticated example west of the Mississippi or south of the Ohio.

(To be continued.)

THE SYNONYMY OF BYTHINELLA OBTUSA LEA.

BY BRYANT WALKER.

This well-known and characteristic little species, which has an extended range through the Northern States from New York to Iowa, if not further west, was first described by Lea, in 1841, as *Paludina obtusa*. Haldeman, in his "Monograph of the Fresh-water Univalve Mollusca" (1844?), although apparently unacquainted with the species, referred it to the genus *Amnicola*. Binney (1862), in his preliminary study of the fresh-water operculates, also placed it among the *Amnicolæ*. Stimpson (1865), in his "Researches upon the Hydrobiinæ," considered it "probably referable" to *Bythinella*. In this he was followed by Binney (1865) and Tryon (1870), and from that time the species has been uniformly known and cited as *Bythinella obtusa*.

Unfortunately, however, Lea had been anticipated in the use of the name, *Paludina obtusa*, by Troschel, who, in 1837, had described a species of *Vivipara* from Bengal under that name. It follows necessarily, therefore, that Lea's name will have to give way; and had not the species already been described by another author under a different name, a new one would have to be provided for it.

Were it not for the express statement that his species was imperforate, I should be inclined to refer this species to Green's *Paludina alleghaniensis* (see Binney, L. & F. W. Shells, III, p. 60), which has several years' priority. The differences relied upon by Lea in differentiating his "*obtusa*" would scarcely be sufficient in the absence of the other peculiarity. I know of no other species from Pennsylvania that would fill the description except *Amnicola decisa* Hald., which might well be called imperforate. On the other hand,

the "elevated and rather obtuse" spire would apply better to "*obtusa*." In view of this uncertainty, it would seem better to accept a later description, in regard to which there can be no question, rather than to attempt to rehabilitate a name which must always be the object of suspicion. There should be a statute of limitations in science as there is in law; and the use of a name which has become established by tradition and long usage, should not be overturned, in the absence of the type specimens, excepting upon the most convincing proof.

In 1852 Küster, in his "Monograph of Paludina," in the *Conchylien Cabinet*, describes a small species from North America as *Paludina emarginata*, which he attributed to Say, on the authority of Brown. As Say never used the name "*emarginata*" in connection with any fresh-water operculate form, this species will have to stand as *Paludina emarginata* Küster.

Binney, in his "Land and Fresh-water Shells of North America" (1865), refers Küster's species to *Amnicola cincinnatiensis* Anth. as a synonym. This was clearly erroneous, as a most casual inspection of Küster's description and figure quoted by Binney will show.

Tryon makes no mention whatever of Küster's "*emarginata*" in his continuation of Haldeman.

What Küster's species really was has been a matter of speculation with me for many years. Recently, however, in reading Frauenfeld's paper (1863) on the *Amnicolæ*, in the Imperial [Vienna] and Cuming Collections, I found a statement that specimens clearly agreeing with Küster's figure were in the Cuming collection labeled "*obtusa* Whit." Now there was a well-known collector named Whittemore, who lived in Massachusetts in 1840-1860, and it seemed quite probable that he had supplied the Cumingian specimens under Lea's name, but without quoting his authority. Then, too, there was a very evident accord between Küster's figure and his description and those of Lea's species.

On applying to Mr. E. A. Smith, of the British Museum, for information in regard to the Cumingian specimens, I was favored with the following statement:

"The shells marked *Amnicola 'obtusa* Whit' in the Cuming collection certainly are not *cincinnatiensis* Anth., and I believe that you are right in considering them the same as *obtusa* Lea. They agree exactly with Binney's figure, Part III., p. 70, but are corneous

and not "dark green" as Lea describes it. May not the green tint have been due to confervæ? Accompanying the specimens of '*obtusa* Whit.' is a ticket '*emarginata* Say,' in Frauenfeld's own handwriting. I do not see how they can be separated from the form described and figured by Küster as '*emarginata*' of Say, or in other words, I consider them the same species."

This would certainly seem to be conclusive as to the identity of Küster's "*emarginata*" with Lea's "*obtusa*." And, as for the reason above given, Lea's name cannot be used, it follows that the species must hereafter be known as "*emarginata* Küster." As to the proper generic designation, the investigation of the radula by Messrs. Pilsbry and Beecher shows the species to belong to the genus *Cincinnatia*, the dentition being like that of "*Amnicola*" *cincinnatiensis* Anth., and unlike all other known species of "*Bythinella*" or *Amnicola*.

The complete synonymy of our species will then stand as follows:

CINCINNATIA EMARGINATA (KÜST.).

1841. *Paludina obtusa* Lea, Proc. Am. Phil. Soc. II., p. 34, non Troschel (1837), Wieg., Archiv, I., p. 173.
1844. *Paludina obtusa* Lea, Trans. Am. Phil. Soc. IX., p. 13.
1848. *Paludina obtusa* Lea, Obs. Gen. Unio, IV., p. 13.
1844. *Amnicola obtusa* Lea, Hald. Mon. F. W. Univ. Moll., p. 24.
1862. *Amnicola obtusa* Binney Desc. Cat. Amnicola, &c., p. 10.
1865. *Bythinella obtusa* Stimp., Hydrobiinæ, p. 20.
1865. *Bythinella obtusa* Binney, L. & F. W. Shells, N. A. III., p. 69, fig. 138.
1870. *Bythinella obtusa* Tryon, Mon. F. W. Univ. Moll., p. 48, pl. 16, fig. 6.
1852. *Paludina emarginata* Küst., Paludina, Conch. Cab., p. 50, pl. 10, figs. 3 & 4.
1863. *Amnicola emarginata*, Frfld., Verh. Zool.-bot. Ges. Wien. XIII., p. 1030.
1865. *Amnicola cincinnatiensis* Binney L. & F. W. Shells, N. A., p. 85, fig. 169.

A NEW JAMAICAN LAND SHELL.

BY GEORGE H. CLAPP.

Pleurodonte Adamsiana, n. sp. Plate II, Figs. 1, 2.*

Shell imperforate, carinated, depressed, convex above, regularly and very convex below, solid, dark purplish-brown with a white up-turned carina; the whole surface, with the exception of the apex, densely, finely granulate; apex subplanulate, almost smooth, shining, yellowish-white; sutures impressed; whorls 5, convex, slowly widening and wavy; body-whorl acutely carinated at the periphery, concave above, convex below the carina, impressed in the umbilical region, very slightly descending anteriorly, with a slight furrow or groove, about 4 mm. long, just back of the aperture above the carina; carina white, translucent. Aperture oblique, subtriangular, shining brown, inside showing the light peripheral band; peristome white shaded with brown, bearing inside the lower margin four teeth; a very small one near the insertion, then a larger on the basal margin, then two near together on a common eminence toward the outer angle of the aperture; the last two teeth are united for over half their height, the outer one turning sharply toward the peristome. The base is deeply tri-serobiculate behind the peristome, the outer two grooves being in a common pit. Margins of peristome joined by a thin transparent callus which sweeps around the umbilical region.

Greater diameter 32, lesser 28, altitude 14 mm.

"Whitney Estate," Upper Clarendon, Jamaica. A single dead but perfectly fresh and unweathered specimen.

This species seems to unite two widely different groups, as it has the *aperture* and *teeth* of *P. peracutissima* and the granulated surface and suprapерipheral furrow of *P. sinuata*. In general appearance it is, however, unlike either.

I take pleasure in naming this shell, one of the most beautiful of the Jamaican *Pleurodonte*s, after the late Prof. C. B. Adams who did so much in working out the wonderfully complex molluscan fauna of Jamaica.

* Plate II will accompany the next issue.

A NEW COLOMBIAN PLEURODONTE.

BY H. A. PILSBRY.

Pleurodonte (Labyrinthus) Clappi, n. sp. Pl. II, figs. 3, 4.

Shell imperforate, thick lens-shaped, carinated at the periphery, strong and solid, chocolate-brown, with a purplish cast; surface slightly striated obliquely, and showing a minute and dense but superficial spiral wrinkling or malleation over part of the base. Spire dome-shaped rather than conic; whorls $4\frac{3}{4}$ to 5, but slightly convex, slowly widening, the first $2\frac{3}{4}$ whorls punctate, the last angular at the periphery, the angle almost obsolete on the more swollen latter part of the whorl, which is very deeply deflexed in front, and strongly constricted behind the lip, the constriction showing two pits behind the basal lip and a linear scar at the periphery. Aperture extremely oblique, ear shaped, the peristome continuous, the lip broadly reflexed; parietal wall bearing a strong and long oblique lamina; outer lip with a compressed, fold-like tooth rising from a swollen base; basal lip three-toothed, the outer tooth high, oblique and compressed, the median stout and squarish, the inner smaller and bilobed; a small compressed fold stands on the axial reflection, exactly over the umbilicus.

Alt. 21, greater diam. 35, lesser 30 mm.

Alt. 19, greater diam. $32\frac{3}{4}$, lesser 28 mm.

Sierra de Santa Marta, Colombia, at "Alto de Cielo," at about 5,000 feet elevation, in forest among rotting leaves on the ground.

The first specimen taken was a dead shell, eroded and showing a dull red inner layer on the spire, eaten into many small pits on the body-whorl. A second perfect specimen, slightly larger, has been found this year. It is most nearly allied to *Helix sieversi* v. Martens (Conch. Mittheil. iii, p. 7, 1889; Man. Conch. viii, p. 263, ix, pl. 22, f. 7, 8), also from the Santa Marta mountains, resembling it in the arrangement of the teeth, but *P. Clappi* differs from that species in being much larger, with the periphery keeled, the spire lower and dome-shaped, the teeth more strongly developed, and the umbilicus wholly closed. *Pleurodonte sieversi* measures $12\frac{1}{2}$ by $19\frac{1}{2}$ mm., has 5 whorls, a wide-conoidal spire, rounded periphery and minute umbilical chink, and there are some differences in the teeth, the inner

basal one not being described as bifid, and being about equal to the next tooth in size, and no axial tooth is developed.

P. Clappi is a very interesting addition to the sub-genus *Labyrinthus*. It will be interesting to know what snail-eating mollusk or arthropod inhabits the northern part of South America, where this type of shell is developed, that is absent in southern Colombia and Ecuador, where the almost toothless group *Isomeria* occurs.

This species is one of the most interesting of Mr. Herbert H. Smith's finds in the Sierra de Santa Marta. It is named in honor of my friend Geo. H. Clapp.

GENERAL NOTES.

TRUNCATELLA TRUNCATULA (Drap.) IN THE UNITED STATES.—In preparing the Catalogue of North American Land Shells, this species was inadvertently overlooked. It has been recorded by Prof. Verrill, in the Proc. U. S. Nat. Mus., III, 376, and Trans. Conn. Acad. Arts & Sci., V, 525, fig. 8, as follows: "Living in considerable numbers, and of all ages, among the docks at Newport, R. I., July, 1880. It occurred among decaying sea-weed thrown up at high-water mark, both among the vegetable matter and on the under side of stones." "Common on the coast of Europe, and in similar localities. Perhaps introduced on this coast by shipping, but it may have been hitherto overlooked. It was associated with *Assiminea grayana* and *Alexia myosotis*."—C. W. J.

AN EVOLVING ASHMUNELLA.—*Ashmunella thomsoniana cooperæ*, n. var.—Shell with max. diam. from 13 to 15 millim., but usually of the smaller size; basal tooth single, occasionally slightly double; umbilicus narrower than in type or var. *porteræ*, exposing less of the penultimate whorl; genitalia as in *porteræ*, with the same long (22 mm.) spermatheca, and double insertion of the penis retractor. *Hab.*—Las Vegas Hot Springs, 1900, 1901. Discovered by Miss Mary Cooper; later taken in quantity by Miss Cooper and Miss Maud Ellis. The locality is in the Transition Zone, at about 7,000 ft. altitude; *porteræ* belongs to the Canadian Zone, about 1,000 ft. higher. This is not a very distinct form, conchologically; but is worth calling attention to as a species of *Ashmunella* in the making, probably derived from the *porteræ* form rather than from the true *thomsoniana*.—T. D. A. COCKERELL.

PUBLICATIONS RECEIVED.

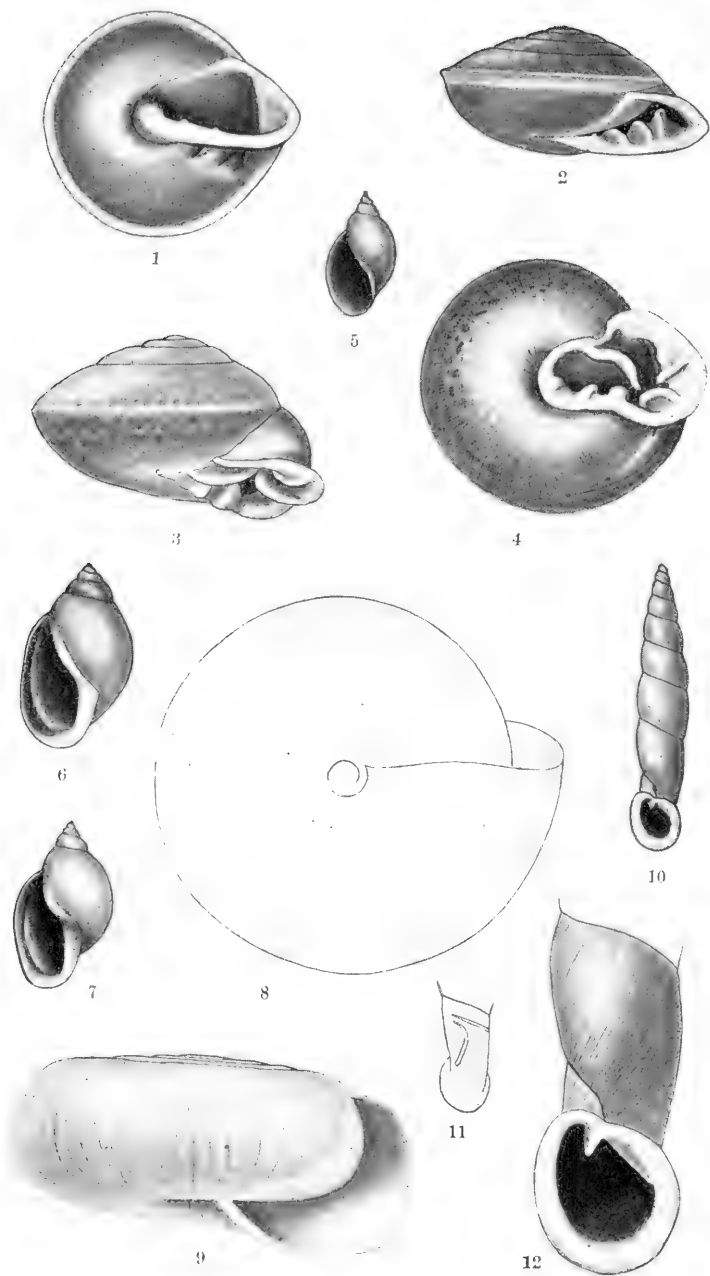
MARYLAND GEOLOGICAL SURVEY: EOCENE. By Wm. B. Clark and Geo. C. Martin. It has afforded us a great deal of pleasure and instruction to peruse the carefully prepared and beautifully printed volumes of the Maryland Geological Survey. The State may justly feel proud that it is able to present to the world such admirable reports on its physical and geological features. The present volume on the Eocene fauna is especially interesting to conchologists, as by far the largest number of forms described are molluscan. The volume contains 331 pages and 64 plates, and includes a map and sections. Two formations are recognized, the Nanjemoy and Aquia, the former corresponding in many respects to the Lower Claibornian, and the latter to the Chickasawan of the Gulf States. There are described and well figured 135 species of mollusca; among which is a large new Nautiloid (*Hercoglossa tuomeyi*), while 19 Gastropoda, and 10 Pelecypoda are also described as new. Among the 135 species are 15 of which the genus only is given, the specimens being too imperfect for specific descriptions. We highly commend this step, for the description of indeterminate species is only a hindrance to the progress of paleontology. C. W. J.

CORRESPONDENCE.

EDITORS NAUTILUS: I have read with deep interest Mr. J. B. Henderson's article in the June NAUTILUS on the trip made by himself and companions, Messrs. C. T. Simpson and Robert T. Hill, to Haiti on a hunt for land shells, and was sorry to learn of their comparative failure to secure a greater number of specimens of that splendid species, *Pleurodonte gigantea*. I then recalled that when my friend, Mr. H. Rolle, of Berlin, returned from his Haitian trip, where he had spent three months or more collecting specimens, he called on me at my home (then) at Brooklyn, N. Y., and told me of his efforts to find this snail, and how very difficult it was to secure them, because it was a *night* shell, rarely ever being seen in daylight. He succeeded by doing his searching at night, with the aid of a lantern. He referred to the same spot—palace and fortress—mentioned by Mr. H., where they found the dead shells so numerous. If they had worked the grounds by *lamp-light* I fancy they would have been rewarded with a larger catch. My collection contains but one of this species; it is a very large and excellent specimen, except for a somewhat marred epidermis. Mr. H. makes no mention of finding any *Cerions*. Did they not look or care for them? I think *Cerion* a very interesting and beautiful snail. They must be quite abundant, for the Rev. Mr. Smith, resident missionary at Cape Haitian, sent me a very large number of most perfect and beautiful specimens. I compliment the gentlemen on the final success of their efforts.

June 6th, 1901.

A. B. KENDIG, Brookline, Mass.



THE NAUTILUS.

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PLATE II.

Figs. 1, 2. *Pleurodonte Adamsiana* Clapp. This Journal for July, p. 33.

Figs. 3, 4. *Pleurodonte Clappi* Pilsbry. This Journal for July, p. 34.

Fig. 5. *Physa Walkeri* Crandall. Petosky, Mich.

Figs. 6, 7. *Physa rhomboidea* Crandall. Muddy Creek, Sedalia, Mo.

Figs. 8, 9. *Gastrodonta Clappi* Pils. This Journal XII, p. 86; XIV, p. 58. Large depressed specimen from Clingman Dome, no. 2490, coll G. H. Clapp. Alt. 3, diam. 6.2 mm.

Figs. 10, 11, 12. *Nenia Smithiæ* Pilsbry. Page 39.

THE UNIONIDÆ OF NORTH AMERICA.

BY H. VON IHERING.

By the publication of his "*Synopsis of the Naiades*" Mr. Simpson has rendered an excellent service to students of Malacology and of the *Unionidæ* especially. It is for me the greatest satisfaction to felicitate Mr. Simpson upon having produced a work which will mark a new period in the study of fresh-water mussels.

It will be understood from this that the work of Mr. Simpson does not represent the conclusion of a series of successful studies, but a basis for the beginning of a new period of investigation. Doubtless this work will give an impulse to the study of the *Unionidæ*, and it is the purpose of these lines to point out what we may expect concerning the American *Unionidæ*.

The criticisms we have to make upon the *Synopsis* of Mr. Simpson refer principally to two points: The validity of the genera adopted by him, and the systematic arrangement of these groups to form greater sections. Concerning the specific limits and their sometimes enormous synonymy I am nearly always of the same opinion with him. Some observations about species concerning which I hold divergent views, will follow at more length below. I cannot say the same concerning the genera, as may easily be understood. Many of the distinctive characters are derived from anatomic structures, and therefore are unknown where the animal has not yet been observed. The association of a number of species in one genus is therefore in many cases but a provisional grouping; and specially is this the case with the Mexican and Central American species.

The systematic arrangement of the North American *Unionidæ*, as given by Simpson in his *Synopsis*, is based essentially upon the marsupia; that is to say the gills or parts of them functioning as ovisacs. This is a classification which we may not see employed without scruples, because it is based rather on physiologic than anatomical characters. Zoölogical classification is founded on morphological characters, and while physiologic or biological facts may give us important explanations, they cannot be employed directly for systematic purposes. This is generally acknowledged, since it became necessary to dismember the class of *Helminthes*, and it is likewise valid for the *Mollusca*, as proved by the example of the pelagic gastropods. Whether the eggs expelled out of the genital orifice pass into the inner gills (*Endobranchiæ*) or in the outer ones (*Exobranchiæ*) or if they fill on each side both the gills (*Amphibranchiæ*), is a fact of merely physiologic signification, and cannot be employed for systematic purposes. These differences are less than those which exist in many genera or species of gastropods, very closely allied, in reference to the deposition of eggs, some being oviparous, others ovoviviparous or viviparous. As it seems, there are in many species of the group *Lampsilis* and *Quadrula* structural modifications of the outer gills, which may be used for systematic purposes, but the few exact data thereon which may be found in the publications of Lea, Sterki and Simpson are throughout insufficient. What we need is a careful, histological study upon the gills, marsupia and ovisacs of the North American *Unionidæ*.

These facts, however, do not affect the general question. It is quite evident that a systematic arrangement of the marsupia does not coincide with a natural system of the family. The species of *Diplodon* of New Zealand, which I have examined, had filled only the inner gills with eggs; but Suter has observed that sometimes eggs are also found in the outer gills. Simpson says that in the species of *Quadrula*, both the gills are filled with eggs, but that sometimes the inner gill contains but few. We cannot doubt that in the most ancient *Unionidæ* the eggs were discharged only into the inner gills and that later all four gills were filled with eggs, representing the last stage, the exclusive employment of the outer gills. In the genus *Quadrula* all these successive stages are still represented; and it is not admissible to use such differences for the establishment of genera. It happens that in the same species are observed great differences in this respect. The specimen of *Quadrula heros* Say, examined by Lea, had filled with eggs all the four gills; while the specimen examined by Sterki had only the hinder part of the outer gills filled with eggs, as in many species of *Lampsilis*. According to the classification of Simpson, which in this respect is an artificial one, these specimens would fall in quite different genera. Differences of this nature have caused Simpson to separate from *Quadrula* various species and sub-genera. It is no natural disposition when we see *Pleurobema* allied with *Unio*, *Quadrula tuberculata* Bar. widely separated from the nearly related species *speciosa*, *forseyi*, etc.; *Obliquaria reflexa* widely remote from *Quadrula metanевра*; *Quadrula æsopus* allied to *Pleurobema*. In the same manner is *Lampsilis phaseolus* separated from *L. iris*, etc., because the development of the marsupium is more extensive. Therefore it is necessary to associate these separated groups with their real relatives.

(To be concluded.)

A NEW COLOMBIAN CLAUSILIA.

BY HENRY A. PILSBRY.

Nenia Smithiæ, n. sp. Pl. II, figs. 10, 11, 12.

Shell cylindric-fusiform, rather thin, lusterless, nearly smooth, obsoletely marked with growth-wrinkles; of a rich purplish-brown color. Whorls $8\frac{1}{2}$, moderately convex, the penultimate widest, those

above gradually tapering to an obtuse apex; last whorl flattening at the sides, elongated, having a weak basal carina, the suture very obliquely descending, becoming shortly free in front. Aperture large, rotund-ovate, dark reddish-brown inside; peristome broadly flaring, white on both face and reverse. Superior lamella vertical, compressed and sharp, continuous with the spiral lamella. Spiral lamella short, penetrating merely to a dorsal position. Inferior lamella rather receding, not extended upon the peristome, strongly converging toward the superior lamella, ascending straightly inside, and penetrating to a ventral position. Subcolumellar lamella completely immersed, short. Principal plica situated high, short, extending from a latero-dorsal position nearly to the lip. Lunella united with the lower end of a short, curved upper palatal plica, together with it forming somewhat the shape of an inverted letter J. No lower palatal plica.

Length 24, diam. 4.2, longest axis of aperture 5.5 mm.

Sierra de Sta. Marta, U. S. of Colombia, at El Libana, at 6000 to 7000 ft. elevation, in moss on tree trunks. Collected by Mr. H. H. Smith, May, 1898.

This species belongs to a somewhat numerous group of plain species from Colombia and Ecuador. It resembles *N. femurina* Jous., of Ecuador, but has different sculpture and a longer "neck." In *N. crossei* Hid., the aperture is narrower and oblong, not rounded-ovate as in this species.

It is named in honor of Amelia W. Smith, the devoted and capable companion of her naturalist husband, on his collecting journeys through the tropics of two continents. Types in Coll. A. N. S. Phila. and of George H. Clapp.

A GIGANTIC FOSSIL LUCINA.

BY WM. H. DALL.

During the cruises of the U. S. Fish Commission steamer *Albatross* in the West Indies, some years ago, one of the party collected some fossils from various localities, and among others some large internal casts of bivalves from Clairemont, St. Ann's Parish, Jamaica. These, according to the investigations of Hill, must have come from the Montpelier white limestone, a widespread deposit of Upper Eocene or Oligocene age, but older than the Oligocene of the

Bowden horizon. The Montpelier limestone contains, as a rule, little that is recognizable in the way of fossils except foraminifera; hence any species which can be identified is of interest, and in the present case the interest is increased by the unparalleled size, for the genus, of the species concerned. The specimens referred to appear to belong to the sub-genus *Miltha* or *Pseudomiltha* of the *Lucinidæ*. It is absolutely certain that they belong to the genus *Lucina*, *sensu lato*, and probably to one or the other of the above-mentioned sub-genera. The species, which may be provisionally named *Lucina megameris*, is, so far as I am aware, the largest Lucinoid shell known. It is equivalve, very inequilateral, the beaks being near the anterior third, moderately convex, though somewhat flattened peripherally; the cavity of the beaks rather shallow, the internal margins of the valves smooth and entire, the lower posterior part of the valves produced, the anterior end rounded, short; posterior adductor scars small and high; anterior scar low, narrow and loriform, produced backward nearly to the vertical from the posterior scar. There are no traces of the cardinal teeth, if any, but there were two feeble, non-functional, posterior laterals, one on each valve. The disk is more or less radiately striated and profusely punctate, as in many other Lucinas. The greatest length of the cast, on a line drawn from the umbo tangent to the posterior end of the anterior scar, is 235 mm.; the shorter line at right angles to the last, 230 mm.; the diameter of the cast from side to side, 67 mm. The margins are defective to the extent of half an inch or more in front and behind; the valves appear to have been not quite closed when the matrix filled them, but the margin opposite the umbones appears to be complete. Allowing 15 mm. for the thickness of the shell at the umbones, which from the breadth of the impression of part of the hinge-plate preserved seems reasonable, and the total length of the valves would in that case have been 250 mm., or about ten inches. The largest Lucinoid shell heretofore recorded, *Lucina (Pseudomiltha) gigantea* Deshayes, from the Parisian Eocene, attains a length of 98 mm., slightly less than four inches; from which the overwhelming superiority in size of the Jamaican species is evident.

The cast, without extraneous matter, weighs seven pounds avoirdupois.

With the exception of *Hippopus* and *Tridacna*, the shells of very few, if any, of the teleodont bivalves equal or exceed the above

dimensions, though the mass of the animal in *Panopea* and *Tresus* is probably greater than in our species. On the other hand, among the Prionodonts, such as *Inoceramus*, etc., a number of fossil forms occur which were larger; and the spread of the valves of the recent pearl oyster, *Meleagrina*, sometimes exceeds a foot, when closed.

In a recent examination of all the generic forms supposed to belong to the family *Lucinidæ*, I have been led to the conclusion that there is no evidence that the Palæozoic fossils referred to *Paracyclas* Hall, should be placed in this group. They appear to be absolutely without any of the characters which are diagnostic of Pelecypods belonging to the *Lucinidæ*.

I may add that the Clairemont limestones contain two other species of this family, one a true *Lucina* of the type of *L. edentula* Reeve, and the other a species of *Phacoides* belonging to the subgenus *Lucinoma* Dall., typified by *L. filosa* Stimpson; a group which has a remarkably wide distribution in age, space and depth of water.

THE AMERICA PHYSÆ.

BY O. A. CRANDALL, SEDALIA, MO.

Physa ancillaria Say.

Including the subspecies *Physa vinosa* Gould, *magnalacustris* Walker, and *crassa* Walker.

This species was described in 1826 from forms taken from the Delaware river near Easton, Pa. Typical forms are still found in the same locality. It differs from *P. heterostrophæ* Say, in its larger size, more inflated form and by its coarser lines of growth. The greatest difference lies in the manner in which the whorls are put together, and the resulting change in the structure of the suture and form of the spire. In that species the whorls lie against each other, forming a more or less impressed suture, while in this form the whorls overlap in such a manner as to make the suture appear as a mere line. The type is shouldered, but in a majority of specimens the shoulder is not prominent. * It has a little more than four whorls, the last very large, and the columella is always twisted. It is an annuan, but forms are found having two varicose lines on the last whorl near the margin.

Distinguished by its inflated form, shoulder, low spire, unimpressed sutures and twisted columella.

Physa vinosa Gould. This variety differs from the type only in having a more globose form, the spire a little more elevated, and impressed sutures.

Physa magnalacustris Walker. This form has been recently discovered by Mr. Bryan Walker in northern Michigan. As his description has been published in the NAUTILUS it is not necessary for me to give it here. It is a large, fine globose shell, remarkable for the broad, white longitudinal bands on the last whorl. If they are all like the specimens shown me, it should rank as a species.

Physa crassa Walker. This variety has also been recently described from forms found in Michigan. It is much heavier and somewhat narrower than the type. It has been well described by its author.

Physa ancillaria is distributed over the same territory as *P. heterostropha* Say, but is not so plentiful in the extreme east, and may extend a little further west, but does not cross the Mississippi river. *P. obesa*, De Kay, is a form of this species.

Physa sayi Tappan.

There has been a great deal of contention over this species. Some of our ablest conchologists contend that it should not rank as a species, while others equally as experienced accord it that rank. After having given it much investigation and study, I have decided to recognize it as a species. That it is an offshoot of *P. ancillaria* Say, as that shell is of *P. heterostropha* Say, I have no doubt; but has it not by its constant variation from its ancestor established the right to rank as a species? It is not only possible, but highly probable that all the American species of this genus sprung from one form. The evolution began away back in the dreamy past, and has continued in some degree to the present time. When in our investigations we find a form that has maintained distinctive characters for a long period of time—in fact so long that the knowledge of man runs not to the contrary—we must admit it to specific rank.

It was described sixty years ago from forms taken in Lake Pipin, Portage Co., Ohio, and typical forms are still found having the same inflated form, expanded lip, elevated spire with dark brown apex, five whorls, coarse lines of growth and two varicose bands.

It is distributed over the northern part of the United States, and

extends into Canada and as far west as the Rocky Mountains, but not south of the Ohio and Missouri rivers.

Physa warreniana Lea, is a less inflated form and may be ranked as a variety.

Physa lordi Baird.

This species was described in 1863 from specimens taken in Osoyoos Lake, British Columbia. It is a northwestern species, and probably does not extend east much beyond the Rocky Mountains. It is the largest American species of the genus, and may be readily distinguished by its large size, inflated, gibbous form, and thin and fragile shell.

Physa parkeri Currier.

The consensus of opinion places this shell with *P. lordi* Baird as a variety, but in this opinion I do not concur. I am unable to see any similarity in the two forms except in size, and the general outline of the form when *P. parkeri* is not shouldered. *P. lordi* is a large gibbous form, while *P. parkeri* is large and square shouldered. It is also a thick, heavy shell of a different color and structure. I leave the matter to be determined by those more familiar with these forms than I am.

Distribution, Northern Michigan.

Physa rhomboldea, n. sp. Pl. II, fig. 6, 7.

Shell rhomboid-ovate, large, heavy, robust, yellowish horn-color to pale yellowish-brown, texture fine, surface undulating and shining when not covered with a dark coating, spire elevated, acute with dark brown tip, whorls five convex, sutures much impressed, aperture ovate, lip simple, not expanded, sometimes a little compressed, thickened on inner margin with reddish-brown callus, columella well covered with heavy deposit continuing and extending from the lip. On many of them the columella is folded so as to form a narrow umbilicus.

Length 16 mm. diameter 9 mm. Bi-annuan.

This shell was collected by me in Cedar and Muddy creeks, near Sedalia, Mo. I have since found it at Dardanelles and Sulphur Springs, Ark., and at three localities near Las Vegas, New Mexico. I have sent to Prof. Pilsbry examples from Missouri and Las Vegas. In a reservoir on Romaro ranch I found some dead shells considerably larger than the one described.

It is distinguished by its robust appearance, deep sutures, con-

stricted aperture and umbilicus, which will be found in a large part of them. It is more like *P. solida* Philippi than any other species.

Physa gyrina Say.

Including the subspecies *Physa hildrethiana* Lea, *oleacea* Tryon, and *albofilata* Ancey.

This species was found in Bowyer Creek, near Council Bluffs, Iowa, in 1821. It is a large, coarse shell, sub-cylindrical in form; the largest sizes having six whorls. The lip joins the body whorl at an acute angle, forming a loop-shaped aperture; the penultimate whorl is enlarged, giving the spire a blunt appearance, lines of growth coarse, *crossed by microscopic striæ*, giving the surface a dull appearance.

Diameter $\frac{8}{15}$ the length. This species is a tri-annual.

Distinguished by its form, coarse lines of growth, loop-shaped aperture, large penultimate whorl and obtuse spire.

Physa hildrethiana Lea, comprises nearly all the forms found east of the Mississippi river. It is distinguished from the type by being of a lighter texture, finer lines of growth, not so much covered with cross striæ, and having a darker color. Many of these forms are more slender.

Physa oleacea Tryon. This variety is more cylindrical than either of the other forms, has a very obtuse spire, lines of growth much finer and the cross striæ more thickly covering the surface, giving the shell a smooth, dull appearance. It is generally found with five whorls. The spire is very variable, but otherwise its markings are constant. Some forms are cylindrical with the spire smoothly rounded over, showing no raised apex. This form Prof. Tryon, in the "Monograph of the Fresh-water Univalve Mollusca," placed with the synonyms of *P. elliptica* Lea. It is sometimes so distinct from all other forms of this species that I should accord it the rank of a species but for the fact that my observations while collecting them have clearly disclosed so many proofs that it is only a peculiar and eccentric form of *P. gyrina*. I have found it inhabiting little ponds, with the typical form maintaining family relations, and of all sizes and forms from the cylindrical scarcely raised spire to the elongated and obtuse spire of the typical form. I am fortified in this position by Prof. Tryon, to whom I took some samples for identification about a year before his death, and he identified them as a variety of *P. gyrina*.

(To be concluded.)

GENERAL NOTES.

The following interesting notes are taken from the Journal of Conchology, Vol. x, no. 2, pp. 35-42, April, 1901, "Conchology at the Dawn and Close of the Nineteenth Century" (The Presidential Address delivered by Mr. E. R. Sykes, at the Annual Meeting of the Conchological Society of Great Britain and Ireland, Oct. 27, 1900).

* * * "The close of the Nineteenth Century is, to use a commercial expression, a time to 'take stock,' and consider what progress has been made. It is with one of these forms of estimating our present position that I propose for a few minutes to concern myself, and especially with an endeavor to arrive at some idea of the actual number of species of recent mollusca which are now known to science. Any such estimate can but be approximate, but a survey of the most recent monographs enables one to form a fairly accurate conception.

"The classic starting-point for such a calculation, as indeed for all other systematic molluscan work, is the tenth edition of Linnaeus." His works contain roughly speaking about 700 species. This number gradually increased nearly every year, until "Dillwyn, in 1817, was enabled to enumerate 2,244; which we may divide into: *Cephalopoda*, 45; *Gastropoda*, 1,510; *Scaphopoda*, 15; *Pelecypoda*, 638; *Polyplacophora*, 36.

In the classic work of the brothers Adams (1853-58) we find the following: *Cephalopoda*, 197; *Gastropoda*, 12,604; *Scaphopoda*, 46; *Pelecypoda*, 4,258; *Polyplacophora*, 216.

Treating Paetel's well-known work (1888-1890) in the same way we get: *Cephalopoda*, 305; *Gastropoda*, 35,134; *Scaphopoda*, 137; *Pelecypoda*, 8,467; *Polyplacophora*, 439; or a total of 44,482 species.

"Hoyle's catalogue of the recent *Cephalopoda* in 1886, with addenda in 1896, contains 469. From the Zoölogical Record of 1897-9, we add eleven, and on an average, we may include four for 1900, making a total of 484 species.

In the *Gastropoda* the recent catalogue of the *Cyclophoridæ*, *Cyclostomatidæ*, and allies, by Kobelt and Moellendorff, "yields about 2,444 species, and if we add 48 species from the Zoöl. Record of 1899, and estimate a similar number for the 1900, we get 2,541." Since Paetel's list in 1888 (omitting the *Cyclophoridæ*, etc.), basing 1900 on a three years' average (682), there have been recorded 7,396, a total estimate of 43,021.

As to the *Scaphopods*, the most recent monograph, by Pilsbry and Sharp, yields 238; if we add the single one in the record of 1899, and another for 1900, we have 240 species.

For the *Pelecypoda* we have since Paetel's list (1890), basing as before, 1900 on a three years' average (142), 1,056; a total of 9,523 species.

“Finally we turn to the *Amphineura*. Here from Dr. Pilsbry’s work we get: *Polyplacophora*, 540; *Aplacophora*, 33. Adding from the Zoöl. Record in a precisely similar manner we have to include *Polyplacophora*, 59; *Aplacophora*, 4; and we get a final total of 636.

“The next question which arises is, how far are the above totals trustworthy? On the one hand they are inflated by a mass of synonyms which still masquerade as species, while on the other hand they are reduced by a certain number of omissions. The only omission of any importance, however, will, I think, be found in the *Nudibranchiata*, of which the true total is, owing to the nature of the works consulted, unduly curtailed.”

“Making a reduction therefore for synonyms and allowing for the above, I think a very fair approximation will be: *Cephalopoda*, 450; *Gastropoda*, 40,000; *Scaphopoda*, 220; *Pelecypoda*, 8,500; *Amphineura*, 600; or a grand total of 49,770—say 50,000 known species of recent mollusca.”

C. W. J.

THE LOCALITY OF SAY’S TYPE OF *ALASMODONTA MARGINATA*.—Bearing on the question whether the name *Alasmodonta marginata* of Say should be applied to an Eastern or a Western shell, and as it has been questioned that Lea ever collected in the Scioto River, the following quotation¹ will be found of interest: “Mr. Lea remembers that Mr. Say founded his genus *Alasmodonta* on a single valve which he himself had picked up on the river shore at Chillicothe, Ohio, and which he carried from that place to Philadelphia in his saddle-bags.”

From this it is clear that Say’s name should be applied to the form known as *A. truncata* of the western states, as it corroborates Say’s statement that the type was found in the Scioto River.

It may be well to point out that the *Journal of the Academy of Natural Sciences of Philadelphia*, containing the description of *Alasmodonta marginata*, although dated December, 1818, really did not appear until the year 1819, which is the same date as the separate of Say’s paper from the 3d edition of *Nicholson’s Encyclopedia*. From the fact that no locality for the species is given in the latter paper, it seems safe to say that *A. marginata* was first described therein, the locality being supplied in the later paper in the *Journal*, which was published prior to March 13th, 1819, as Say, in a letter of that date, speaks of having sent a copy of it to a correspondent.

In Say’s *American Conchology* there is an article, or chapter perhaps, entitled: “An attempt to exhibit a synonymy of the Western North American species of the genera *Unio* and *Alasmodonta*,” in which will be found listed as a *western species*, “*Alasmodonta marginata* Say.”—WILLIAM J. FOX.

¹From *The Published Writings of Isaac Lea, LL. D.*, by Newton Pratt Scudder. (*Bull. No. 23, W. S. Nat. Mus.*)

CORRESPONDENCE.

We extract the following from a letter recently received from Rev. W. H. Fluck, Wounta Haulover. (Address care of Moravian Mission, Bluefields, Nicaragua):

“I believe I am the only conchologist in Nicaragua, and I suppose my collection is not only the largest but the finest. Caesar said, ‘Better be first in a little Iberian village than be second in Rome,’ but I don’t agree with him. I send you herewith a few shells.

Donax cayemensis Lam. Prinzapolka, Mosquito Coast, Nicaragua, C. A.

Donax denticulatus L. Wounta Haulover.

Nerita pelaronta L. Man of War Keys, Mosquito Coast, Nicaragua, C. A.

Dione dione Linné. Wounta Haulover.

Neritina reclinata Say, var. *reticulata* C. & J. In the Lagoon at Wounta Haulover.

Pachycheilus corvinus Morel. Quiquina, on the Toongla River.

Polymesoda inflata Hanley. Lagoon, Wounta Haulover.

I have eaten bushels of the Donaces. The Indian children collect them at low water.”

We would add that the specimens of *Donax* and *Dione* are the finest we have ever seen. The *Neritina* is exceptionally large. *Neritina reclinata* is now referred, correctly no doubt, to *N. lineolata* Lam.; and the netted Central American race will stand as *N. lineolata* var. *reticulata* C. & J. *Polymesoda* is what has usually been known as *Cyrena*; and is now accepted as the generic name for the American *Cyrenas*, which have a small pallial sinus, such as *carolinensis* and the tropical American species.

Working alone in a bookless land, we are sure that Mr. Fluck will be glad to receive papers on conchological topics, and exchanges for the shells of his region.

 GEORGE W. DEAN.

We regret to learn of the death of our old friend Mr. Geo. W. Dean, which occurred on April 10th at his home in Kent, Ohio. Mr. Dean was born in Wayne township, Ashtabula Co., Ohio, August 20, 1820. In 1855 he took up the occupation of a nurseryman and florist, a business in which he was successfully engaged until the time of his death.

Mr. Dean was a great lover and student of nature, and well known to many of the readers of THE NAUTILUS, for notwithstanding his busy life as a horticulturist, he was an ardent and enthusiastic collector of shells.

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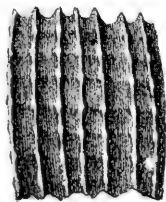
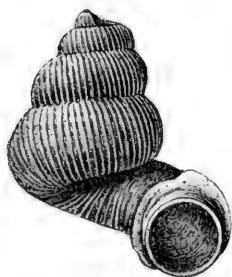
No. 5.

A NEW JAMAICAN ADAMSIELLA.

BY J. B. HENDERSON, JR.

Adamsiella jarvisi n. s.

Shell moderately elongate, pyramidal. Whorls four, well rounded, the last leaving the body of the shell and projecting one-half its own



length free in a slight curve. Apex truncate; sutures well impressed. Sculpture consists of unevenly-spaced, prominently-raised laminae circling all the whorls; these are crossed by obsolete spiral liræ which are only apparent at their

points of intersection with the transverse ridges. Umbilicus narrow and extending through the shell, forming a puncture at the apical truncation. Aperture exactly round; inner peritreme greatly extended; the outer peritreme corresponding to an exaggerated lamina, circles the whorl like a collar, the outer edge of which is irregular but not fluted. Color pale yellowish-gray.

Height 11; diam. above aperture 6.5; greatest diam. 9; diam. of aperture 3 mm.

This species resembles *A. pearmaniana* in general shape and sculpture, but is obviously distinct by reason of its coarser laminae and evidences of spiral striae, also by the striking projection of the last

whorl. The sculpture of this shell is somewhat suggestive of the rough burr-like appearance presented by some of the Jamaican Choanopomas. A series of chestnut-brown spots circling the outer expanded peritreme probably indicates in fresh specimens parallel rows of similar spots upon the whorls. Operculum unknown.

Collected by Mr. Jarvis near Ewarton, Jamaica.

THE UNIONIDÆ OF NORTH AMERICA.

BY H. VON IHERING.

Entering into consideration of particular species, I would make the following observations:

Quadrula spheniopsis Morel certainly does not belong to the genus *Quadrula*, because the female is inflated in the same manner on the base of the shell as *Lampsilis*. I have a good series of specimens, some of which were examined by the late Dr. Fischer. I subordinate this species to the genus *Nephronaias*, of which *Pachynaias* Crosse and Fischer is a synonym.

Quadrula pernodosa Lea. I consider that this is not a variety of *pustulosa*, because the form is quite different from that of the varieties of *pustulosa*, which is always more quadrate, while *pernodosa* is of an elongate, higher form, with more prominent beaks. The hinge-line is longer in *pustulosa*. The distance of the large pseudocardinal tooth from the end of the lateral is more than a half of the height in *pustulosa*, but is less in *pernodosa*.

Lampsilis occidens Lea, I consider as a good species, different from *L. ventricosus* by the more central position of the beaks and different shape of the anterior extremity. I have males and females of both *ventricosus* and *occidens*.

Lampsilis pictus Lea, is perhaps the male of *perdix* Lea.

Lampsilis sapperi sp. n. This is the shell mentioned by Simpson in his Catalogue, p. 571, n. 4, as a doubtful variety of *L. explicatus*. The shell is more elongate, with the ventral margins sinuate and the anterior extremity lower and somewhat obliquely truncate on the inferior part of the anterior margins. The pseudocardinals are very stout, one in the right, two in the left valve. This differs remarkably from *L. explicatus* as figured by Crosse and Fischer, pl. 61, fig. 1, of the Moll. Mex., having the pseudocardinals elevated, compressed,

lamelliform. I believe the *L. sapperi* more allied to *L. umbrosus* Lea than to *explicatus*, being, however, of a more elongate form with produced posterior extremity and larger size. The type example has a length of 64 mm., breadth of 114 mm., diam. of 38 mm. The epidermis is dark brown, blackish, the nacre white. The posterior slope has two obtuse, somewhat indistinct diverging lines. The species is from the Chixoy river in Guatemala, and dedicated to Dr. Carl Sapper, who has collected in scientific expeditions in Central America and Mexico many interesting *Unionidæ*, for which I am much indebted to him.

Nephronaias medellinus Lea seems to be the same as *Lampsilis aztecorum* Phil.

Nephronaias averyi Lea, I have from the Rio Tuca, in N.-W. Guatemala.

Nephronaias goascoranensis Lea (1858), I have received from Dr. Sapper from the Moramusko river, in Honduras, and from the Rio Coco in Nicaragua. The species varies, and I have specimens corresponding to the figure of Lea and others to that of Crosse and Fischer (Miss. Sci., Mexico, pt. 2, 1894, pl. 64, fig. 5 and 5 a), of *Unio calamitarum* Morelet (1849.) The name of this widely-distributed Central American species should, therefore, be *Nephronaias calamitarum* Morelet, if Morelet, as also Crosse and Fischer have not confounded two different species, and it is impossible to say what is the true *calamitarum*.

Nephronaias tabascoensis Küster (1856) is also a widely-distributed Central American species. This is my No. 60 from the Rio Copan, Guatemala, tributary of the Motagua river, and which Mr. Simpson believed be the *scamnatus* Morelet. Having both *N. scamnatus* Morel. and *gandlachi* Dunker from Cuba, I consider them different. The true *scamnatus* is a smaller and thinner shell, while to *tabascoensis* are synonymous *U. persulcatus* Lea, *rugulosus* Küst. and perhaps also *plicatulus* Küster. To this species belongs also *Unio calamitarum* Morelet, var. *prolongata* Crosse et Fischer l. c., p. 612, pl. 63, fig. 5 et 5 a. The supposed Central American examples of *N. scamnatus* may be identical with *N. dysoni* Lea. *N. tabascoensis* I have also from Nicaragua, Rio Telpanek, and (No. 61) from El Obraje, Guatemala.

Referring to the genera of North American *Unionidæ* admitted by Simpson, I would make the following observations :

Truncilla. This would be a quite natural genus, eliminating some heterogenous elements, that must be placed with *Quadrula*, as *T. personata* Say, allied to *Q. trigona*, and *T. perplexa* and *foliata* allied to *Q. metanevra*.

Lampsilis. A very natural genus, from which, however, *Proptera* should be separated as a genus.

Obovaria belongs in the vicinity of *Quadrula*, as do likewise *Tri-tononia*, *Cyprogenia*, *Obliquaria* and *Dromus*.

Ptychobranchnus is a subgenus of *Lampsilis*.

Pleurobema will form a natural group after the removal of *P. æsopus* and probably some other species.

Unio. There are to be removed *U. spheniopsis*, a species allied to *Nephronaias cyrenoides*, and also the group of *U. semigranosus*, consisting of species of *Quadrula*. There are a number of species of *Quadrula* in Mexico distinguished by peculiar granular sculpture and thin reddish-gray epidermis, for which Crosse and Fischer created the sub-genus *Psoronaias*. I can find no reason for dividing them between two groups, as Simpson has done; and I unite *U. semigranosus* and allied species to *Quadrula*. In this way all sculptured forms are eliminated from the genus *Unio*.

Plagiola. Genus probably to be restricted to *P. elegans* and similar forms, while *P. cyrenoides*, etc., may be transferred to *Nephronaias*.

The family *Unionidæ*, as limited by Simpson, would contain, according to these views, two families: *Diplodontidæ* and *Unionidæ*, which are distinguished not only by the marsupia, but also by important conchological characters. The sexual differences, strongly pronounced in the *Lampsilis* group, are not entirely deficient in the other groups, as there are species with pronounced sexual differences in both the genera *Quadrula* and *Diplodon*. The sculpture of the beaks is concentric in the *Unionidæ*, radial in the *Diplodontidæ*. In some species of *Hyria* and *Tetraplodon* the radial sculpture is reduced or almost obsolete. Of two specimens of *Castaliella sulcata* Krauss in my collection, one shows the radial sculpture well developed; in the other it is nearly absent. The pseudo-cardinals are variant in both examples; the nacre is bluish-white. This mussel is doubtless identical with *Tetraplodon schombergianus* Sow., but I have received my specimens, collected by Kapler on the Marowini River, Surinam, from the Zoological Museum in Stuttgart as typical specimens of *Castalia*

sulcata Krauss. As Simpson believes also to be typical his specimen with purplish nacre, further investigations will be necessary, however, as it is probable that the species shows some variability, and that *Tetraplodon schombergianus* is a synonym.

Conformable with the conceptions here exposed, we may consider the super-family of Naiades as composed of two families: *Unionidæ* and *Diplodontidæ*. The former, the only one occurring in North America, may be divided into the following three sub-families:

UNIONIDÆ with the genera: *Anodonta*, *Lastena*, *Gonidea*, *Anodontoides*, *Pegias*, *Arcidens*, *Symphynota*, *Alasmidonta*, *Hemilastena*, *Margaritana*, *Unio*.

QUADRULINÆ with the genera: *Quadrula*, *Pleurobema*, *Obovaria*, *Cyprogenia*, *Obliquaria*, *Dromus*.

LAMPSILINÆ with the genera: *Lampsilis*, *Truncilla*, *Micromya*, *Medionidus*, *Nephronaias*, *Glebula*, *Plagiola*.

As shown by the arguments given, the opinions of Mr. Simpson, in many essential points, are in accordance with those of the writer, and I thought it useful to publish such of my ideas as do not accord with Mr. Simpson's, in order to submit them to examination in the discussion which a book of such great importance will naturally provoke.

S. Paulo (Brazil) 10 May, 1901.

AN ABNORMAL CHITON.

In September of last year Mr. Hemphill sent me a photograph of an abnormal specimen of the common Californian species *Ischnochiton (Maugerella) conspicuus* Cpr., the divergence from the ordinary form consisting in its having *only six valves*. The length of the specimen (photo) is about 70 and the breadth 38 millimeters. There is no indication of pathologic deformity; the proportionate size of the valves compared with the size of the shell as a whole, exhibits no eccentricity. Cooke, in the Mollusca volume of the Cambridge Natural History Series, remarks that "seven-valved monstrosities very rarely occur." Sykes has recently reported and figured a three-valved individual. In the hundreds of Chitons of various species that I have collected on the West Coast I have never detected an example with less than the usual number, though it is possible in handling a large number, especially of the smaller forms, to

overlook an individual varying in the above respect. It will be well for collectors to keep their eyes open for such abnormal individuals; it may be found that they occur oftener than is supposed.

R. E. C. STEARNS.

Los Angeles, May 2, 1901.

THE AMERICAN PHYSEÆ.

BY O. A. CRANDALL, SEDALIA, MO.

Physa gyrina var. *albofilata* Ancy. This variety is confined to southwest Missouri and northwestern Arkansas, extending into the Indian Territory and Kansas. It is distinguished by its lighter color, fine lines of growth, rarely showing cross striæ, generally malleated on some part of the surface, and large white varicose bands. It is generally found with five whorls.

Forms: *Physa hawni* Lea, *P. cylindrica* Newcomb, *Physa smithsoniana* Lea.

P. gyrina is the most widely distributed of all the American species. It extends over all the territory between the Alleghanies and Rocky Mountains, and from the Arctic region south into Alabama and Texas. I have examples from near Philadelphia, Pa., and from Routt county, Colorado, but I do not consider them permanent inhabitants of those localities. It is possible that they may yet be found to extend as far west as the Sierra Nevada Mountains, but I have been unable to obtain any evidence that they now inhabit the Great Basin. I account for their being found outside of the limits here given by the ova being carried on the feet of migratory birds, by means of which isolated colonies are planted, which survive for a time, but finally become absorbed by the more numerous inhabitants and disappear. They may be called sporadic colonies. This also in part accounts for the hybridization that has produced so many forms that have been described as new species, only to vanish in a season.

Physa elliptica Lea.

Includes the sub-species *Physa elliptica troostiana* Lea, *Physa elliptica minor* n. v.

There probably is not a more distinct species in the genus than this, yet Binney and Haldeman place it in the synonymy of *P. gyrina* Say. Tryon recognized it as a species, gave it a very large

synonymy, and substituted his description of *P. oleacea* for that of Lea. The species are widely different, and were so acknowledged by him in later years. The form which I refer to this species may be described as follows:

Shell elliptical, thin, pellucid, smooth and generally shining, lines of growth scarcely perceptible, spire rather short and obtuse, sutures impressed, aperture elliptical, axis straight, with varicose bands when mature, and diameter from two-fifths to one-half the length. The outline is almost exactly that of an elliptic spring. All the varieties are small, not exceeding a half inch in length.

Physa troostiana Lea is a more robust form, more obtuse, and the diameter a little greater in proportion to the length. Its habitat is along the Ohio valley.

Physa elliptica minor n. v. was sent to me from Grand Rapids, Mich., by Mr. Streng. It is very small, being only four to five mm. in length, rather cylindrical in form, whorls three, convex, sutures impressed, spire slightly elevated, surface highly polished, color deeper than the type. At first I thought they were immature, but the lip has a well defined rib on the submargin, and I now think they are a miniature form of this species.

Physa deformis Currier probably belongs here, and may be a variety, but for the present I prefer to consider it only a form. It may be a larger form of *P. elliptica minor*; if so it will take its place.

Forms: *P. aurea* Lea, *P. febigerii* Lea, *P. nicklini* Lea.

This species is distributed sparingly over all the region east of the Mississippi and north of Tennessee.

Physa niagarensis Lea.

This species was described in 1864 from forms taken in Niagara river, N. Y., but has generally been considered a variety of *P. integer* Hald. In fact I have held the same opinion until quite recently. In the last few years I have had opportunity to examine examples of *P. integer* from over fifty localities, about one-fourth of which were properly referred to this species, and from these examinations and the places from which they were taken, I feel satisfied that this form is not a variety of *P. integer*. If it is not entitled to rank as a species, it should be referred to *P. heterostropha* as a variety.

They vary but little, but the largest part of those I have examined have the form of *P. heterostropha*, except that the spire is a little

more elevated and the acute apex is tipped with reddish-brown. Axis straight, aperture ovate, smooth and shining surface, rarely showing varicose bands. Color yellowish-white grading into a pale yellowish chestnut in some forms. It usually has four whorls. While white, it is not porcellaneous. Lea's description is correct.

P. saffordi Lea, is a form of this species.

Distribution: Along the Great Lakes.

Physa integer Haldeman.

Subspecies: *Physa integer billingsi* Heron.

This is a very distinct species, described in 1841 from shells found in Indiana. It is distinguished by its oval form, light color frequently banded with white, deeply impressed sutures, ear-shaped aperture and somewhat rough but shining surface. It is not closely allied to any other species. It requires two seasons to reach maturity. Diameter seven-tenths the length.

It is the only species that extends from the Lakes to the Gulf. It inhabits all the country bordering on the Lakes from Ontario west, and extends south and west as far as San Antonio, Texas. I have collected live forms in the latter place, and found it fossil in the post-pliocene at Belton, Texas.

Its distribution being different from that of any other species raises a doubt as to the identity of the species at the extreme ends of the territory covered. It has not been reported from south of the Ohio river, nor from eastern Arkansas, but seems to occupy a belt lying between central Arkansas and central Kansas, continuing about the same width to the Gulf.

Physa billingsi Heron. The type was taken in Rideau river, near Ottawa, Canada. The first examples sent me from that locality varied so much from any described form that I was inclined to accord it specific rank, but having received it from several localities in Michigan, I am now placing it here as a well-marked variety.

It is smaller than *P. integer*, of finer texture, and the sutures are much less impressed. None of them have the ear-shaped aperture. The lip is expanded and in many of them forms the arc of a circle. In some of them the diameter is nearly as great as the length. From this form they graduate into the usual form of *P. integer*.

Its distribution, so far as known, is confined to Canada and Michigan.

Physa anatina Lea.

This is the most striking and beautiful species of the genus. It was discovered in a northern tributary of the Arkansas river in Kansas, in 1864, and in that locality it has its greatest development. The extent of its distribution is unknown. It is plentiful around Wichita, Kansas, and has been reported from Missouri, Arkansas, Nebraska and Michigan. It probably inhabits all the intervening territory.

Distinguished by its sub-fusiform and symmetrical shape, smooth and shining surface, pale color, six oblique whorls, impressed sutures, and the malleations on the lower part of the last whorl of all adult forms. Bi-annuan.

Diameter $\frac{5}{9}$ the length.

Physa brevispira Lea.

Ottawa river, Canada West, furnished the type for this species in 1864. It is not numerous in any locality, and is seldom reported by collectors. I have examples agreeing with Lea's figure from Lake Nipissing, Ont., and shells from five other localities which I believe belong here, although they differ in color and height of spire. Specimens from Detroit river, Reed's Lake and Pent Water, Mich., are good representatives of the species in size, color and all other characters except that the spire is somewhat exerted. The Isle of Mackinac furnishes a much larger white shell which I refer to the same species.

Distinguished by its globose form, opaque whitish color and dilated aperture. It has been sent to me as *P. ancillaria* and *vinosa*. Annuan.

Diameter $\frac{3}{4}$ the length. Aperture $\frac{7}{10}$ the length of shell.

Physa walkeri n. s. Pl. 2, fig. 5.

Shell elongate-ovate, ashy horn color, texture rather coarse, whorls four, very convex, sutures much impressed, spire much elevated and tapering to an acute apex, aperture ovate, not expanded, $\frac{6}{10}$ the length of the shell, lip tortuous and evenly curved, inner margin thickened with thin white deposit. Length 10 mm, width 6 mm.

This little shell was sent to me by Bryant Walker, Esq., of Detroit, Mich., having been collected by him at Petoskey, Mich., after whom I take pleasure in naming it. It has also been sent to me from three other localities in Michigan, and Rideau river, Ont. It is allied to *P. integer* Hald, and fills the place between that species and *P. anatina* Lea.

It differs from *P. integra* Hald. in having a more elevated, slender and acute spire, less deeply impressed sutures and much finer texture. The aperture is nearly ovate, not ear-shaped, the columella gracefully curved and covered with a thin lamina. It differs from *P. anatina* Lea in being much smaller, lighter colored, the whorls less oblique, lines of growth more visible and being of lighter texture. The shell as a whole, when seen with these species, impresses itself as distinct at a glance.

***Physa cubensis* Pfeiffer.**

This is a Cuban species found in Florida. I have not seen Pfeiffer's description, but forms kindly sent to me by Prof. Pilsbry may be described as follows:

Mature shell sub-fusiform, light amber, smooth and shining surface, lines of growth scarcely perceptible, whorls five, convex, sutures impressed, spire rising like a cone to an acute apex, aperture elongate ovate, lip not expanded, columella twisted and covered with a callus. Bi-annular I think.

A peculiarity of this species, as shown by the forms sent to me, is that the immature form is ovate, the last whorl in the adult being somewhat flattened and elongated, thus making the shell sub-fusiform when mature.

A NEW CALIFORNIAN BITTIUM.

BY W. H. DALL AND PAUL BARTSCH.

***Bittium (Elachista) californicum* spec. nov.**

Shell white, broadly elongate-conic; whorls rounded, falling off more abruptly toward the suture than the summit. The earlier whorls increase less rapidly in diameter, and are more evenly rounded. Base short, well rounded; aperture suboval, effuse and subchannelled anteriorly, with the posterior angle rounded; columella somewhat twisted and slightly revolute.

The ornamentation consists of about 14-16 broad and low axial folds, which gradually become obsolete on the periphery and base,

and on the whorls three or four impressed spiral lines, which are equally apparent on the ribs and intercostal spaces.

This species occurs both recent and fossil in California. Recent shells appear more slender with fewer ribs, 12-14. The type is a fossil specimen from Dead Man's Id. off San Pedro, Cala., and has 8 whorls which measure: long 5.3 mm., diam. 2.2 mm. A recent shell of 10 whorls measured 6.0 mm., diam. 2.1 mm.

LIMNÆA AURICULARIA IN AMERICA.

BY FRANK COLLINS BAKER.

Some weeks ago Mr. Herbert E. Walter, instructor in Biology in the North Division High School, brought me several specimens of a *Limnaea* which was new to the fauna of the United States. Upon inquiry, the locality was given as the propagating green-house of Lincoln Park. A few years ago Miss Marie LaGrange, a pupil in the North Division High School, found a number of the same species in a lily pond in the park, the water of which was artificially heated to give the necessary warmth for certain tropical plants, the temperature being above 90° Fahr.

Comparison with the shells in the Academy's collection showed the species to be *Limnaea auricularia*, and an inquiry of the park gardener brought to light the fact that certain plants had been recently imported from Belgium. This information at once removed the mystery surrounding the sudden appearance of this shell in the park, and shows how easy it is at the present time to transport a species from one continent to another, especially if it be a pulmonate. The shells of *L. auricularia* are about an inch in length, of a deep corneous color, and are rather thin. When alive, the mantle of the animal is seen through the shell to be made up of dark and light spots arranged irregularly. The animal appeared rather active, moving about the aquarium with a steady, gliding motion. The heart pulsations were 54 per minute.

It may also be of interest to state that the following introduced species have been found in the greenhouse or in the lily ponds: *Testacella haliotoidea*, *Limax maximus* and *L. flavus*, *Vitrea draparnaldi* and *Limnaea auricularia*.

ORESTES A. CRANDALL.

It is with deep regret that we record the death of Colonel O. A. Crandall, of Sedalia, Missouri, which occurred at West Chester, Pennsylvania, July 6. He left home during the latter part of June on a business and pleasure trip East. After staying a few days at Bridgeport, Connecticut, he went to Philadelphia, where he was sick four days, when he went to the home of an old friend at West Chester, hoping that with complete rest he would soon recuperate; but the extreme heat combined with heart trouble caused his sudden death. Interment was at Sedalia.

“Orestes A. Crandall was born at Syracuse, N. Y., February 25, 1833. In 1835 his parents removed to McHenry county, Illinois, at that time known as the Crystal Lake country, a wilderness inhabited by Indians and wild animals. The nearest settlement was forty miles distant. Thrown upon his own resources at the age of thirteen, Mr. Crandall developed rapidly those sterling qualities which in later years made him prominent among men.

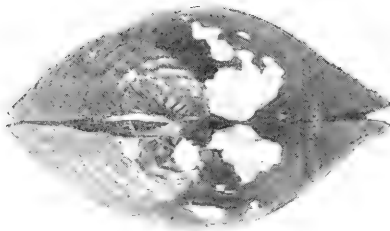
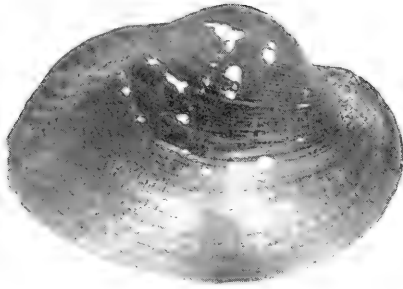
“In 1853 he went to California, walking 500 miles of the distance and carrying his bundle on his back. He worked eight years in the Golden State as miner and mineralogist, returning to “The States” in 1861 and locating in Saline county, Mo.

“At the outbreak of the war, soon after coming to Missouri, he aligned himself with the Union and went to the “wilderness” of Illinois, where he organized and put two regiments of soldiers in the field. He fought with honor during the war, his last battle being the battle of Sedalia, October 15, 1864, in which he was captured by the Confederate forces.

“He located permanently in Sedalia in 1864, and in that year was admitted to the bar and practiced his chosen profession until the beginning of the eighties. He married Miss Kate A. Kidd, of that city.

“In 1875 he organized the Pettis County Bank and was made its president. He was elected president of the Missouri Trust Company in 1880. Under his guidance the company became one of the foremost institutions of its kind in the country.”

Mr. Crandall was well known to many readers of THE NAUTILUS, especially those interested in fresh-water snails. For a number of years his spare time was spent in a study of the genus *Physa*, the results of which are still being published under the title “The American *Physa*.”



STROPHITUS WRIGHTIANUS WALKER.

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LAND MOLLUSKS OF THE NORTHEASTERN GROUP OF THE LOO CHOO ISLANDS.

BY HENRY A. PILSBRY.

The exploration of Tane-ga-shima and Yaku-no-shima (Yaku-shima), effected under the direction of Mr. Y. Hirase, gives us absolutely the first information upon the land mollusca of the "north-eastern group" of the Loo Choo Islands.

Tane-ga-shima is a well-cultivated island, about 32 miles long and 5 wide. It is comparatively low, the highest point having an elevation of about 1200 feet. It is somewhat noted as being the first Japanese soil trod by an European. In 1542, Mendez Pinto, the Portugese adventurer, landed there, astonishing the natives with his firearms. I have named a diminutive *Clausilia* in memory of this circumstance.

Yaku-shima is a wilder, forested island, nearly circular, with a diameter of about 15 miles. It towers in a splendid mountain mass 6000 feet above the sea. The snail faunas of the two islands seem to be very similar, with a number of identical species. I do not know whether Mr. Hirase's collector ascended the peak of Yaku-shima; probably not. The heights would probably have different species from the shore zone.

A Helicid species, *Eulota (Euhadra) submandarina*, described by me many years ago from two bleached specimens, one said to be from the "Loo Choo Islands," the other labeled "China," proves to be a characteristic species of these islands. It is quite unlike other known Japanese forms, both in shell and soft anatomy. *Eulota sub-*

mandarina is quite variable. The figured type measures alt. 17, diam. 21 mm. Three specimens from Tane-ga-shima (from no. 660 of Mr. Hirase's collection) measure $16 \times 21\frac{1}{2}$, $18 \times 24\frac{1}{2}$ and 20×26 mm. They are reddish-brown, with a narrow dark band at the periphery. Two others from the same island are more elevated, measuring alt. 22, diam. 21, and alt. 21, diam. 25 mm.; the latter being of a rich dark chestnut color, the band black. These are Mr. Hirase's no. 659.

From Yaku-shima the shells sent out are larger, alt. 23, diam. 30; alt. 22, diam. 28 mm. They have $6\frac{1}{2}$ whorls, like the smaller shells of Tane-ga-shima, and the color is rather light, the peripheral band reduced to an indistinct line. This form I have called var. *magna*. It is no. 672 of Mr. Hirase's collection.

Doubtless *E. submandarina* is peculiar to these and perhaps some neighboring islands.

The following species are not confined to the two islands: *Trochomorpha Gouldiana* Pils. occurs on Yaku-shima, indistinguishable from the types from Oshima. *Macrochlamys tanegashimæ* has recently been received from Kago-shima, Satsuma (Mr. Hirase's no. 701), quite like the types, but slightly larger. *Sitala circumcincta* var. *elata* (Gude) is a trifle more brown in color than the types from Hondo, the perforation is perceptibly wider, and the whorls possibly less convex; but specimens received from three localities in Kiusiu are partly similar, partly intermediate in characters, so that although it takes next to no difference to make a "species" in this group, I do not think the Kiusiu or Yaku-shima Sitalas deserve separation from the Nippon form.

Among the land operculates there is a new *Spiropoma* (*Cælopoma*) which has been called *S. Nakadai*, and a new *Pupinella*, *P. Funatoi*. These are named for Messrs. Nakada and Funato, two able and enthusiastic collectors of shells for Mr. Hirase.

The *Clausiliidæ* are represented by five species and several varieties, all peculiar to the islands, and remarkable for the excessive thickness of the shells. Their general relations are with species of Kiusiu and Nippon, not with those of the central group of the Loo Choo Is. The wonderful forms with plicate lips, found in Oshima and Great Luchu (Okinawa or Nawa Island) are apparently wanting in Tane-ga-shima and Yaku-shima, and their place is taken by species of the sections *Stereophædusa* and *Hemiphædusa*. All but *Clausilia stereoma* are rather small, and all of them are remarkably

unlike any Japanese species, though more nearly related to them than to those of the central Loo Choo Islands.

The general affinities of the faunas of the two islands are with that of southern Kiusiu, but there is remarkable specialization, vastly more than in Tsu-shima, for instance, although the latter is more distant from the west coast of Kiusiu than these islands from the south. Tsu-shima, so far as the specialization of the snail fauna is concerned, might be a part of Kiusiu. Its isolation must be of very recent date, but Tane-ga-shima and Yaku-shima are clearly much more ancient islands. The full list of species sent by Mr. Hirase is as follows :

Species from Tane-ga-shima.

Eulota submandarina (Pils.).	Clausilia Pinto Pils.
Ganesella tanegashimæ Pils.	Clausilia tanegashimæ Pils.
Macrochlamys tanegashimæ Pils.	Spiropoma Nakadai Pils.
Microcystina Hiraseana Pils.	Pupinella rufa var. tanegashimæ.
Clausilia stereoma var. cognata	Pils.
Pils.	Pupinella Funatoi Pils.
Clausilia ptychocyma Pils.	Diplommatina tanegashimæ Pils.
Clausilia entospira Pils.	

Species from Yaku-shima.

Eulota submandarina var. magna	Clausilia stereoma var. nugax Pils
Pils.	Clausilia ptychocyma var. yaku-
Trochomorpha Gouldiana Pils.	shimæ Pils.
Sitala circumcincta var. elata	Ennea Iwakawa var. yakushimæ
(Gude).	Pils.
Clausilia stereoma Pils.	Diplommatina yakushimæ Pils.

Yaku-shima is so for the northern limit for *Trochomorpha*.

There are in all 21 forms. One species is common to Yakushima and Oshima; four are varietal or subspecific modifications of, or identical with, Kiusiu and Nippon species, and twelve species with six varieties are confined, so far as we know, to the two islands.

Most of the species have been described in the Proceedings of the Academy of Natural Sciences, but the following remain to be characterized :

Ganesella tanegashimæ n. sp. Shell imperforate, depressed, with convexly-conoid spire, rather thin. Dead specimens, denuded of the cuticle are white, becoming red-brown above, the inner $3\frac{1}{2}$

whorls of that color; periphery encircled by a narrow red-brown band, the peristome pale red-brown. Whorls $5\frac{1}{2}$, very slowly increasing, moderately convex, the last rounded at the periphery, rather flattened beneath, hardly impressed around the axis, slowly descending in front. Aperture oblique, broadly lunate; peristome narrowly expanded, thickened within, reflexed and abruptly dilated over and closing the umbilicus; columella concave, bearing an inconspicuous, low, oblique, fold-like tooth. Alt. 21–22, diam. 28 mm.

Tane-ga-shima (Mr. Y. Hirase, no. 689).

Only dead and somewhat weathered specimens were found; but what remains of the cuticle on the parietal wall is a moderately bright yellow tint. The species is related to *G. myomphala*, and most resembles the variety *minor* of Gude, from which it differs in the smaller aperture, the columellar tooth, less impressed axial region and higher spire. In this connection I may mention that a species of *Ganesella*, *G. Adelinæ*, n. sp., has been sent from Oshima, Mr. Hirase's no. 352. It is the shape of *G. largillierti* or somewhat more pyramidal, but has a decidedly larger umbilicus than that species. On a pinkish or pale yellow ground there are three blackish bands, the peripheral united with that above, or with a reddish space between, basal band wide, interior of the umbilicus and the dilated columella very dark; peristome well expanded. Alt. $26\frac{1}{2}$, diam. 25, to alt. 24, diam. $22\frac{1}{2}$ mm.

Diplommatina yakushimæ n. sp. Shell similar to *D. cassa* but more acutely tapering above. Whorls $5\frac{3}{4}$, the last two of equal diameter, last half whorl reduced. Sculpture of even, fine, low, rather close, delicate striæ; no spiral striæ. Aperture subcircular, the lip expanded, duplicate; columellar tooth blunt and strong; palatal fold short, above the columella. Length 2.3, diam. 1.3 mm.

Yakushima (Mr. Y. Hirase, no. 679).

D. tanegashimæ is a large shell, conspicuously different in sculpture. *D. yakushimæ* is much smaller than any of the numerous Japanese species of the same group. It resembles *D. cassa* most. Besides its distribution in Hondo, *D. cassa* has now been sent from five localities in the provinces Bungo, Higo and Satsuma, in Kiusiu. It is evidently a species of wide distribution, though surpassed in this respect by the tiny *D. pusilla*, which has been found in Hokkaido, Hondo and Kiusiu, the latter island being represented by specimens of the variety *omiensis* in Mr. Hirase's last sending

Ennea Iwakawa var. *yakushimæ* nov. Similar to *E. Iwakawa* of Nippon and Kiusiu Islands in sculpture and aperture, but of a decidedly broader, more swollen shape. Yakushima (Mr. Y. Hirase, no. 680*b*, types; also 680*a*).

A NEW SPECIES OF STROPHITUS.

BY BRYANT WALKER.

Strophitus wrightianus, n. sp. Plate III.

Shell irregularly subrhomboidal, inflated, scarcely sub-solid, nearly equilateral; beaks very full and high, turned in over a slight lunule; their sculpture consisting of a few strong ridges that run nearly parallel with the growth lines; anterior end rounded, elevated above the line of the hinge superiorly and slightly cut away below; base line evenly curved; posterior ridge angled, ending in a blunt point below the median line of the shell; dorsal slope subtruncate, covered with strong, subconcentric, somewhat broken ridges extending from the posterior ridge to the margin; disk with light uneven growth lines; epidermis almost jet black, lighter on the beaks, shining, with occasional indications of very light transverse sculpture similar to that on the dorsal slope; left valve with an irregular tooth and a vestigial one in front of it; right valve with a roughened tooth in front of the beaks; laterals almost wanting; beak cavities deep; anterior muscle scars distinct; posterior scars faint; nacre bluish white, a little thicker in front.

Length 54 mm., height 38 mm., width 31½ mm.

A single specimen only of this fine species occurred in two barrels of *Unionidæ* received from Messrs B. F. and G. H. King, collected in the tributaries of the Flint river, Baker county, Ga. It differs from all other known species in the strong ridges which cover the dorsal slope. It seems to be most nearly related to *S. tombigbeensis* Lea, and has the "obtruded anterior margin" characteristic of that species.

Mr. C. T. Simpson, to whom the specimen was submitted for examination, and to whom I am indebted for assistance in preparing the foregoing description, writes in reference to it: "I know of nothing at all like it. In fact it is so different from anything that I have seen or read of that I am at a loss to know just where to place

it. Its general form, texture and color of epidermis inclines me to believe that it is a *Strophitus*, related to *S. tombigbeensis*. I find some vestiges of plication on one or two specimens of *Strophitus* in our collection. The teeth of this are stronger than in any specimen of that genus I have seen, but there is much variation in this matter."

I take great pleasure in naming this species after Mr. B. H. Wright, who has done so much in recent years in developing our knowledge of the *Unionidæ* of the southern states.

NEW PISIDIA.

BY DR. V. STERKI.

The following *Pisidia* have been known as distinct species for several years, and the names have been used in my own collection as well as in identifying specimens sent for examination by many conchologists. So they should have been published long ago.

Pisidium affine n. sp. Rather large, well-inflated, slightly oblique, beaks somewhat posterior, large and prominent in full-grown, broad and quite low in young specimens, rounded or slightly flattened on top; superior and inferior margins moderately curved, posterior subtruncate, with slightly marked angles above and below, supero-anterior forming one regular curve from the beaks to the anterior end, which is low-situated and well-rounded; surface distinctly and somewhat irregularly striated, with some coarser lines of growth, dull or somewhat shining; color lighter or darker grayish horn to plumbeous or brownish with a few irregular darker zones corresponding with the lines of growth, and often with fine darker mottlings, usually with a broad lighter zone along the margins; the young are pale horn or straw-colored; shell moderately thick, nacre whitish, muscle insertions little; hinge rather stout, plate rather broad; cardinal teeth long, not very strong, the right one curved, its free edge often indented in the middle, its posterior end somewhat thicker, with a fine groove, the left anterior tooth curved, the posterior slightly so, oblique, rather behind the anterior, each covering the other for half their lengths; lateral teeth stout, rather long, their cusps short and somewhat pointed, the outer ones in the right valve of good size; ligament rather long and stout.

Size: Long. 6, alt. 5, diam. 4 mill. (average).

Long. 7, alt. 6, diam. 4.7 mill.

Long. 4.6, alt. 3.8, diam. 2.8 mill. (small, northern form).

Habitat: Great Lake Region, Michigan to New York: also Minnesota, Illinois and Ohio (Ohio river drainage). It seems to prefer quiet water, small lakes and slow-running rivers.

Pisidium affine is related with *nov-eboracense* Pr. and with *sargenti* St. (See the following sp.) From the former, it differs by the following characters: it averages larger, its beaks are larger, broader, as especially noticeable in the young, the whole muscle is more full, the hinge margin is less curved, the supero-anterior, as mentioned, forms one long, unbroken curve, the anterior part is larger, the end situated nearer the "base" and more rounded. *P. nov-eboracense* retains its light, yellowish horn color, and the surface is rather shining, while older specimens of *affine* usually are light to dark grayish, and the surface is more dull.

Our species is somewhat variable. Specimens from Michigan, especially Perch Lake,¹ Reed Lake, some other small lakes, and from the Grand River at Grand Rapids are regarded as typical, and examples from the Little Lakes near Mohawk, N. Y., are rather the same. In northern Michigan, *e. g.*, in Mountain Lake, River Rouge, Carp Lake, there is a smaller form, of darker color but typical shape, collected by Mr. Bryant Walker, and the same was found in Clearwater Lake, Minnesota, by Mr. H. E. Sargent. A somewhat higher form, with a slightly marked angle at the scutellum, is known from Minnesota, Michigan, Buffalo, N. Y. (Miss E. J. Letson), and Meyer's Lake, near Canton, Ohio (the writer). The latter has a straighter striation and a somewhat waxy appearance of the surface.

Whoever has carefully studied and compared a few suites of specimens at all stages of growth, will always recognize the present species, as the young and half-grown are quite characteristic, while some full-grown examples may present similarities with *P. nov-eboracense* and *sargenti*. All these species are decidedly variable, in several directions, and so it takes a good deal of material and some experience in order to ascertain their claims for specific distinction, and to recognize aberrant and poorly developed forms. The present one being a "critical" species, I trust the somewhat lengthy expose on it will be excused.

Pisidium sargenti n. sp. Mussel of medium size, somewhat oblique,

¹ Collected in large numbers by Dr. Kirkland.

well inflated; beaks not much posterior, rounded or slightly flattened on top, well prominent over the hinge margin; the latter slightly curved in the adult, almost straight in the young and half-grown, with projecting, not or hardly rounded angles at the scutum and scutellum, which are slightly to well marked, narrow; posterior margin subtruncate above, passing into the well rounded inferior with an uninterrupted curve, or with a slightly marked, rounded angle, more so in the young; supero-anterior margin little to moderately curved, sloping from the projecting angle at the scutellum to the rounded anterior end; surface regularly and rather coarsely striated, dull, rarely somewhat shining in older specimens; epiconch thin and often worn off, pale horn-colored in the young, lighter to darker grayish to brownish in older specimens, usually with a lighter zone along the margins; shell moderately thick, nacre glassy, colorless to white or bluish, muscle insertions distinct; hinge stout, plate rather broad, cardinal teeth well formed, short, the right one rather strongly curved, its posterior end thickened and grooved, the left anterior angular, stout, the posterior small, oblique; lateral teeth rather short, stout, their cusps short, pointed, the outer ones in the right valve well formed; ligament short, strong.

Size: long. 5, alt. 4.4, diam. 3.4 mill.

Habitat: New York to Ohio, Michigan, Illinois and Minnesota, rather common in creeks, rivers and small lakes.

Well formed specimens are easily recognized by the oblique shape, the rather short, slightly curved hinge margin with the projecting angles at both ends, the regular striation and the dull, often roughish appearance of the surface; by the latter features it may be discerned from some forms of *P. scutellatum* which are of similar shape; but it is more nearly related to *P. nov-eboracense* and *affine*; and some full-grown, well-inflated specimens, in which the scutar and scutellar angles are sometimes less marked, might be mistaken for one or the other. But a lot of mussels at different stages of growth are always recognizable at once; the projecting angles, especially marked in half-grown specimens, in connection with the peculiarly dull surface (like in "typical" *P. compressum* and in *P. kirklandi*) are well marked characters, and so is the color, which turns to grayish while the mussels are much younger and smaller than in *P. affine*. In the latter species, the hinge-teeth, especially the cardinals, are longer and finer.

The present species is named after Mr. H. E. Sargent, who has assiduously collected small mollusca, and has secured some good lots of this *Pisidium*.

THE AMERICAN PHYSÆ.

BY O. A. CRANDALL, SEDALIA, MO.

Physa forsheyii Lea.

Sub-species *Physa forsheyii grosvenorii* Lea.

This species was discovered near Ruterville, Texas, in 1864. The description calls for six whorls, but I have examined cotypes in the Academy of Sciences in Philadelphia, and nearly a hundred examples from eight different localities, and have been unable to find a single one having more than five, so I concluded that five is the proper number.

This is a small shell, not exceeding $\frac{5}{8}$ inch in length, and distinguished by its sub-fusiform shape, exerted spire, deeply impressed sutures, smooth but not shining surface. Nearly all the adults are covered with microscopic transverse striæ, which give the surface a dull appearance. Bi-annuan.

Physa grosvenorii Lea, also described in 1864, belongs here as a variety. I have collected it in many different places, and have no hesitancy in referring it to this species. The only difference I can discover between this and *P. forsheyii* is that it is smaller, shorter, a little more inflated, more robust, and of a darker color. Some of the young shells are highly polished, but the adults have the same dull appearance as the species form, and are dark yellowish horn-color. It is a very pretty shell, uniform in size, color and general outline.

In the middle of January I found some of these little shells under some leaves in a spring brook near Sedalia, Mo., where they hibernated for the winter. The aperture, instead of being closed by a film as in land shells, was filled with dirt and sand, mixed with the viscid exudations from the body, forming a cement one-eighth inch thick, which I found quite difficult to remove without injury to the shell.

The species form is distributed over Texas and Louisiana, but farther north, through Arkansas, Indian Territory, Southern Kansas and Missouri, as far north as the central part of the state, it takes the form of *P. grosvenorii*.

Forms: *Physa whitei*, Lea.

Physa pomilia Conrad.

This species was first described by Conrad in 1834 from forms taken from Random's Creek, Claiborne Co., Ala., and was again described in 1864 by Lea under the name of *P. showalteri*. They are both the same species, but Lea's description is the most correct, and was substituted by Tryon for that of Conrad. It is exclusively a southern species, its habitat being the country lying south of Kentucky and east of the Mississippi River. An annual. Very similar forms have been sent to me from Grand Rapids, Mich., as *P. showalteri*, but I feel confident that they are a modified form of *P. anatina* Lea.

Physa microstoma Haldeman.

This species was described from a single specimen found in Kentucky in 1840, and has been reported by Rhodes from several places in that state. Its principal character is the two obtuse teeth on the columella, but the other characters are sufficient to found a species upon. Some time ago I received from Mrs. Geo. Andrews, of Knoxville, Tenn., several lots of shells collected in East Tennessee, a large part of which bear the description of this species except the teeth. It is a thick heavy elliptical shell with four to five whorls not convex, with a continuous peristome, and the labium much thickened anteriorly. The columella is thick and twisted so that it forms a single protuberance somewhat like the tooth-like callus on the columella of *Bulimulus alternatus* Say. The varicose bands are white on the outside and reddish-chestnut on the inside.

I do not hesitate to refer the shells sent to me from Tennessee to this species.

Physa crocata Lea. This is a closely allied form, described in 1864 from specimens taken in Walker Co., Georgia. It is a smaller and much lighter shell. In some specimens the spire is a little more exerted, and the twist in the columella not so marked. In form and color, which is light brownish-ochraceous, they are the same. Both are bi-annuals. Length not exceeding $\frac{1}{2}$ inch.

Habitat: Kentucky, Tennessee, northern Georgia and Alabama.

Physa distorta Haldeman.

Some time ago I received from Mr. H. E. Sargent twenty little shells collected near Woodville, Ala., which I refer to this species. The largest is ten mm. in length and six in diameter; the greatest diameter being near the shoulder. Its color is very light yellowish-gray, whorls three, very convex, sutures very deep. Spire elevated,

first and second whorls small and the last one very large, forming a rounded shoulder; so much larger, that in some of them the spire appears to rise like a cone from an expanded surface. Not umbilicated. Aperture oval, columella scarcely folded, outer lip thickened on sub-margin with a very pale yellowish-red callus. It corresponds with Haldeman's description except the umbilicus.

This species was described in 1842, and so far as I can learn, has not been reported since.

DOUBTFUL SPECIES.

Physa fontana Haldeman, 1841, = young *P. heterostropha* Say.

P. subarata Menke, not sufficiently described for recognition.

P. parva Lea, 1864, probably young *P. anatina* Lea.

P. altonensis Lea, 1864, an abnormal form of *P. gyrina* Say described from a single shell, and not heard of since.

P. inflata Lea described many years ago, and not reported since.

P. solida Philippi. This species was described many years ago from forms found at New Orleans, but I have been unable to procure any information regarding it. It is a very marked species, and it seems that it should have been reported many times. The name is pre-occupied, and should it ever be re-discovered, it will have to be given a new name.

P. tenuissima Lea, 1864. This is a very distinct species if it exists. It was described from a single dead shell found at Alexandria, La. I have been unable to get any information regarding it. I have in my collection a single shell sent to me from Hudson, Ohio, that bears this description, but until others are reported, it had better stand in the doubtful list.

P. globosa Haldeman, 1843. Like the two last, I have been unable to learn anything about this species, except the description given by Binney. It has been suggested that it is the same as *P. brevispira* Lea. I do not concur in this opinion. The form is very much the same, but this is a southern species, and these seldom get as far north as the Great Lakes without materially modifying the form. Besides if it was, it would be found in intervening territory, which does not seem to be the case.

GENERAL NOTES.

LUCAPINA CRENULATA (SOWERBY).—On Aug. 3, at La Jolla, Cal., Miss Vashti Thomas was so fortunate as to find a living specimen of this gigantic keyhole limpet, which she brought to me for examination. As the published descriptions of the animal state it to

be "black," and lack detail, the following notes from life may be useful:

Mantle about 20 cm. long, rather light olive brown, minutely reticulated with black, and blotched in an irregular but radiate manner with dark brown, the blotches mostly around the shell aperture. Edge of mantle black. Shell aperture 43 mm. long, 26 broad. Under side of mantle yellowish-white; tentacles and adjacent parts black; mouth light orange. Foot 65 mm. broad, sole deep orange; sides of foot dark olive brown, edge black, the black grading into the brown. Epipodial ridge darkened, with round white spots, the lower edge crenulated. Upper surface of shell exposed by mantle aperture, flesh colored, with radiating riblets, 13 in 10 mm. measured transversely. Aperture in shell oval, 18 mm. long, 13 broad; portion of animal filling shell-aperture pitch-black.—T. D. A. COCKERELL.

NAVANAX INERMIS (COOPER).—During July this interesting animal was not uncommon on mud flats in San Pedro harbor, California. As the published descriptions are somewhat inadequate, the following notes from life are offered:

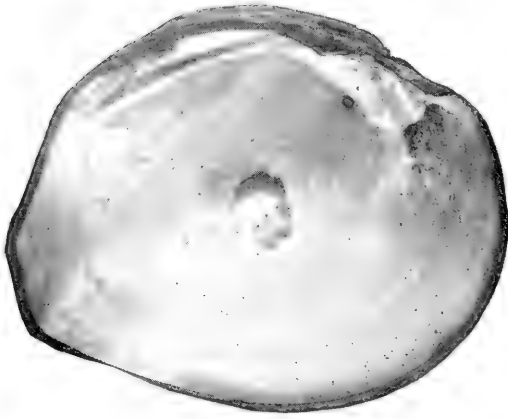
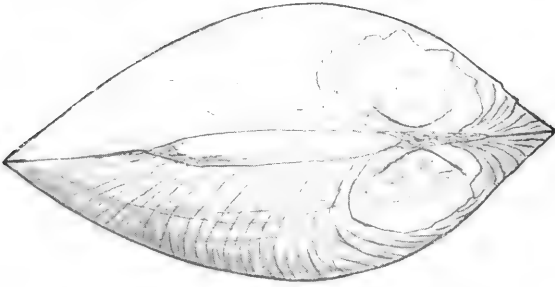
Dark brown to black, minutely lineolate above with pale yellow lines; anterior margin of head-shield narrowly yellow or orange; in a young example a yellow line, on which are three blue spots, runs back from each lateral angle. Epipodial flaps narrowly margined with orange, next to which is a row of bright blue spots. Beneath the animal is marked with a number of orange streaks or elongated spots, giving way to light yellow lines on the sides. A pink copepod lives in numbers under the epipodial flaps.

The creature is quite variable, and at first I thought there were two species, but with sufficient material all are seen to be specifically identical.

I may as well record *Aglaja purpurea* (Bergh) from San Pedro. Dr. W. R. Coe gave me one which he found on July 20.—T. D. A. COCKERELL.

EPIPHRAGMOPHORA KELLETII, ON SANTA CATALINA ISLAND.—“We found the first ones at the Canyon back of Avelon, where we found the *E. gabbi*. In this locality there are only scattering shells and we were greatly disappointed. But we made a trip to the Isthmus and there we found them in quantities. They live on and under the cactus, and I have found them nowhere else. This is their hibernating season of course, and they are all asleep. Sometimes a dozen on one leaf, old and young. I expected to find them on the fresh growing cactus leaves, but instead of that they are on the old dead leaves, and under piles of dead leaves. They do not seem to require moisture. I think we have found as fine specimens as are to be found anywhere.—MRS. E. M. GAYLORD, July 19, 1901.

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QUADRULA LANANENSIS FRIERSON.

THE NAUTILUS.

VOL. XV.

NOVEMBER, 1901.

No. 7.

A NEW LAND OPERCULATE FROM HAITI.

C. T. SIMPSON AND J. B. HENDERSON, JR.

CERATODISCUS, nov. gen.

Shell almost strictly discoidal; spire very slightly raised; whorls few, nearly round, closely coiled except the last third of the outer one, which leaves the penultimate whorl at a tangent and has a groove on its inner side; aperture nearly circular, scarcely thickened or reflexed; surface with finely reticulated sculpture; epidermis corneous. Operculum unknown. Probably one of the Cyclotidæ.

CERATODISCUS SOLUTUS, n. sp. Pl. V, figs. 1, 2.

Shell small, planorboid, the large nucleus slightly raised, but not elevated to the level of the last whorl; whorls three, nearly round, being a little wider and flatter above than below, the first two and two-thirds in contact and having a deep suture above and below, the last third of the outer whorl solute, leaving the penultimate whorl at a tangent, the free part very slightly deflexed; on the inner side of the uncoiled part of the shell, close to the penultimate whorl, there is generally a well-marked groove; surface with close, delicate incremental striæ which are crossed by microscopic threads that run parallel with the direction of the whorls; aperture nearly circular, compressed a little on the inner side; peristome scarcely thickened or reflexed; epidermis greenish-yellow. Height 1.5, greatest diameter 5, diameter at the point where the last whorl becomes free 4 mm.

Seven dead specimens were found on the mountain of La Ferriere, in northern Haiti, at an elevation of perhaps two thousand feet, in a

talus of red clay by the road side. These were the result of an hour's search, and it is greatly to be regretted that no specimens were found with the operculum. When taken they were considerably incrustated with earthy matter.

A TEXAS OIL WELL FOSSIL.

BY T. H. ALDRICH.

Some months since, Dr. Wm. B. Phillips, Director of the Texas Mineral Survey, sent me a few fossils from Beaumont, Texas, obtained at a depth of 390 feet in an oil well on Spindle Top Hill. Among them was a new species of *Nassa*, which has been described in Bulletin No. 1 of the University of Texas, Mineral Survey, July, 1901. Description is herewith repeated, and a figure added.



NASSA BEAUMONTENSIS Aldr.

“Shell cancellated, whorls seven, the first two smooth, the others with two strongly nodular transverse lines, except the body whorl, which has six or seven. Aperture with both outer and inner lip dentate, canal short. Length 8 mm., breadth 4 mm. This species resembles *Nassa bidentata* Emmons, but is much more strongly nodular and has but two transverse or spiral ribs, and also possesses one more whorl. The shell resembles a species of *Phos*, externally.”

DESCRIPTION OF A NEW UNIO FROM MISSOURI.

BY WM. A. MARSH, ALEDO, MERCER CO., ILLINOIS.

Pleurobema missouriensis, new species.

Shell smooth, obliquely triangular, rounded before, subbiangular behind, moderately thick, very much thicker anteriorly, sides somewhat flattened, beaks wide, solid, incurved, ligament long, light brown, epidermis light brown, without rays, growth lines numerous, not raised, umbonal slope wide and rather flat, posterior slope wide,

flattened, with two dark inconspicuous lines running from beaks to posterior margin, beak sculpture unknown; cardinal teeth rather long and solid, depressed, disposed to be double in both valves, corrugate. Lateral teeth straight, oblique, corrugate. Anterior cicatrices distinct, deep. Posterior cicatrices distinct and well impressed, shell cavity wide and deep, nacre white.

Habitat, near Poplar Bluff, Black River, Butler Co., Missouri.

I know of no described species which this closely resembles; in outline it is perhaps nearest to *U. Bigbyensis*, Lea, but differs in every other respect. Specimens of *Bigbyensis* from Flint River, Ala., attain twice the size of this shell. *Bigbyensis* is nearly always covered with green rays. This shell is rayless. It also has higher and more massive beaks, is more equilateral and differs entirely in the color of epidermis, teeth, etc. The color of the epidermis and character of the beaks is more like *U. Hartmanianus*, Lea, but that shell has very much higher beaks, more swollen and pointed, and is in every respect a more solid shell.

Four specimens of this shell from quite young to adult have been in my collection for a number of years, having been collected by the late Ellwood Pleas, of Ind. I never could place them with any known species, but have kept them separate, hoping that sooner or later I might obtain others like them, but having failed to obtain others, I now describe them.

A NEW UNIO FROM TEXAS.

BY L. S. FRIERSON.

Quadrula lananensis, n. sp. Plate IV.

Shell quadrate to triangular, nearly equilateral, anterior margin rounded. Base round in front, nearly straight behind. Posterior oblique, biangular, slightly emarginate. Dorsum curved, smooth, nearly polished above, striate below and upon posterior slope. Lines of growth distinct and ill-defined. Dark reddish-brown, sometimes a little olive, obscurely radiate. Beaks eroded, umbos low, somewhat inflated. Anterior umbonal slope rounded. Lateral slope flattened. Posterior ridge angular near the beaks, becoming obsolete near the base. Ligament brown, smooth, medium-sized.

Length 3.2, height 2.3, diameter 1.5 inches.

Shell of medium thickness, thinner behind. Teeth double in left valve, single in right. Laterals rather thin, nearly straight. Cardinals stumpy. Muscle scars well marked; generally separate, sometimes confluent. Pallial line distinct in front, less so behind. Cavity of shell dish-like; of the beaks deep and full.

Sometimes the dorsal muscle scars are situated in the extreme end of the beak cavity, but generally upon the base of cardinal and dorsal plate. Nacre rose-color, with blotches of yellow surrounded by brown. Cavity nearly always studded with numerous pearly excrescences.

Flesh of animal whitish or salmon-colored exteriorly, but shows scarlet when cut. Eggs carried in all four gills, very red, and the gravid animal thus presents a striking appearance.

Habitat: Lanana and Banita Creeks, near Nacogdoches, Texas. About 200 specimens were taken on July 10, 1901, by Messrs. Askew, Strode and Frierson.

Examples may be seen in their cabinets, and in the U. S. National Museum and Academy of Natural Sciences, where the types are deposited.

Q. lananensis is closely allied to *Q. askewii* Marsh, both by its conchological and anatomical characteristics. It may be differentiated from that shell by being longer, more compressed, more oblique, and its shell is never so *inflated and thickened in front as Askewii*, and not so acutely angled on the posterior ridge.

Internally, *lananensis* is rose-colored nearly invariably, and the color is *uniformly spread over its surface*. *Askewii* is mostly white, and when colored (pink), the color is almost always confined *exterior to the pallial line*.

Finally, *Q. Askewii* never possesses those peculiar pearly excrescences which seem to belong to *lananensis*. This species was collected many years ago at the type locality by Mr. H. G. Askew. But that gentlemen's innate modesty forbade his describing the shell, and he generously gave to me this honor.

Lananensis is the shell quoted as having been found by Mr. Askew in the Lanana Creek, in the "Contributions to the Natural History of Texas" (page 321), by Mr. J. A. Singley, and called by him *U. cerinus* Conrad. Its relationship to this abundant Louisiana shell is so remote, however, that it is not worth while to point out their differences.

ON THE CLASSIFICATION OF THE UNIONIDÆ.

BY CHAS. T. SIMPSON.

In the August and September numbers of the *Nautilus*, Dr. von Ihering takes exception to the classification of the Unionidæ proposed by me in the Synopsis, claiming that it is based essentially on the marsupia.

He has apparently overlooked the fact that it is founded not merely on the characters of the marsupia, but on the more obvious anatomical characters, as well as those of the shell and the beaks. It agrees with what I believe to be the development of the family from the earliest and simplest forms to the latest and most highly organized.

So far as the classification of the Diplodontinæ is concerned we essentially agree. This I divided into two supergeneric groups founded on characters of the beak sculpture and shell, and *not* on those of the marsupia. Von Ihering agrees with me that the earliest uniones probably had radial beak sculpture. I have examined the animals of a large number of the South American and Australasian uniones and in all cases where they were gravid the embryos filled the inner gills alone, forming a smooth pad, the ovisacs not being separated by sulci. I have examined a few specimens of the forms with zigzag radial beak sculpture (*Rosanoramphus*), and found in the gravid ones that the marsupia filled the inner gills only. It may be, and probably is the case, that in rare instances among the Hyrianae there are a few embryos in the outer gills. I know of no special characters employed in the classification of large groups which do not vary somewhat, but I believe it still to be a fact that in the Hyrianae the embryos are almost invariably contained in the inner gills only, that in the Unioninae they are found in the outer, or (in the Tetragenæ) all four of the gills.

In the South American and Australasian Uniones we have the radial beak sculpture with simple shells and the embryos contained within the inner gills, the ovisacs not being separated by any external markings. I believe that these are the simplest and lowest forms of Unione life, that they have descended almost unchanged from the earliest forms of the family. The fact that they occupy the Southern Hemisphere exclusively while the Unioninae, containing

the more highly developed forms, belong entirely in the Northern Hemisphere, would indicate this. I consider the radial beak sculpture a character belonging to the older and simpler forms; the concentric beak sculpture belongs to the more recent and higher forms. The zigzag radial sculpture of the group *Rosanoramphus* is a move in the direction of concentric sculpture, hence of a higher order than that which is strictly radial.

The *Tetragenæ* is a transition group. *Its young are contained in all four of its gills, filling them throughout*, though they are more numerous as a rule in the outer than in the inner, and this fact together with the general character of the shells and the beak sculpture, which is generally more nearly concentric than radial, led me to place these forms in the *Unioninæ* rather than to make a separate sub-family for them. *In every case where I have placed a form in this group the shell has deep beak cavities.* In the genus *Pleurobema*, which seems to be the next step in the way of development, while the shells are generally rather short, solid and inflated as in *Quadrula*, *the beak cavities are invariably shallow*, and in all cases that I have examined *the outer gills only contain embryos.* Here we have characters of the marsupia agreeing with those of the shells. Care must be taken in the examination of the marsupia or appearances may lead to wrong conclusions. According to von Ihering, Sterki has found *Quadrula heros* with only the hinder part of the outer gills filled with embryos. I have seen the same thing in other *Quadrulas*. I have seen in some of the *Unionidæ* the front part of the gills filled with embryos while all the rest was empty, and in a number of cases a few ovisacs in the middle or in various parts of the gills entirely empty, while the rest were full, or a few filled while all the rest were empty. In such cases the empty ones had simply been discharged, the full ones had not. In all the forms which I have mentioned so far the marsupia fill the entire gills and are pad-like, that is, the ovisacs are not marked out separately by sulci.

Advancing a little in the development of the family we find a number of aberrant forms confined to the Mississippi and Gulf drainages of the United States. Each group has certain characters of the shells which we may call generic, though they are not striking. But they are all very wonderful in the character of their marsupia. In such groups as *Ptychobranthus*, *Cyprogenia* and *Strophitus*, the marsupia are astonishing, and in all of them the ovasacs are distinctly marked.

To this point, proceeding upward in the scale of development, the shells of males and females are essentially alike. It is true that there is some variation in their forms, but it is equally true that somewhat elongated specimens with no inflation at the post-basal part of the shell may be females, while shorter specimens that are full post-basally may be males. I do not think there is any strict dimorphism up to this point. In many cases among these lower forms I have assorted my material before opening it, placing in one lot those I would naturally suppose were males, and in another the presumed females, and on opening the shells and examining the animals I always found I was as likely to be wrong as right. In some groups, notably *Nodularia* and *Lamellidens*, all the shells of certain species are inflated at the post-basal region.

Above this point the shells begin to be regularly dimorphic. They are less regularly so in *Obovaria*, *Medionidus*, some forms of *Nephronaias* and *Plagiola*; they are nearly always dimorphic in *Lampsilis* and *Truncilla*. The shells of male and female are always so different that the merest tyro could without difficulty separate them.

Von Ihering believes that the *Unio tuberculatus* of Barnes is nearly related to the *U. forsheyi* and *U. speciosus* of Lea. I am surprised at such an opinion, because, while the shells of the two last-mentioned forms are alike in male and female, those of the former are strictly and remarkably dimorphic, that of the female being more compressed and ending posteriorly in a wide, rounded wing. That of the male is more inflated, is truncate behind, and has no wing at all. In the animal of the female there is a wide, rounded flap of the mantle which fills this peculiar extension of the shell, differing somewhat from that of any other that I know of.

Now among all these higher forms comprised in the group *Heterogena* there is a radical difference in the marsupia. Wherever I have been able to examine them, they occupy only the posterior portion of the outer gills in the form of distinctly-marked ovisacs. Each ovisac when filled is rounded below. The higher the form ranks, the more markedly is the marsupium swollen and separated from the rest of the gill, and the more distinctly is the female shell swollen in the post basal region to correspond with it. In some forms of *Plagiola* and *Medionidus* there is little difference between male and female shells. In such cases the marsupium, though having the characteristic ovisacs, is but

slightly fuller than the rest of the gill. In the more highly organized species of *Lampsilis*, both the shell of the female and the marsupia are decidedly produced behind. In *Truncilla*, which I regard as the highest manifestation of Unione life, the marsupium is almost absolutely separated from the rest of the gill, and when full, assumes the shape of a great kidney, projecting below the rest of the branchiæ. The great flap of the mantle of the female is very peculiar, being double or having a strong over-hanging ridge inside. In many of the shells of this genus the area corresponding with and covering the marsupium is greatly swollen, is thin, has a different texture from the remainder, is gaping and distinctly toothed.

I have never been able to examine a gravid female of the *Unio tuberculatus* of Barnes, hence I cannot give anything more than a guess as to the character of its marsupium, though from some material lately seen, in which the ovisacs appeared to have just been emptied, I am inclined to believe that the outer gills are filled throughout with embryos, forming well-marked ovisacs.

Now these remarkable characters of a distinctly separated marsupium occupying only the hinder part of the outer gills, and a corresponding swelling of the female shell to receive it, the fact that the more distinct and swollen the marsupium is the more pronounced is the swelling of the shell, may be merely the work of chance; they may stand for nothing whatever in the way of rank or development among our Uniones, but it does not seem so to me. All the changes of shell and marsupium which I have indicated seem to me to be steps in the development of the family from the lowest, simplest and oldest forms to the highest, most complex and most recent.

I need not occupy space with a discussion on the validity or proper determination of species. Such questions are after all largely matters of personal judgment, and in this branch of the work I have endeavored to do the best I possibly could with the material I have been permitted to examine.

Dr. von Ihering changes the subfamilies Unioninæ and Diplodoninæ into families, and divides the former into three sub-families, Unionidæ, Quadrulinæ and Lampsilinæ. He gives no characters for these sub-families, and I am totally at a loss to know on what he would found them. Certainly he cannot establish them on beak sculpture, for in nearly all the species this is more or less concentric, and it seems to me does not offer distinctions sufficiently important to be used as a basis for founding sub-families.

This classification is not founded on characters of the marsupia, for he has placed in *Quadrulinæ* groups in which the embryos occupy all four of the gills, others in which they fill only the outer gills, and still others where they are confined to the hinder or the median part of the outer gills. Besides, he distinctly states on page 39 that a systematic arrangement of the marsupia does not coincide with a natural arrangement of the family.

Nor do I see how such an arrangement can be based on shell characters. *Obovaria*, which is placed with *Quadrula*, has more or less perfectly developed dimorphism in the shells. In *O. ellipsis* the female shells are almost always swollen at the posterior base, and the same is the case with *O. lens* and *O. circulus*, while in *O. castaneus* the male and female shells are as distinct as in any species of *Lampsilis*. *Ptychobranchus*, with its wonderfully folded marsupium occupying the entire outer gills, with the shells of male and female alike, he places in the genus *Lampsilis*. Why he does so I do not know, as the group differs most decidedly from *Lampsilis* in the characters of shell, marsupium and animal.

On the other hand, he places *Truncilla personata* Say, *T. perplexa* Lea, and *T. foliata* Hild., in the genus *Quadrula*! To me such an arrangement is absolutely astonishing! The male shell of the first-named species is somewhat triangular, and does resemble a *Quadrula* somewhat. The female shell is very different, being quadrate and having a decided, gaping, toothed post-basal swelling. In *T. perplexa* the female shell has a great rounded post-basal swelling, which differs in thickness, texture and color from the rest of the shell. I do not think there is a species known in which the differences between the male and female shells are so great as they are in *T. foliata*. In the male shell at the place where there is a compressed, radial, central area the outline of the female is carried down into an enormous and elongated, rounded wing. That these should belong in a genus in which the shells of male and female are alike and from which the animal and marsupium so widely differ, is beyond my comprehension! If such an arrangement is a natural one then I am sure that all the years I have spent in patiently and lovingly studying the Naiades have been absolutely wasted. It seems to me that we might just as well go back to the arrangement temporarily adopted by Dr. Lea, of grouping together in one lot those forms which have a wing, and in another those which have none, and subdividing these groups into small ones founded on form and sculpture of the shell.

I have no doubt that a careful histological study of the branchiæ and perhaps other parts of the animals of the Unionidæ will furnish additional characters for classification. But it will be many years before this can be done, and when it is, I feel sure that the results of such study will fully agree with the characters of the shells and marsupia.

HOW POTAMIDES (CERETHIDEA) CALIFORNICA HALD. TRAVELS.

BY MRS. M. BURTON WILLIAMSON.

In traveling over the mud-flats, *Cerethidea californica* Hald. leaves zigzag marks upon the sandy mud. These lines are made by the apical whorls of the shell as it is dragged forward, or sideways. How does the animal crawl? It *appears* to move forward by the contraction of the foot only, but my observations have led me to the conclusion that the foot movement is somewhat secondary. The movement of this tapering shell is one requiring considerable muscular strength. This is very apparent. In order to study the mode of travel of this species, a specimen was studied as it traveled up the sides of a glass jar of sea-water, and this and other specimens were studied for several hours. The conclusion reached was, that first there was a strong muscular movement forward, then the foot advanced. The Cerethidea pushes its head forward while the tentacles are expanded to their full extent, the body whorl is raised with an effort, then the shell is propelled *forward before the foot advances*. Immediately, no time is lost, the foot is spread out its full capacity and drawn forward. This is immediately followed by a contraction of the foot in the posterior part, then the head is again advanced. The strength of the animal seems to be concentrated in the movement of the body-whorl as it is raised up and forward. Of course all these movements are rapid, so that it requires close observation to see that all movements are not simultaneous, or at least which is secondary. A homely illustration may be used to make this movement plainer. When a man attempts to step upon a ladder with a hod full of bricks, or plaster, his first movement is apt to be a hunching of the shoulders—the weight being

here—then the step forward, or upward, follows. The movement of the body-whorl reminded me of this hunching of the shoulders of workmen when extra weight was to be borne by them.

GENERAL NOTES.

GONIOBASIS IN MASSACHUSETTS.—A few years ago the Rev. Geo. D. Reid found *Goniobasis virginica* at Deep River, Connecticut. That was, I think, the first instance of that species being found in New England. On October 1st, while riding the wheel from Springfield to Hartford, I examined the Connecticut River for a few minutes and found the same species in the town of Agawam, Mass., at a spot some three miles from Springfield. This establishes the species in Massachusetts, and no doubt it will be found farther north in the same river.—HENRY W. WINKLEY, Branford, Conn.

TRUNCATELLA ON GUADALUPE ISLAND.—Specimens of this genus were collected by Mr. R. E. Snodgrass, in November, 1899, for the first time on any of the islands off Lower California. They resemble *T. stimpsoni* Stearns, but differ in being stouter with less convex whorls, and of a pale red color. Length 6, diam. $2\frac{1}{2}$ mm. This form may be called *T. stimpsoni guadalupensis*.—H. A. PILSBRY.

CYPRÆA CITRINA Gray.—Any one interested in the geographical distribution of Cypræidæ will be pleased to learn that the true *Cypræa citrina* Gray, has been rediscovered on the beach at Fort Dauphin, S. Madagascar. The old authors have recorded the species from Madagascar, but some more recent ones gave Australian localities as the habitat of this scarce cowry, and supposed there was some error about the existence of the species on the shores of Madagascar. As there may be no doubt whatever about this and about the identification of the specimens, *Cypræa citrina* must really belong to the fauna of Australia as well as to the fauna of Madagascar. It somewhat recalls the far more common *C. helvola*, but the teeth are totally different. The color itself, although similar, is not quite the same.—C. F. ANCEY.

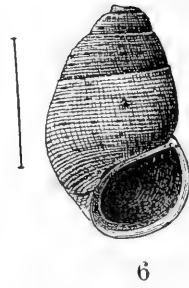
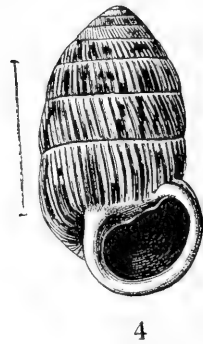
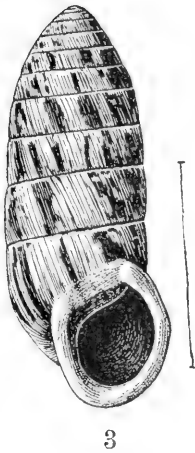
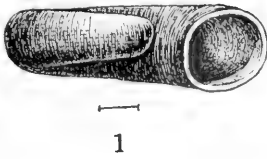
PUBLICATIONS RECEIVED.

CATALOGUE OF THE MARINE INVERTEBRATES OF EASTERN CANADA. By J. F. WHITEAVES, Geol. Survey of Canada, 1901.— This is a very useful catalogue, and gives for the first time a concise record of our present knowledge of the Marine Invertebrates of Eastern Canada. The work contains 271 pages, of which 98 are devoted to the mollusca, 100 species of *Pelecypoda*, 5 *Scaphopoda*, 166 *Gastropoda* (including 8 *Polyplacophora*), and 13 *Cephalopoda* are listed, with ample notes on their geographical and geological distribution and bathymetrical range.

GUIDE TO THE GEOLOGY AND PALEONTOLOGY OF NIAGARA FALLS AND VICINITY. By A. W. GRABAU (Bull. Buffalo Soc. Nat. Sci., VII., No. 1, 1901). The Buffalo Society of Natural Science has appropriately signalized the Exposition year by issuing a volume bearing the above title, containing a full and readable account of the local geology and paleontology. On account of its situation, the geology of Niagara is of course of far greater than local interest, since the intensely interesting and complex history of the Great Lakes is involved, so that the mass of data presented deals with subjects of wide interest. It is suitably illustrated with excellent maps and views. The paleontological part consists of an untechnical account of the fossils of the region, properly illustrated by good figures.

Chapter V., by Miss Elizabeth J. Letson, describes the post-pliocene fossils of the Niagara River gravels, and dealing with species still existing has special interest for conchologists. Some 17 species of *Gastropoda* and 14 *Pelecypoda* are discussed and illustrated. Among the more notable species may be mentioned the carimate form of *Goniobasis livescens* var. *niagarensis*, which reproduces the contour of *Anculosa carinata*; *Amnicola letsoni* Walker, an apparently extinct species; some peculiar forms of *Limnæa desidiosa* and *catascopium*, and a series of *Unionidæ*, very interesting to the student of geographic distribution:—*Lampsilis rectus*, *ellipsiformis*, *Uniogibbosus*, *Quadrula solida* and *coccinea*—forms speaking clearly of a former connection between the Great Lakes and Mississippi drainages. All of the species are illustrated with original figures. The work is well done, and cannot but prove useful for many years to come.

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1, 2. *Ceratodiscus solutus* H. & S. 5. *Ctenopoma hydii* Weinkl.
3, 4. *Cerion marmoratum* Pfr. 6. *Chondropoma bjalmarsoni* Pfr.

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 No. 8.

LAND SHELLS OF FORTUNE ISLAND, BAHAMAS.

 BY J. B. HENDERSON, JR.

Fortune Island is one of the Bahamas belonging to the Crooked or Long Island group, and which is separated from the more westerly groups by a deep arm of the sea. Geologically it is in every respect similar to the other Bahamas. The little island is but four or five miles long and from one to one and one-half miles in width, with an elevation scarcely exceeding thirty feet. Its surface is rough with flat fragments of "eolian" limestone, and the entire island is covered by a dingy-colored scrub growth of trees and shrubs. A few clumps of graceful palms scattered here and there relieve somewhat the monotony of the dreary aspect. A wide beach of silvery coral sand encircles the island, glittering like a mirror by day and superbly bright in the moonlight. Singularly enough the only shells we found cast upon this beach were *Cerion*. Occasionally low cliffs of eolian rock extend down to the water's edge, and at such places, *Tectarius muricatus* L., *T. trochiformis* Dillw., and *Litorina lineata* Phil., were discovered.

The scrub vegetation affords but little shade, and the ground is baked by a powerful sun whose rays oppress the weary collector as they seem to enliven the swarms of sand-flies and mosquitoes. A diligent search from daylight to dark brought to our bag but four species of land shells, although individually these were quite abundant.

1. *Cerion marmoratum* Pfr. Generally dead specimens found under bushes. A considerable range of variation exists, the extremes of which are illustrated on Plate V, figures 3 and 4.

2. *Cepolis (Hemitrochus) milleri* Pfr. The color varieties of this really beautiful shell are infinite—indeed, no two specimens are entirely alike. They cling to the under side of leaves and to the stems of a certain species of shrub. Dead shells are scattered about in the debris of fallen leaves.

3. *Ctenopoma hydii* Weinkl. Under slabs of eolian limestone; about the roots of trees; among fallen leaves. There is no actual difference between this species and *C. bryanti* of Great Inagua. I believe it is also reported from Long Island. (Plate V, figure 5.)

4. *Chondropoma hjalmarsoni* Pfr. Same station as the last. This shell has a decided Haitian appearance and has evidently been identified as *C. semilabre* Lam. It is doubtful if Lamarck's species ever occurs out of Haiti, indeed I am inclined to believe it is confined to the "cul de sac" region of that island. *C. hjalmarsoni* is more obese than *C. semilabre*, its decussated sculpture is not conspicuous, the revolving striæ are more pronounced and the longitudinal striæ less so than in the Haitian shell. (Plate V, figure 6.)

Fortune Island is easily accessible from New York, and offers an excellent base for exploring the neighboring islands of the group; however, it requires much patience to tarry in a desert of poor collecting when the larger Antillean islands with their magnificent mountains and forests and incomparable molluscan richness lie but a day beyond.

COLLECTING SHELLS IN MONTANA.

BY MORTON J. ELROD, UNIV. OF MONTANA.

The State of Montana is not very productive of conchological specimens. The conditions are all against shell growth. The rivers are rapid, the water quite soft, and food in the rivers scarce. The large lakes, as Flathead lake, contain clear, cold water. They are usually deep, with rocky bottoms, and surrounded by mountains with steep slopes. The marshy, stagnant parts of the lakes are usually small. The mountain sides in summer become dry and parched, except in protected portions and along the streams. Great stretches of plain are without moisture for a portion of the summer, drying up every living thing that cannot move to the water-courses. The days are hot, the nights cool. In this mountainous State, where very little

soil is lower than 3000 feet above the sea, the air is dry and evaporation rapid. A passing rain-cloud may leave considerable moisture, but it is soon taken up by the parched earth or evaporated if left on the surface. Stagnant ponds with decaying vegetation are few and confined to the vicinity of the few rivers. Even such ponds usually become dry each summer.

No doubt the western mountain region will produce some excellent material for study of variation through isolation, when collections have been made more extensively. Most of the valleys were former lake beds of greater or less extent. As these lakes have been drained, they left swamps in which rhinoceroses, camels, three-toed horses, elephants, titanotheriums, and other beasts have become mired, their remains being buried for long ages. These swamps have dried up, and the waters have become more widely separated, now occurring as deep mountainous lakes, or larger lakes, which are mere expansions of rivers. Such isolation must have caused the separation of shells of a species which naturally would take different lines of development. Accompanying this gradual separation of waters we might expect a region of moisture on the land adjacent to the lakes, giving suitable environment to the land snails.

As a result of the above conditions, we may expect great variations in adjacent regions, where the barriers may be sufficient to cut off all communication between the regions. Such variations have been illustrated in part by Hemphill's suite of *Patulas* (*Pyramidula*), in the Lichtenhaler collection at the Illinois Wesleyan University. This has also been shown by collections made in the Sandwich Islands. There is very little doubt but that the isolated lakes in Montana and the northwest will produce interesting variations. But the sparsely-settled country and the small number of collectors makes the work of collecting and studying very slow. This may be better understood by a practical application. The State of Montana has an area of 146,000 square miles. So far as the writer is able to discover, he is the only resident of the State who has collected fresh-water and land shells, and this has been done at odd moments while prosecuting other lines of work.

The accompanying list is not large. Five species is the maximum taken in one day. Those taken from mountain sides represent much toil for a few scattered specimens. The list, incomplete as it must be, represents the specimens collected at intervals during the past

three years, and is given as a basis for work, with the hope that others may add to it. The species are all from the western side of the range, or Pacific slope, with the exception of a few, which are properly indicated where they are discussed.

Missoula is located in a valley in which the Hell Gate and Bitter Root rivers unite to form the Missoula river. West of the Bitter Root river the Bitter Root range of mountains extend parallel with the river in a northerly and southerly direction. So far the writer has explored but a few spots in these mountains and along the rivers. But the results have been surprisingly good. North of the valley lies the Cabinet range, rugged and broken. Few spots in this have been examined. Across the Cabinet range lies the Flathead Indian Reservation. The crest of the Mission range marks the eastern border of the reserve. The Mission range extends almost due north and south for a distance of nearly a hundred miles. The southern end contains the highest peaks, reaching 10,000 feet, while the northern end slopes down to the Swan river, and has been ground smooth by glacial action.

Out of the Mission range four large creeks flow across the Mission valley, joining each other or the Pend d'Oreille river, which is the outlet of Flathead lake. The range makes the eastern bank of Flathead lake for its entire length. In the cañons of this range numerous small lakes lie nestled among the hills, invisible until one comes suddenly to the bank. Sin-yale-a-min lake is at the base of Sin-yale-a-min peak, at the southern end of the range. A ten days' camp at this lake brought to light probably all the shell fauna to be found. To the north the mountain produced the very interesting variety of *Pyramidula strigosa* described later.

McDonald lake is 15 miles north of Sin-yale-a-min lake, 500 feet lower in altitude, at the base of McDonald peak. Ten days at this spot produced several quarts of *P. elrodi* Pils., besides the first living shells. Another camp at Crow creek produced several valley shells. Several camps at different points on Flathead lake produced other species from the sands and from the water. Swan lake is on the eastern side of the Mission range. A camp on this lake added one to the list in the western part of the State, not found elsewhere.

While the collecting represented by these notes has extended through four summers, the results will probably be modified when a further study of the extensive country has been made.

The identifications have been made for the greater part by H. A. Pilsbry and W. H. Dall, and for this and other courtesies thanks are hereby extended.

Margaritana margaritifera L.

This is the only species of bivalve mollusk of the family *Unionidae* taken. It has been found at several places in the Bitter Root river above the junction of this river with the Missoula. At one place a colony was found on a sand bar, when about a peck of live specimens were taken. At another they were found, in March, clinging to the rocks where the water was swift. They were captured by inserting the tip of a switch from a tree between the valves. The shell was closed on the limb, and the specimen pulled from the water. In this way a dozen or so were secured. Pieces of shells have been seen around Flathead lake, but no living specimens taken. In 1900, several dozen were taken in Crow creek, Flathead Indian Reservation. The species is found in all the western mountain streams. At no place is it abundant, and many people who have lived in this country all their lives express surprise at seeing these shells and hearing they are from waters in the State.

A NEW SPECIES OF LIOMESUS.

BY W. H. DALL.

Liomesus nassula n. sp.

Shell solid, white, covered with a pale olive, slightly-hispid periostracum, with a rather elevated, subacute spire of seven whorls; suture distinct, not channelled; apex somewhat eroded with a small blunt top; surface of the whorls delicately sculptured with fine revolving threads, four or five to a millimeter, of which about every fourth thread is perceptibly stronger than the other three; these are crossed by still finer, sharp, elevated, arcuate, incremental lines, along which the hispidity of the periostracum is arranged; pillar white, solid, twisted, funicular distally; canal very short, wide; outer lip thin, simple, with a concave flexuosity behind the periphery; body with a thin white callus. Alt. 42, max. diam. 22, lon. aperture 17 mm.

Dredged in 121 fathoms, sand, near the Pribiloff Islands, Bering Sea, by the U. S. S. Albatross.

This interesting addition to the genus has a sharper spire than any other species and a different sculpture. It is perhaps nearest *L. canaliculatus* Dall, which has coarser sculpture and a channeled suture.

A NEW TETHYS FROM CALIFORNIA.

BY T. D. A. COCKERELL.

Tethys (Neaplysia) ritteri, n. sp.

Length 21 cm., breadth about 8 cm. Dark grayish-olivaceous; sides with oblique, flame-like, blood-red markings, especially about the middle of the body; upper surface of the head and outer surface of epipodial lobes mottled with brown, but without any conspicuous blotches; inner surface of epipodial lobes and mantle covering shell pale sea-green, wholly without markings; lobe overlapping branchiæ deep rich purple; when the shell is removed, the area beneath it is seen to be strongly suffused with dark purple; branchiæ purplish-grey; sole 45 mm., broad, transversely grooved and corrugated, greyish-brown, inclining to coffee-color; epipodial lobes about 80 mm. long and 28 broad, from base within ends of lobes to nearest part of sole about 67 mm.; anterior tentacles 11 mm. from inner base to tip; posterior tentacles 14 mm. long.

Shell very thin, flexible, corneous, 58 mm. long, 42 broad; accessory plate well-developed.

The animal produces an abundance of a reddish-brown fluid. The muscular stomach or gizzard contains eleven pentagonal corneous bodies, which fit raised areas on its wall. The largest of these bodies was $14 \times 10\frac{1}{2} \times 10\frac{1}{2}$ mm. The alimentary canal contained seaweed.

Hab.: San Pedro, California. The specimen described was found cast up on the shore of the bay, just in front of the University of California Marine Laboratory, July 23, 1901. Others were obtained by workers at the laboratory; one of these, which I saw, had been in formalin, and the red, flame-like markings had wholly disappeared.

This animal has the structure of *T. californicus* (Cooper), which was also described from San Pedro, but the color-scheme is so entirely different that it must be assumed that the species are distinct. Should any reason hereafter appear to the contrary, *T. ritteri* will at least be a very distinct variety. It is named after Prof. Wm. E. Ritter,

director of the Marine Laboratory at San Pedro, in recognition of his important services to marine zoölogy.

JAPANESE VIVIPARA IN CALIFORNIA.

BY ROBERT E. C. STEARNS.

In the NAUTILUS for February, 1892, Mr. Williard M. Wood mentions the presence of "Paludina Japonica" (as determined by Mr. W. J. Raymond), in the Chinese market in San Francisco, where he saw a bucket-full of living specimens, being part of the first lot brought alive from Japan, where they are collected in the rice-fields near Yokohama, and are sold for a few cents a quart. They are called by the Chinese "Tsen law." Subsequently Mr. Wood (NAUTILUS, September, 1892), mentions seeing the same species and certain forms of *Anodonta* in an aquarium in a shop in the Chinese quarter of San Francisco.

A year or more ago, Mrs. A. E. Bush, of San José, sent me a few examples of a *Vivipara*, a quite familiar Japanese form. One living specimen sent to Dr. Pilsbry, he kindly determined for me as *V. stelmaphora* Bgt. (= *V. malleata* Rve.), "it is a female and gives us plenty of young," etc. From Mrs. Bush's note it appears that the species may now be collected, or might have been at the time she sent the specimens, in San José, and also in a little valley at the foot of Mount Hamilton. The examples received from her were collected at the former place. The first specimens from the several regions were detected by a boy, at a point seven or eight miles from San José. In wheeling over the floor of a little lake that was dry at the time, he picked up the shells and gave them to a friend who was interested in conchology.

From the above it is quite evident that somebody planted this Asiatic form thereabout, presumably some of the Japanese or Chinese living in the neighborhood. It may be remembered that the European *Helix aspersa* was planted in San José forty years ago; in course of time the mollusca of the region may exhibit quite a cosmopolitan aspect.

Los Angeles, Cal., Oct. 22, 1901.

THE SHELL-BEARING MOLLUSCA OF RHODE ISLAND.

BY HORACE F. CARPENTER.

The earlier portion of this paper appeared in Volumes III. and IV. of this Journal.]

199. *Yoldia sapotilla* Gould.

Nucula sapotilla Gld., DeKay, Sby., Hanley; *Leda sapotilla* Stimp., S. I. Smith, Reeve; *Yoldia sapotilla*, of modern authors.

Shell elongated ovate, thin, fragile, translucent; beaks nearly central, a little nearer the anterior end, not elevated; anterior portion of the shell semi-oval, regularly rounded, posterior narrowed and compressed but not so much so as in *Y. limatula*; surface with very minute concentric lines; epidermis thin, glossy, bright yellowish-green with one or two narrow zones of a darker shade; interior white and pearly; hinge with sixteen long and pointed teeth on each side of the beaks, those near the center small and close together. Length $\frac{9}{16}$, height $\frac{3}{8}$, breadth $\frac{3}{16}$ inch.

This species is comparatively rare and local, but inhabits soft mud in deep water from Long Island to the Arctic Ocean. It has been dredged in Provincetown Harbor by Col. Joseph G. Totten, and in Long Island Sound by Mr. S. Smith. Prof. A. E. Verrill has dredged it off Gay Head, 19 fathoms; Buzzard's Bay, 25 fathoms; east of Block Island, 29 fathoms; and in Casco Bay and Bay of Fundy, 4 to 100 fathoms. Quoted from Mass. Bay (Gould), Nova Scotia (Willis), Labrador (Packard), Greenland (Mörch).

Gould says, "In its shape and the perfect polish of its surface, this shell resembles the seed of the Sapotilla (*Achras sapota*), a tropical fruit," and for this reason he gave it its specific name.

Yoldia obesa Stimp. and *Yoldia thraciformis* Stimp. have been quoted from Long Island to Greenland, but have not as yet been found in Rhode Island.

Family ARCIDÆ.

The Arks are boat-shaped shells, having a straight hinge with numerous short comb-like teeth; the umbos separated from each other by a flat, lozenge-shaped ligamental area, and on the interior of the valves are two distinct muscular impressions. The animals have two hearts, each with an auricle; they spin a byssus not like the mussels, but a horny substance composed of numerous thin calcareous plates

which can be cast off and renewed whenever occasion requires. There are a large number of genera and species; they are distributed world-wide, in all seas and at all depths from low water to 240 fathoms. Fossil arks are abundant in all ages. There are several groups of this family, one of which is sedentary in its habits, adhering to crevices in rocks; another group *Scaphula* Benson, an East Indian genus, lives in fresh water, a thousand miles from the ocean; others live in sand or mud and move about freely. We have two species in New England, although a third, *Arca ponderosa* Say, is occasionally washed up on the beach at Edgartown, Martha's Vineyard.

200. *Arca (Argina) pexata* Say, 1822.

Shell oblong, thick and solid, very inequipartite; beaks prominent, ventricose, pointing obliquely forwards, terminating in points which are nearly in contact, surface with 32 to 36 broad radiating ribs, crossed by minute lines of growth, the whole covered with a very coarse, brown hairy epidermis; interior white, the margin polished and deeply crenulated by the alternate termination of the ribs and grooves; hinge with a series of small teeth. Length $2\frac{1}{2}$ inches, height 2 inches, breadth $1\frac{1}{2}$.

This species is very abundant in Narragansett Bay and has been quoted from Cape Cod to Gulf of Mexico. I think it must be very rare and local south of Long Island Sound, as collectors south of New York seem to consider it a rare species. It is distinguished from all others of our marine shells by its rough, dirty epidermis, which is thick and hairy, generally detached in places and can be torn off in long strings. The fishermen call it the hairy clam. It is not an attractive looking object when found alive, and is still more repulsive if we open the valves, for the animal then exudes a reddish, bloody-looking liquid, from which circumstance it is often called the bloody clam.

201. *Arca (Scapharca) transversa* Say, 1822.

Shell transversely oblong, rhomboidal; beaks prominent, separated from each other by a long, narrow space; surface with 32 or more radiating ribs, the ribs and intervening spaces of about equal breadth. Length and breadth about $1\frac{1}{2}$ inches each, height 1 inch. This species is of southern distribution and is not at all common as far north as Rhode Island. It has been found from Florida to Cape Cod.

Several specimens have been collected at Nantucket and Martha's Vineyard; it is not very rare at New Haven, but I have never found anything in our bay excepting single valves. Mr. John Ford, of Philadelphia, while on a visit to Providence, a few years ago, obtained several live specimens among the oysters dredged off Bullock's Point.

Family MYTILIDÆ.

The mussels inhabit all shores in great numbers. Some species inhabit deep water and others frequent near high water mark, being uncovered nearly all the time and moistened by the salt water only once every twelve hours. Woodward says, "The members of this family exhibit a propensity for concealment, frequently spinning a nest of sand and shell fragments, burrowing in soft substances or secreting themselves in the burrows of other shells." In speaking of the animals, he says, "Animals marine or fluviatile attached by a byssus." There are no fluviatile members of this family, although one species, which will be spoken of hereafter, seems to live equally well in either fresh or salt water.

Genus *Mytilus* Linné, 1758.

The mussels are easily recognized by their triangular or wedge-shaped shells, which are pointed at the anterior end and broad and rounded at the posterior; the hinge is either toothless or in some species with very minute teeth. There are sixty-five species distributed world-wide, one of which inhabits Rhode Island.

202. *Mytilus edulis* Linné.

Mytilus vulgaris Da Costa; *Mytilus borealis* Lam., De Kay, Midd.; *Mytilus pellucidus* De Kay; *Mytilus notatus* De Kay (young).

Shell ovate-triangular, solid; beaks pointed, situated at the anterior end; hinge margin rising in a straight line at an angle of forty-five degrees from the basal margin, which is also straight; posterior widened and rounded, the broadest part of the shell being directly opposite the centre of the basal margin; surface covered by a dark, shining, bluish-black epidermis, under which the shell is violet; interior silvery in the centre, with dark violet margins. Length of large specimens two and a half inches, height one and three-tenths, breadth one inch.

This species, the common edible mussel, inhabits the whole of the ocean shores of the northern hemisphere, being extremely abundant

all over the northern portions of Europe, Asia and America. They are used in Rhode Island for food to a very limited extent, probably on account of the vast quantities of clams, quohogs, oysters and scallops which abound here, any of which form a much better quality of food than the mussels; but they are consumed in large numbers in Europe. The annual consumption in the city of Edinburgh is estimated at four hundred bushels, averaging one thousand to the bushel; the amount collected for bait in various kinds of fishing is enormous. In France, Norway and Russia immense quantities are gathered and used, animal, shell and seaweed together, as a fertilizer for the land. They are found in Rhode Island attached to each other by their strong byssus in great numbers. They are not buried in mud, but cluster together on rocks between tides and form beds in the banks. The young are found in deeper water and attain their growth in one year.

Mytilus pellucidus, Penn., Mont., Turt., Don., De Kay and others, considered by many as a separate species, I think is only a variety of *Mytilus edulis*. The shell is thin and transparent, beautifully radiated with blue, yellow and green zones. These marks are generally seen in specimens about one inch to an inch and a half in length and they gradually disappear as the shell gets larger; still these zones are sometimes seen in old and solid specimens, while others, one half an inch or less in length, are of a uniform shining black appearance, so that it does not seem to depend at all upon the age or size of the individuals. In every cluster of *Mytilus edulis* we find from one to a dozen or more of these pellucid, radiating ones, which if they do belong to a separate and distinct species, present an anomaly seldom seen, *i. e.*, a colony of different species of animals living together and firmly bound together by such strong bonds of friendship (or something else) as these mollusca are.

Genus *Modiolus* Lam., 1799.

The horse-mussels differ from the edible mussels in having a shell swollen at the umbos, and in having three pedal impressions in each valve, whereas there are but two in *Mytilus*. The animal burrows in mud, or clusters together under banks of grass or peat in salt marshes in some species, while others live in deep water. There are three species living in Rhode Island, one of which, however, is not a native, but has become domesticated here within about twenty years.

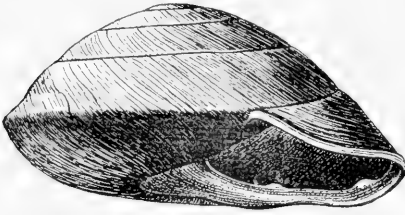
204. *Modiolus (Branchydontes) hamatus* Say, 1812.

Mytilus hamatus Say, De Kay; *Mytilus serratus* Barnes, 1823; *Modiola hamatus* H. F. Carpenter, 1865, A. E. Verrill, 1872; *Brachydontes hamatus* Perkins, 1869.

Thomas Say describes this species in the Jour. Acad. Nat. Sci., ii, p. 257, 1822, under the name of *Mytilus hamatus*, giving for its locality the Gulf of Mexico; the specimens he described were obtained from the markets of New Orleans, adhering to the shells of the southern oyster, *Ostrea virginica*. Since his time it has been found on oysters along the coasts of all the southern Atlantic States. Shell very much contracted and incurved at the beaks, which are acute; surface covered all over with elevated radiating lines, which near the umbos are divided into two and sometimes three; color black or very dark brown; interior purple with white margins. Length two and one-half inches, breadth one and a half, but sometimes as broad as long; very variable.

Gould's Invertebrata of Massachusetts, 1840, does not mention this species at all; even Binney's Gould, second edition, 1870, supposed to contain descriptions of all the marine species inhabiting the coast of Massachusetts, has not a word to say about it. It is, however, getting to be quite common in Rhode Island waters, but the collector will obtain more specimens in five minutes in the oyster markets of Providence, than he could collect at the shore in a week. The first specimens I ever saw were given me by Mr. E. H. Jenks, who obtained them in a fish market in Pawtucket; neither of us knew what they were at the time, but I pronounced them to be *Modiolus* at once. After carrying them home I referred to a volume of Say in my possession and saw by the figure and description given in it that they were *Mytilus hamatus* Say. They were attached to oyster shells. On seeing Mr. Jenks a few days after, I told him what they were, but added, "they are not *Mytilus* if Say does say so, they are *Modiolus* just the same." Since then the species has become domesticated in our bay, having been brought here alive on the southern oysters and transplanted in these waters. I have found a few specimens in our bay not attached to oysters, stones or anything else, but its proper habitat is on valves of *Ostrea virginica*, adhering by a short, stout byssus.

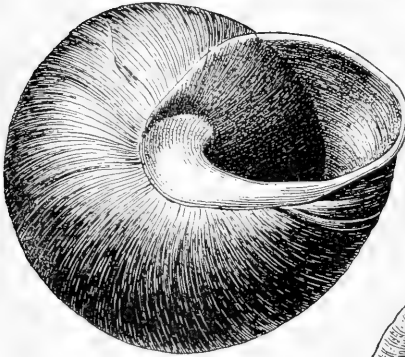
In November, 1870, Mr. Geo. H. Perkins published the "Molluscan Fauna of New Haven," in which, speaking of this species, he says, "An examination of the *animal* has led me to consider it a *Modiola* rather than a *Mytilus*." He described it as a *Modiola* under the sub-generic name of *Brachydontes* Sw., 1840. In 1872, Prof. A. E. Verrill, in the March number of Silliman's Journal, p. 211, says, *Modiola hamatus* = *Mytilus hamatus* Say. New Haven harbor and vicinity, usually attached to oysters.



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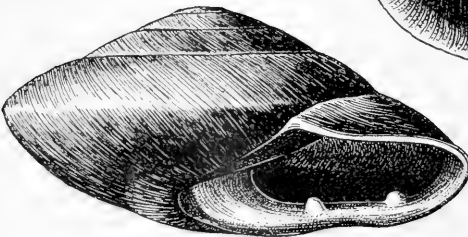
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VENDRYES: NEW SPECIES OF PLEURODONTE.

THE NAUTILUS.

VOL. XV.

JANUARY, 1902.

No. 9.

A DAY ON THE GREAT BARRIER REEF

BY CHARLES HEDLEY.

“All hands on deck!” Ugh! “The billy’s boiled!” Groan. “The tide is falling fast!” That fetched your conchologist. Sleepily he crawled out and reached for his mug of hot tea. Balancing himself on the combings he looked abroad.

Far in the west the jungle-clad mountains of tropical Queensland loomed soft and blue. Between lay a purple sea which in the near distance suddenly changed to the vivid green of shoal water. To windward a beach of coral sand showed white and bright under the dense foliage which smothered a long, low island. Beyond it a line of foaming breakers stretched to the sky-line. Back against the white surf there rose the bristling fangs of the reef, rank after rank passing in long perspective out of sight. Below in the clear water, the links of the cable lay as sharp on the sand as if the cutter had floated in the air. Down overboard a blue starfish (*Linckia*) slept, here a prickly urchin, there a madrepore.

Regardless of scenery the party munched their damper, and asked what was the scarlet tree ashore, and should the cook be keel-hauled for opening plum jam instead of marmalade.

“Get the dingy up and look alive!” quoth the captain. Into her tumbled all hands, Mr. Conglomerate, the captain, the cook, the jib-sheet hand, and Mr. Conchologist. Safe in the locker are stowed all the nice town clothes. A soft felt hat, flannel shirt, tweed pants, belt and sheath-knife, and big laborer’s boots with thick socks rig out a man for the reef. Mem. tie your boots with string instead of

laces for wading. Our tools are a geological hammer, a four pound sledge, a crowbar, all the cans and buckets available, a pocket-full of corked tubes and a pocket lens fastened to the waist with a key-chain, such as bank clerks use. A big shooting bag is a handy thing to sling over the shoulder. A design for reef collecting which we never put in practice was a belt like a soldier's cartridge belt to hold tubes instead of cartridges. Not only could molluscs, worms, etc., be packed apart, but such useful things as alcohol, formal, or picric acid would be at hand in small quantities. In practice we filled, say the left trouser pocket, with empty tubes. When a specimen is found it is important not to lose sight of it, and one hand may be engaged holding the rock. With the free hand a tube is taken, the cork pulled out with the teeth, the specimen bottled, the tube filled with sea water and stowed in the right hand pocket.

Now we pull in among the corals and jump overboard. "But what is the thing like a barrel stranded yonder?" "That, Mr. Conglomerate, is a *Tridacna gigas*." A real, live, giant clam, with jaws gaping like a crocodile, lying high and dry and loose upon the reef. Between the jaws are living jewels of green and gold, thick strewn on living velvet. With a convulsive jerk the shell half closes and gaps again. "I've seen plenty bigger nor this; do you want him, Mr. Conchologist?" asked the jib-sheet hand. "Yes, take that." So he drove the end of a board hard down in the centre of the gape. That disabled the monster. The cook plunged in a butcher's knife, dexterously peeled back the gorgeous mantle, slipped off the huge adductor muscle and unceremoniously threw out the carcass, bigger than a leg of mutton, on the sand.

The conchologist who ordered the execution feels, well, just a qualm of remorse, as the men hoist the shell to the boat. Anyhow he never collected a bigger shell. And then for an instant, the sunshine and the sea were swept away and the magic of memory flashed out a picture of distant lands and days; faint incense, cold and gloom, past rows of marble pillars and stained glass windows, to a small conchologist gaping with amazement at his first *Tridacna*, the holy-water basins in St. Sulpice.

Again the ripple on the water, the sunshine and the sea. All about the giant lay lesser clams, *Hippopus*. "How do you tell one from the other, captain?" "Why, look at the meat," says he. And sure enough, we saw that *Hippopus* lacked the jewelled eyes of

his great brother. Queer topsy turvy molluscs these, lying hinge down, gape up. And yet they have turned round in the shell and live heart up, foot down, like other bivalves.

"Here's something for you!" Wading across, the conchologist found four men standing at a respectful distance round one small *Octopus*. Boldly he grappled with the fearsome beast, twining and untwining the long sticky tendrils. The jib-sheet hand muttered something to the cook, and both exploded with laughter. I fear that irreverent young rascal had remarked how like the *Octopus*, all legs and arms, was to Mr. Conchologist himself. Now the slippery thing is gathered up and slid into the bucket. When packing time came, however, no *Octopus* could be found; evidently it climbed out when the gaoler's back was turned.

Another big coral block, over with it. A scuttle of little crabs, as they clatter down small holes, a shrinking of things soft, a twisting and a writhing of things neither hard nor soft; among them is a particularly energetic bunch. Left alone it unwinds into a huge Brittle star; casting a couple of cables into the water beneath, the Brittle star lowers itself along itself to the sea, pulls after itself the cords which are itself, and tucks itself, body and ropes and running rigging, comfortably into a crack in the coral.

This is a land of big things. Here is a huge sea anemone, bigger than a dinner plate, *Discosoma*, with all its tentacles spread abroad. A gorgeous little fish, crimson with a white bar, has made friends with the anemone and at the least fright swims to its capacious bosom and nestles safe among the poisonous tentacles.

And here is the Chinese dainty, the *bêche de mer*, a dozen different kinds of them. The commonest Holothurian is a long, black, snake-like species. When feeding they sweep all around with their branching tentacles, grasping a miscellaneous catch of foraminifera, shells and sea-weed, and thrust the mass down their throats. Another *bêche de mer* has earned the name of cotton-fish, because when handled it voids a mass of white glutinous threads, troublesome to clean from hands and clothes.

"Pass the crow-bar and up-end this block. A heave, my hearties, and up she goes!" "A mutton-fish," says the jib-sheet hand, and grabs it. *Haliotis asinina*; now we always did think that narrow shell could not contain the body, and here it is like *Scutus* or *Umbrella* or *Lucapina*, only a shield upon the back. "And those, toe-

nails you call them, not a bad name either. I call this *Acanthochites* and that *Cryptoplax*." As the conchologist crooks his finger round a live *Stomatella mariei*, the creature falls asunder. Like a Gecko, he would ransom his body with his tail. *Gena* does the same in Sydney harbor; *Harpa* is said to know the trick.

"What are you doing?" asks Mr. Conglomerate, strolling up. "Smashing up *Heliopora*? What a shame!" And so it is, to wreck the beautiful blue branches, but we seek all manner of queer things hidden in corners, and *Gephyrean* worms and *Lithophaga* burrowing inside. A few odd urchins and star-fish are overhauled for *Stylifer* without success.

And see under the water what looks to the eye like a mass of white down, but to the finger feels hard. We read the riddle with a chop of the crow-bar; the fragment shows tiny crimson rods packed together, and partitioned off into floors and ceilings. It is a lump of *Tubipora musica* in full bloom.

Out in the broad daylight lie the Strombs, they love the little sandy pools among the rocks. The sociable big *Pterocera* lie around in scores, not too proud to foregather with their humble cousin *S. luhuanus*. There is nothing shy about a Stromb, it vigorously resents being picked up, and kicks like a *Nassa*, lashing out water with its operculum, and thrusting out its beautiful big, green eyes, on their long stalks, it stares boldly at its captor.

But now the tide is rising fast. Soaked and tired and hungry we must leave our hunting ground. Though bags and buckets and tubes are crammed, yet we have scarcely tasted of the riches of the reef. All to-morrow, next week, and next month we might collect without exhausting it.

Back to the cutter we row over fields of deeper corals, scarlet gorgonias, parrot fish glancing blue and gold and green, *Monacanthus* in armour of black and red, over madrepores ten feet across, like tables spread with dainty lace and edged with violets.

Then we climb aboard and snatching a hasty meal as we work, face the only tiresome labor of the day, the labelling, sorting and packing of our catch.

At last the jars and kegs are screwed down. Let us pass the pannikin along for rum, light a pipe, stretch luxuriously on the hatch and lazily watch the ghostly gleam of the zodiacal light fading in the west.

A NEW SPECIES AND SUB-SPECIES OF JAMAICAN PLEURODONTE.

BY HENRY VENDRYES.

PLEURODONTE (Pleurodonte) VACILLANS, n. sp. Pl. VI, figs. 1, 2, 3.

Shell rather solid, very slightly dilated transversely, depressed turbinate above, depressed convex below; color brown all over, deepening slightly in tint and simulating an indistinct band running along the centre surface of the spire whorls (except the apical) with a dark brown band below the periphery of the last whorl encircling the base of the shell and fading off to very light about and around the umbilical region; whorls a little more than five, apical obtuse, the rest subplanulate except the last which is impressed above the periphery and somewhat inflated above the impression; the periphery subacute and descending slightly near its extremity; suture linear, impressed. Sculpture on part of the antepenult whorl apparently the same as in *P. carmelita*, in the rest for the main part, of irregularly raised, drawn out growth lines, coarse in some places and very fine in others; aperture peroblique, sublunate, livid shining within in fresh specimens; peristome not so stout as in *P. carmelita*; the extremities joined by a callus spreading across the parietal wall, upper margin simple, somewhat sinuously depressed above near its commencement, basal margin reflexed, widening, and adnate for some distance to the base of the last whorl which is inflated, but less so than in *subacuta*. There are two small distant teeth within, like those of *P. subacuta*, but of a brown color, as is also the peristome. The umbilicus is covered in some specimens but not completely so in others; in the first case the basi-columellar part of the peristome which forms the covering shows a shallow depression over the perforation beneath. Alt. 23, diam. 48 mm.

Habitat: Silver Hill in the Parish of St. George, situated at an elevation of about 4000 feet on the northeastern slope of the chain of mountains in St. Andrew; St. Catherine Park, in the neighborhood of the habitat of *C. carmelita*, and in exactly similar stations to those which the latter frequents.

This shell so much resembles *P. carmelita* in some respects, and *P. subacuta* in others, that one may be led at first sight to confound it with one or the other of those species to which the particular specimen under examination may show a preponderance of resem-

blances. Its principal differences from *P. carmelita* are the possession of the two teeth (*carmelita* never exhibits a vestige of teeth) and the adrate peristome. These two features, however, bring it nearer to *P. subacuta*, but the sculpture, the deflection of the last whorl (or rather the descending), the color of the peristome and teeth, and the generally less inflated appearance of the shell remove it also from that species. It appears as if thrown in between *carmelita*, *subacuta* and *acuta* to exemplify the sportive tendencies of the very variable group to which they all belong.

Figures 1 and 2 are from the type. Figure 3 represents a specimen approaching *subacuta*.

PLEURODONTE (Pl.) SOROR Fér. var. PERACUTA, n. var. Pl. VI, figs. 4, 5.

Same in size as the type, but the shell is more depressed, the base less regularly convex and the outline of the spire is more conoidal. The periphery of the last whorl is much pinched and spread out into a wide, flat, knife-like carina. The base is somewhat convex below the periphery, then compressed laterally inward from it and inflated. The umbilicus is uncovered; the aperture subtriangular, narrowed transversely and forming an acute angle at the right side. A few examples are unicolored brown with the epidermis dull and flaky as in some specimens of *P. cara*, but by far the greater number of specimens are banded with dark and white, as in the type of *soror*, on the spire, and the periphery of the last whorl is white. The bands do not stop, as in the type, half way up the spire, but extend to the very suture line of the first apical whorl. The color of the shell (or of the bands) is not so intense, or pure or lustrous white as in the type. The shells somewhat resemble small banded forms of *P. peracutissima*, but they have the teeth of *soror*. A specimen received from Chitty is marked "*soror*?" From Lower Maysfield in the Parish of St. Elizabeth.

A NEW SPECIES OF VOLUTOMITRA.

BY W. H. DALL.

This genus has long rested on its typical species, the *Mitra grönlandica* (Beck) Möller of the Arctic Atlantic Seas. The discovery of another species, therefore, possesses somewhat more than the ordinary interest.

Volutomitra alaskana n. sp.

Shell fusiform, with about six moderately convex whorls; suture distinct, surface wholly minutely spirally striated, covered with an olivaceous periostracum over a white or yellowish shell; aperture longer than half the total length, with a rather wide canal, callous pillar and body in the adult, and simple outer lip; the canal has a well marked siphonal fasciole, and is slightly flexuous; plaits normally four, rarely three or five, strong and rather distant; nucleus almost always eroded; lon. 44, diam. 17.5; lon. of aperture, 26 mm.

Habitat in the southern and eastern parts of Bering Sea and the Aleutians, in 60 to 85 fathoms, muddy bottom, and southward in constantly deeper water, following the temperature of 39° Fahr. to a point off San Diego, California, in 822 fathoms.

This species differs from *V. grönländica* in its much greater size, less rufous color, and pervasive fine spiral sculpture, but otherwise is very similar. It was first dredged by the writer in the eastern Aleutians, and has since been obtained by the U. S. Fish Commission. The Atlantic species is usually about 18, but reaches 27 mm. in length, and is smooth above, with a few coarse spiral striæ on the base.

COLLECTING SHELLS IN MONTANA.

BY MORTON J. ELROD, UNIV. OF MONTANA.

[Continued from page 89.]

Sphærium partumeium Say.

This beautiful shell is common in the ponds near Flathead Lake and around Missoula. They live in the dense vegetation, in company with *Planorbis trivolvis*, larvæ of Odonata, Cyclops, Daphnia, and numerous water insects. They are gathered by pulling out a mass of the vegetation, picking it to pieces, and here and there finding the delicate shells. A single dead shell was found on the beach of Swan lake. None have been discovered in the small cold water lakes in the Mission mountains.

Planorbis trivolvis Say.

This cosmopolitan species is the most abundant thus far found, and has been taken in most of the ponds where shells are found. It has been taken around Missoula in the streams, in the lakes of the

Mission Mountains as high as 3800 ft., in the ponds bordering Flathead Lake, and in Swan Lake.

Estey's pond covers some 10 or 15 acres, three miles from the Biological Station, and a mile from Flathead Lake. In August, 1900, the shores of this pond were literally covered with dead shells, and great quantities of live ones in the water.

It was here that a very interesting experiment was performed with these shells and a large frog. A dead shell was tossed in front of the frog, close to his nose. The shell was immediately seized, and an unsuccessful attempt made to swallow it. It was disgorged by the aid of the fore feet. A second attempt gave the same result. This was continued until the frog had seized the eighteenth dead shell, when he seemed to weary of the sport, and took a rest. After this he would seize only now and then, and only those in easy reach. After the 23d shell had been seized he no longer made any effort, and a good sized pile of shells was made with no result. Other attempts on other frogs gave practically the same result, with a slight variation in the number.

Planorbis parvus Say.

In August, 1897, while camped on the bank of the Pend d' Oreille river a couple of miles below the outlet at Flathead Lake, some sand siftings produced a dozen or more of these small shells.

(*To be continued.*)

THE SHELL-BEARING MOLLUSCA OF RHODE ISLAND.

BY HORACE F. CARPENTER.

[*Continued from page 96.*]

203. *Modiolus modiolus* Linné.

Mytilus modiolus Linn., Wood, Don. Chem., DeKay. *Modiola modiolus* Turt., Gld., Perkins, Dall.

Shell large, thick and solid, oblong-ovate; beaks at the anterior end which is narrow; posterior broad, rounded; hinge margin straight, ascending from the beaks at an angle of forty-five degrees to the centre, then curving downward to the posterior end; basal margin arched a little upwards near the centre, gaping at this point for the passage of a byssus; epidermis dark brown, thick, folding

over the margin; interior pearly, of a livid color. Length four and a half inches; height two and a quarter; breadth two inches.

It inhabits the ocean in deep water, attached to the larger seaweeds, and is thrown up on ocean shores in storms, the seaweeds being torn from the rocks by the action of the waves and dashed upon the beach. Sometimes these shells attain a length of six inches and are subject to great variety of form, being almost always distorted in some manner. In young specimens, the epidermis at the lines of growth is prolonged into filaments.

205. *Modiolus plicatulus* Lam.

Shell transversely oblong-ovate, elongated, narrowed at the anterior and broadened at the posterior; beaks at the anterior end; hinge margin straight, ascending for two-thirds the length of the shell, then curving downward and rounding at the posterior to meet the basal margin; surface ornamented with numerous radiating, sometimes undulating, prominent ribs; a broad elevated ridge runs from the beaks to the posterior end of the basal margin, dividing the shell into two nearly equal parts; on the upper half of the shell thus divided, the ribs are large and coarse, but on the lower half they are very fine, merely lines on a smooth surface; exterior silvery white, covered by a thin varnish epidermis of a brown color, rayed with zones of yellow, green and black; interior silver white; margins crenulated. Length three inches, height one and a quarter, breadth nine-tenths.

This species, with the exception of *Mya arenaria* and perhaps *Ilyanassa obsoleta*, is the most abundant mollusk in R. I. It inhabits everywhere in mud, peat bogs, salt marshes and in the banks of rivers. It is found up the Blackstone nearly to Pawtucket, where the fresh water is continually pouring over the falls, as well on the shores of the bay and ocean. Its station is everywhere above low water, and they cluster so thickly together as to frequently form banks a foot or two in depth imbedded near high water, forming beds sometimes hundreds of feet in length by ten to twenty in width. When found completely buried in mud, they are generally preserved in good condition, but if taken under any other circumstances, the epidermis is found to be badly eroded, not only at the umboes, where shells usually exhibit this peculiarity if at all, but all over the surface. They may be gathered in any quantity in Providence, in the banks of the river road, above Red Bridge.

Genus *Crenella* Brown, 1827.

There are five species, one of which inhabits New England.

206. *Crenella grandula*, Totten.

Syn: *Modiola glandula* Tott. Gld.; *Mytilus decussatus* Stimp.; *Crenella decussatus* Forbes & Hanley, DeKay.

Shell small, thin, rounded oval; beaks small, separated at the anterior end, and at one half the height of the shell; surface with minute lines of growth, crossed by numerous fine radiating ribs which increase in number as they recede from the beaks; epidermis brownish-yellow; interior pearly; margins sharp and crenulated. Length one quarter of an inch, height nine-twentieths, breadth three-tenths.

This species was discovered by Col. Joseph G. Totten in Provincetown Harbor, and described in Silliman's Journal, Vol. xxvi, p. 367, 1834. It inhabits sandy and soft mud in water from 3 to 60 fathoms, from Sandy Hook to the Gulf of St. Lawrence, and is often found in the stomachs of fishes. It has been dredged in various places between these points, such as Buzzard's Bay, Vineyard Sound, off Block Island, in Massachusetts Bay, Casco Bay and Bay of Fundy. It is found fossil at Montreal.

Genus *Modiolaria* Gray, 1872.

The shells of this genus are small, rhomboidal in shape, and are sculptured by two series of radiating lines, one at each end, leaving a smooth space between.

207. *Modiolaria discors* Linné.

Syn: *Mytilus discors* Linn., Loven, Stimp., Hanley, etc.; *Mytilus discrepans* Mont., Dill., Turt., Flem.; *Modiola discrepans* Lam., Forbes, Gld., Migh., DeKay.; *Crenella discors* Gray, Adams, Forbes and Hanley; *Modiolaria discors* Loven, Binney, Dall, etc.

Shell obliquely-oval, beaks near the anterior end; surface coarsely marked by lines of growth and divided into three fan-shaped spaces, the anterior portion with eight fine lines radiating from the beaks to the basal margin, the middle portion smooth and the posterior with numerous lines radiating in an opposite direction from those on the anterior end of the shell; interior silvery. Length one inch, height thirteen-twentieths, breadth two-fifths.

Circumpolar: from Greenland to Long Island; from Finmark to Great Britain; Bering's Straits to Puget Sound. Inhabits from

low water mark to 100 fathoms, also found in the maws of fishes. Common everywhere north of Cape Cod, rare and local to the south of it. Two other species, also circumpolar in range, the *Modiolaria nigra* and *M. corrugata*, are said to have been found as far south as Buzzard's Bay, but as I have no idea they will ever be found in R. I., I do not include them in these papers.

(*To be continued.*)

GEORGE B. SIMPSON.

George Bancroft Simpson was born in 1841 at Boston, Mass., removed to Waterbury, Conn. at an early age, and in 1861 enlisted in the army for the Civil War. At the close of his service he entered Yale College, but was unable to complete his course for lack of money. In 1868 he came to Albany and began work with his uncle, the late Prof. James Hall, State Paleontologist, as a collector of fossils. Subsequently he took up the drawing of fossils and became highly skilled in this work. Thousands of the fine drawings which have illustrated the *Paleontology of New York* being his handiwork.

He was a devoted lover of nature, and was the author of a useful work on the anatomy of the fresh water clam (*Anodonta fluviatilis*), and had just completed an elaborate treatise on the anatomy, physiology and embryology of *Polygyra albolabris* and *Limax maximus*, at the time of his death, which occurred October 15, 1901.—J. M. C.

PUBLICATIONS RECEIVED.

THE MOLLUSCA OF PORTO RICO. By William H. Dall and Charles T. Simpson. (Extract from U. S. Fish Commission Bulletin for 1900, Vol. I, pages 351-524.)

This work really constitutes a hand-book of the mollusca of the island, as it contains brief descriptions of the genera and species with references to the original descriptions and principal synonymy, illustrated by 6 plates containing 102 figures. The total number of species recorded is 653, of which 42 are new. Excluding the land and fresh water shells and nudibranchs the number of species and well-marked varieties is 530, and an estimate is made of 600 species. "It has been one of the surprises that a number of species originally described from deep water in the Blake report, turned up in less than 100 fathoms in Mayaguez harbor or other localities."

Some important changes in nomenclature are noticeable: The genus *Pyrena* Bolten, 1798 (*Conidea* Swain), is adopted for *Columbella ovulata*, and *Nitidella* Swains., is given generic standing. *Ultimus* Bolten is used generically for *Ovula gibbosa*. We can hardly agree with the authors in some of the names they still retain in the old family *Tritonidæ*, for which they use a new term *Septidæ*. If one name of an author having priority is used, why not use others that can be as readily identified? If *Septa* Perry, 1811, can by elimination be used for *Triton* Montf., why not use *Monoplex* Perry, instead of *Ranularia* Schumacher 1817, and *Aquillus* Montf., 1810, for *Lampusia* Schum.? *L. cynocephala* Lam., certainly belongs to *Ranularia* rather than *Lampusia*. The family name *Septidæ* probably deserves adoption, as the genus *Septa* contains one of the largest and most beautiful shells in the world (*Septa tritonis*), although it is not perhaps the most typical, nor the oldest genus of the family.

THE MOLLUSCA OF THE PERSIAN GULF, GULF OF OMAN AND ARABIAN SEA, as evidenced mainly through the collections of Mr. F. W. Townsend, 1893-1900; with descriptions of new species. By James Cosmo Melvill and Robert Standen (Proc. Zool. Soc. of London, 1901, pp. 327-460). Part I.—Cephalopoda, Gastropoda and Scaphopoda.

This valuable and interesting paper adds greatly to our knowledge of the oriental species and their geographical distribution. Upwards of 935 species are recorded, including 77 new species and one new genus (*Argyropeza*) in the family of *Litiopidæ*. Some families are unusually well represented; of the genus *Conus* 41 species are recorded, while those usually restricted to the *Pleurotomidæ* number 100 species, 20 of which are new; of the 54 species of *Nassidæ*, 5 are new, and there are also 5 new *Mitra* out of a total of 43 species.

As the authors have "endeavored in every case to give the name sanctioned by the laws of priority," we note several changes, although many genera having priority, and now in common use still bear later names: *Glyphis* Cpr., 1856 = *Fissuridea* Swains, 1840; *Mitrularia* Schum., 1817 = *Cheilea* Modeer, 1793; it does not belong to the *Hipponycidæ*; *Vertagus* Schum., 1817 = *Clava* Martyn, 1789. In adopting *Lotorium* Montf., for *Triton* (preoccupied), why retain the family name *Tritonidæ*? For *Cypræa turdus* Lam., 1822, the name *C. ovata* Perry, 1811, is adopted, and for *Fusus turricula* Kiener, *F. forceps* Perry. *Latrunculus* Gray, is used instead of *Iburna* Lam., 1822 not 1801. The work is illustrated by four very finely executed plates containing 87 figures, and is by all odds the most important paper yet published on the faunæ of which it treats.

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NOTES ON ASHMUNELLA.

BY T. D. A. COCKERELL AND MARY COOPER.

A large series of specimens from Manzanares Valley and Cañon Diablo, near Rowe, N. M., shows that the *A. thomsoniana* type is well divided into two races, to which the names *thomsoniana* and *porteræ* are applicable. The Manzanares Valley specimens are to be designated *porteræ*, although the basal tooth is in most cases scarcely double, the inner denticle being reduced to a slight callosity. The Cañon Diablo form, coming from a somewhat higher altitude, is referred to *thomsoniana*, although the basal tooth is often double as in *porteræ*. The fact is, that the character of the basal tooth, whether double or single, is highly variable, and not to be relied on to separate races. On the other hand, the size is much more distinctive. The following measurements of the greatest diameter of the shell are worth giving:

(1) *A. thomsoniana* from Cañon Diablo. 9 are between 11 and 12 mm., 49 are 12, 52 are 12+, 53 are 13, 9 are 13+, 1 is 14, and 1 is 14½ mm.

(2) *A. porteræ* from Manzanares Valley. 1 is 13+, 3 are 14, 13 are 14+, 16 are 15, 10 are 15+, 5 are 16, 6 are 16+, 1 is 18 mm.

(3) *A. porteræ* from Beulah. 2 are 14, 12 are 14+, 17 are 15, 6 are 15+, 3 are 16 mm.

If any one will take the trouble to plot out the curves from these statistics, they will find that two and three are the same, with the mode at 15, and the skew towards the smaller size. On the other hand, one will be found to have an utterly different curve, with the

mode at 13, the skew strongly towards the smaller size, and the extreme of large size barely overlapping the minimum size of *porteræ*.*

A few of the Cañon Diablo *thomsoniana* have the mouth of the shell very strongly contracted, so as to look like a distinct species, but they are connected by intermediates with the ordinary form.

Albinos have been found of both forms :

A. thomsoniana mut. *alba*, nov. Cañon Diablo, N. M., one.

A. porteræ mut. *alba*, nov. Manzanares Valley, N. M., a few.

At the monthly meeting of the Las Vegas Science Club, held November 12, reported in *Science* December 27, 1901, p. 1009, the authors exhibited a series of a supposed new species of *Ashmunella*, "proposed to be called *Ashmunella antiqua*, found fossil in the Pleistocene beds of Las Vegas, N. M. It resembled in most respects *A. thomsoniana*, but wholly lacked the parietal tooth." Upon further examination it appears that the parietal callus has scaled off in the specimens described, and it is likely that the shells are identical with the living *A. porteræ*.†

COLLECTING SHELLS IN MONTANA.

BY MORTON J. ELROP, UNIV. OF MONTANA.

[Continued from page 104.]

Limnæa stagnalis L., var. *appressa* Say.

The first shells of this species were taken early in the year 1900 in a small pool along the Bitter Root river. A large spring supplies the pool with clear, fresh water. In this pond a good series of both living and dead shells was secured. A couple of dead shells were found in Swan Lake in August, 1900. This is over a hundred miles to the north of the Bitter Root locality, while water connection between the two places would be much more than double the distance.

* *A. porteræ* was taken the past summer at the head of Dailey Cañon, in the uppermost part of the Canadian Zone. The specimen is quite like the Beulah ones.

† A co-type of *A. antiqua*, received from Mr. Cockerell, bears out this conclusion. It is without doubt *A. t. porteræ*. The passage quoted above from *Science* is the complete original account of *antiqua*.—ED.

Limnæa palustris Müll.

Taken from a pond near Bitter Root river. Quite abundant, several hundred specimens taken. Also taken in abundance in standing and quiet waters in the creeks on Flathead Indian reservation. At the upper end of Flathead Lake there is a great deal of marshy country tributary to the lake and to Flathead river. In the lowland bordering on the lake, which had been overflowed and later dried off, large quantities of dead shells were observed. Indeed the shells were so abundant one could not walk without mashing large numbers. In still other places the shells were yet alive in the sloughs, in great abundance. Along the Bitter Root river the shells were living in the same waters with *Aplexa hypnorum*. Mr. Earl Douglass collected a large series in the Madison lakes, southern part of the State, in summer of 1900.

Limnæa nuttalliana Lea.

Abundant in the region with *L. stagnalis* L., var. *appressa* Say, *L. palustris* Müll., and *P. trivolvus* Say. A hundred or more specimens secured.

Limnæa emarginata Say, var. *montana* Elrod.

Shell large, globose, thin and fragile; of a light horn color, in many cases tending to light pearl gray; in many instances there is an abrupt line between the lighter portion and the horn colored portion, the lighter portion being next the aperture; the last whorl constituting about three-fourths the length of the shell; malleations obscure or absent, distinguishable in occasional specimens; lines of growth fine, and quite regular; spire short, consisting of three obliquely twisted whorls and the nucleus; suture well impressed; aperture about two-thirds as long as wide; outer lip thin, acute, inner lip reflexed near its junction with the columella.

Length 27 mm. Greatest width 13.25 mm. Width of aperture 10.25 mm. Length of aperture 14.70 mm. Whorls, 5.

The species is found sparingly in Sin-yale-a-min lake in the Mission range of western Montana, and abundantly in McDonald lake, some 15 miles north of the former. A few were taken in Swan lake, on the opposite side of the range. At Sin-yale-a-min lake an entire afternoon was spent in securing a couple of dozen specimens. The method was to row over to the lake outlet in the canvas boat,

secure location where the water was not too deep, and fish with a silk butterfly net attached to a long handle. When a shell was sighted the boat was brought to a standstill so the surface would become quiet, and the net was lowered with the edge of the wire beneath the shell. As soon as the shell was touched the animal let go all hold, and if it did not roll into the folds of the net would settle among the large pebbles. To secure it then in three or four feet of water was impossible. Naturally, the failures were as frequent as the successes. As stated, the afternoon produced a couple of dozen shells, two dripping individuals, each with aching backs and weary eyes, and a torn net and wet boat.

Aplexa hypnorum L., var. *tryoni* Currier.

The Bitter Root river valley flows to the north along the flank of the Bitter Root mountains, which are on the western bank. From these mountains numerous creeks enter the river, and many ponds have been made by these creeks and by the changing river. The river is about 100 miles long, and flows through one of the finest and most fertile valleys in the State. In one of these ponds, near the juncture of the Bitter Root and Missoula, this species was found rather abundantly.

Physa heterostropha Say (?).

Specimens referred by Dall to this species were collected at Missoula in June, 1898, September 17, 1897, and April 8, 1900, on which latter date they were depositing eggs. In working over the *Physa* collected in Western Montana, I have read with much interest the complaint of O. A. Crandall in THE NAUTILUS for June, 1892, in which he raises the question, "Is there such a species as that described by Say? If so, what is it?"

Physa ampullacea Gld.

The species seems widely distributed in Western Montana. It has been taken in Bitter Root river, in Lakes Sin-yale-a-min and McDonald in the Mission mountains, and sparingly in Flathead lake.

Physa gyrina Say.

A few of this species taken with *P. heterostropha* and *P. ampullacea*. Finding these three species together leads to suspicion that the species may not be distinct. A single shell from the Flathead Indian reserve (Crow creek) seems to belong to this species.

THE SHELL-BEARING MOLLUSCA OF RHODE ISLAND.

BY HORACE F. CARPENTER.

[Continued.]

Genus PECTEN Brug. 1789.

The pectens, fan-shells or scallops have on each side of the beaks a broad expansion of shell called ears; beaks touching; hinge toothless, with a triangular pit for the cartilage. The animal has no syphons; the mantle is free, its margins double, the inner one fringed and hanging down like a curtain, and the outer one with a row of dots shown to be eyes. They move about very rapidly by suddenly opening and shutting their valves, and can jump two or three feet; they seem to have the power of choosing the direction, for they can, by a sudden jerk, jump backwards or to either side, skip along the surface of the water or sink to the bottom. I never saw one jump forwards. We have in New England three species, two of which inhabit Rhode Island.

208. *Pecten irradians* Lam.Syn.: *Pecten concentricus* Say, Con., DeKay, Gld.

Shell nearly round; valves convex, with about twenty elevated, rounded ribs radiating from the beaks, the ribs and spaces between of nearly equal breadth; ears nearly equal; interior shining; on the exterior the ribs and spaces are both rounded while on the interior the corresponding spaces are flat. Length three inches, height two and a half, breadth one. The so-called eyes in this species, of which there are from forty to sixty, situated along the edges of the mantle in both valves, are of a beautiful bright-blue color. This is the common scallop and is a very abundant shell in Rhode Island, but owing to the great demand for this luscious bivalve in the market, the State of Rhode Island has passed laws prohibiting their being taken through the summer months of each year. The "scallop law" is off on the first day of September, and on the morning of that day hundreds of boats may be seen in our waters at sunrise eager to be first on the grounds where the scallop beds are. Thousands upon thousands of bushels of pectens are dredged during the following three or four months, and if it were not for the law allowing the young a chance to get their growth, one season would completely exhaust the supply. The entire animal is not used for food, like the

other edible species of mollusca, such as clams, quohogs, mussels and oysters, but only the large muscle in the centre which holds the valves together; this muscle in adult pectens is about an inch in diameter and the same in length. The shells are subject to great variety in color, sometimes having one valve pure white and the other yellow, red, purple, or mottled and banded with several colors, when young; the adult shells generally lose their brilliant shades and become of a uniform slate tint, with one valve, however, always lighter than the other. The young shells frequent the shore and are very active; I have often put out my hand to take one, when just as I almost had it, it would suddenly shut its valves and skip away out of reach. At times I have seen them at Apponang so abundant that they were piled up in layers six or eight inches deep, and at other times not one could be seen. The adults inhabit deeper waters and are dredged from the bottom from boats.

209. *Pecten tenuicostatus* Migh. and Ad.

Syn.: *Pecten magellanicus* Con., Gld., Stimp, DeKay.

Shell large, round, inequivalve, lower one nearly flat, upper one convex, ears nearly equal; surface with fine radiating, punctured lines; lower valve white; upper valve brownish-red, dingy; interior white, glossy and smooth, with a different set of radiating lines from those on the exterior. Length five inches, height five and a half, breadth one and a half.

This is a northern species, found of large size on the coast of Maine and everywhere north of Cape Cod; smaller ones are obtained from the stomachs of fishes. It inhabits deep water off Block Island, and in southerly storms is driven up in large numbers on the shore at Point Judith.

Family Anomiidæ.

Shells thin, pearly, with a notch or hole through the right or lower valve near the beaks, to which is attached a plug, closing the orifice and also serves to attach the shell to other objects. There are two genera, *Placunanomia* and *Anomia*, divided into several sub-genera.

Genus ANOMIA, Linné, 1767.

The animal of *Anomia* differs from *Ostrea* in having a small foot, one of the peculiar characteristics of oysters being the entire absence of any foot.

The shells of *Anomia* have one valve convex and the other flat or a little concave; the flat valve is perforated and the plug which fills the hole and partly attached to the valve. The shells are seldom found free but generally attached to oysters or other shells or stones. There are twenty species, two of which inhabit New England.

(*To be continued.*)

DESCRIPTION OF A NEW UNIO FROM TENNESSEE.

BY WM. A. MARSH, ALEDO, ILLINOIS.

QUADRULA ANDREWSII, n. sp. Shell smooth, triangular, solid, beaks swollen, incurved, shell very inequilateral, compressed and striate at the base, obliquely rounded before, obtusely biangular behind, ligament rather short, light brown, epidermis reddish brown, maculate, growth lines numerous, rather rough, umbonal slope slightly rounded, posterior slope flat, cordate, with very indistinct lines from beaks to basal margin, beak sculpture unknown, cardinal teeth thick, very much sulcate, single in right, double in left valve, lateral teeth thick, short, and slightly curved, anterior cicatrices small and deep, posterior cicatrices distinct, small and deep, shell cavity rather deep, cavity of the beaks deep and angular, nacre silver white and iridescent.

Diameter 1.1; length 1.6; breadth 2.

Habitat: Holston river, Tenn., Mrs. Geo. Andrews.

Remarks: Several years ago Mrs. Geo. Andrews, of Knoxville, Tennessee, sent me a number of these shells. I never knew where to place them, but recently, on sending some of them to Mr. Simpson for examination, I was satisfied they were distinct. They belong to the group of which *trigonus*, Lea, is the type, but in no way do they resemble that species. There is no species which they closely resemble, except *globatus*, Lea, but it is a very much less inflated shell than that species, having a different colored epidermis, rougher and coarser growth lines, at least one-half of the disk is covered with wide, dark green spots; between these rows of maculations are very narrow, dark green interrupted rays.

The outline of *globatus* is rounded, while my shell is triangular.

I name this very interesting species in honor of Mrs. Geo. Andrews, a lady who has sent me very many interesting shells from Holston river. Tennessee.

NOTICES OF NEW JAPANESE LAND SHELLS.

BY H. A. PILSBRY.

Chloritis perpunctatus n. sp. Shell resembling *C. fragilis* in shape and general appearance, but differing in the very narrow umbilicus, half covered by the dilated columellar margin of the otherwise simple peristome, and by the extremely dense covering of exceedingly short hairs, almost exactly as in *C. pumila* Gude, which differs from *C. perpunctatus* in being imperforate, with a higher spire. Whorls 4, the inner ones flatly coiled, the last slightly and slowly descending. Aperture slightly oblique, broadly lunate. Alt. 8, diam. 13.7 mm. Totsugawa, Yamato, with *C. fragilis* (Mr. Y. Hirase, no. 843).

Ganesella sororcula n. sp. Shell narrowly umbilicate, globose-conic; white (fossil), encircled with scarlet bands above and below the periphery, with others variable in occurrence at the suture and within the umbilicus. Smoothish, lightly marked with irregular growth-wrinkles and densely, minutely engraved with spiral striæ. Spire conic, with slightly convex outlines, the apex very obtuse. Whorls $5\frac{1}{2}$, quite convex, the last more or less angular at the periphery, hardly descending in front, moderately convex beneath. Aperture oblique, the outer lip expanded, basal lip narrowly reflexed, columella subvertical, nearly straight, with reflexed, dilated margin. Alt. 19.5, diam. 20.5 mm. Alt. 17.5, diam. 19 mm.

Kikai-ga-shima, Osumi (Mr. Y. Hirase, no. 834).

This species is closely allied to *G. Largillierti*, of Great Riukiu, and *G. Adelinæ*, of Oshima. It is smaller and less conic than either. *G. Adelinæ* has a larger umbilicus, a peripheral band and more whorls. *G. Largillierti*, besides being larger and more conic, wants the crowded spiral lines. It is found fossil with various other land shells, some of which I have already noticed elsewhere.

Ganesella optima n. sp. Shell obliquely perforate, elevated, pyramidal, thin, pale-yellow corneous, whitish above, glossy; lightly marked with oblique growth-wrinkles; faintly, almost imperceptibly striate spirally, but marked with minute whitish lines giving the appearance of spiral striation. Spire straightly pyramidal. Whorls

$7\frac{1}{2}$, slightly convex, the last slightly angular at the periphery in front, a little descending to the aperture, convex beneath. Aperture oblique, the peristome thin, everywhere arcuate, narrowly expanded and reflexed, triangularly dilated at the columellar insertion. Alt. $14\frac{1}{2}$ to $15\frac{1}{2}$, diam. $10\frac{1}{2}$ mm.

Suimura, Prov. Awa, Shikoku Island (Mr. Y. Hirase, no. 824.)

A charming species, unlike any other Japanese *Ganesella* in its elevated shape.

Macrochlamys cerasina n. sp. Shell perforate, depressed, with low-conic spire, dark-reddish amber colored, brilliantly glossy, with faint growth-lines, no spiral striæ. Whorls $5\frac{1}{2}$, convex, slowly increasing, separated by impressed sutures, the last whorl perceptibly angular at the periphery in front, convex beneath. Aperture slightly oblique, lunate, the lip simple and thin, abruptly dilated and reflexed in a minute triangle at the columellar insertion. Alt. 5.7, diam. 8.6 mm.

Tobishima, Prov. Ugo (Mr. Y. Hirase, no. 838).

M. cerasina var. *awaensis* n. v. Shell paler, with lower spire and 6 more closely coiled whorls. Alt. 4.2, diam. 7.8 mm.

Tairinji, Awa, Shikoku Island. Although remote from the preceding geographically, this form seems to me to be too similar for specific separation.

Eulota (Cælorus) caviconus n. sp. Shell small, thin, with a large, deep umbilicus, conic above, flattened beneath, reddish-brown, lustreless, the surface roughened by short cuticular processes like adnate hairs, usually in part worn off. Outlines of spire a little convex, the apex obtuse. Whorls about $7\frac{1}{2}$, the earlier a little convex, the later ones flattened; the last whorl acutely carinate at the periphery, abruptly and deeply descending in front, contracted behind the lip. Aperture small, subhorizontal, oblong, the peristome expanded above, reflexed below, the ends approaching. Alt. 4, diam. $6\frac{1}{2}$ mm.

Goto, Uzen (Mr. Y. Hirase, no. 815).

This peculiar species is related to *E. cavicollis* Pils, differing in the flattened whorls and carinate periphery.

Mandarina exoptata n. sp. Shell narrowly umbilicate, depressed, biconvex, solid, light brown, the early whorls darker. Surface beautifully sculptured with crowded, spirally engraved, crimped lines, cutting irregular growth-wrinkles, the spirals obsolete immediately around the umbilicus. Spire low conic. Whorls $4\frac{1}{2}$, the first $1\frac{3}{4}$ or

2 forming the large nepionic shell. Last whorl wide, strongly carinate, a little sunken above and below the median keel, scarcely descending in front, convex beneath. Aperture oblique, wide, the lip obtuse, expanded above and outwardly, reflexed and thickened below. Alt. 14 to $15\frac{1}{2}$, diam. 23 mm.

Habajima, Ogasawara (Mr. Y. Hirase, no. 805).

An exceedingly distinct species, like a thick *Plectotropis*. It is quite unlike the larger carinate species *Mandarina Pallasiana*.

Microcystina habajimana n. sp. Shell very minutely perforate or closed, depressed subglobose. Amber colored, translucent, brilliantly glossy, smooth except for some very slight growth-wrinkles. Spire quite convex. Whorls 5, nearly flat, the sutures but lightly impressed, narrowly margined. Last whorl faintly angular in front, convex beneath, impressed in the center. Aperture lunate, the peristome simple and acute; columella thickened above and bluntly toothed. Alt. 4, diam. $6\frac{1}{2}$ mm.

Habajima, Ogasawara (Bonin Islands). No. 803 of Mr. Hirase's collection.

Genus HIRASEA nov.

Small disc-shaped or biconvex, perforate shells, pale and of nearly uniform tint, finely rib-striate, the aperture crescentic, the peristome contracted, thickened with a very heavy callus rib within. Type *Hirasea sinuosa*.

This genus belongs apparently to the *Zonitidæ*, or possibly to the *Endodontidæ*. It has some resemblance in the thick lip-rib to *Brazieria* or *Microphyura*, but there is no parietal barrier. The Philippine groups *Pliotropis* and *Glyptoconus* have some similar characters, but they are thin shells with no lip-rib. The species now known may be distinguished as follows:

- a. Upper margin of the lip drawn back, the basal margin projecting beyond it. Spire low, composed of $5\frac{3}{4}$ very narrow and convex whorls, the last angular at the shoulder, very convex beneath, perforate; aperture narrowly crescentic; lip expanded and arched forward in the middle below, retracted at the upper termination. Alt. 2.1, diam. 4.3 mm. Habajima, Ogasawara (Hirase, no. 802). *H. sinuosa*, n. sp.
- a¹. Aperture normally oblique, the upper margin projecting forward; form biconvex. Whorls $4\frac{3}{4}$, with an acute, com-

pressed keel along sutures and at the periphery; subperforate; aperture lunar, oblique, a little contracted; finely rib-striate above and below. Alt. 2, diam. 4 mm. Hahajima (Hirase, no. 801). *H. nesiotica*, n. sp.

A third form was sent from Chichijima, Ogasawara (no. 800), similar to *H. nesiotica*, but much smaller, diam. 3.2 mm., with barely 4 whorls. This may be called *H. chichijimana*. Subsequently some five additional new species from Hahajima have been received.

GENERAL NOTES.

HELIX ASPERSA INCREASING IN CALIFORNIA.—Complaints are being made that the spotted snail, *Helix aspersa*, is becoming too common in the gardens of San José, Oakland and Los Angeles, California, and that it is injuring many flowers and vegetables. This species was introduced into California from Europe many years ago, presumably by a Frenchman who considered it a choice delicacy for his table. For a long time the snails were confined to a small plot of ground in the city of San José, but of late they have evidently resolved upon a "policy of expansion," and are spreading rapidly and are liable to cause serious mischief. It is to be hoped that Californians will cultivate the French taste and thus turn the tables on the molluscan invaders.—**JOSIAH KEEP.**

TRUNCATELLA SUBCYLINDRICA Linnæus.

This species has been credited to the West Indies by various writers, even to the present time, although Linnæus and all the early English authors gave it as a species of Europe. Dall and Simpson, in their Mollusca of Porto Rico, 1901, Bull. Fish Commission, p. 436, give its range as "Porto Rico; adventitious in England; common in Florida and many localities in the West Indies."

The Linnæan species is in fact a common European shell, occurring as far north as England; thinner, more transparent, and typically smoother, than any Antillean *Truncatella*. It is commonly found in older collections under the name *T. montagui*, and is probably not specifically distinct from *T. truncatula* Drap. The "*T. subcylindrica* Gray" of Binney's Terr. Moll. iv, and Land and F. W.

Shells of N. A., pt. iii, p. 100, is a totally different thing, and as the name is preoccupied, it must be dropped for the ribbed species there defined. If *T. subcylindrica* L. occurs at all in the West Indian area or Florida, *which I strongly doubt*, its presence there is "adventitious." All of which may be readily verified by a reference to the works of Linnæus, Hanley, Thorpe, and a collection containing a series of European *Truncatellidæ*.—H. A. Pilsbry.

The collection of the late Dr. Wm. D. Hartman has been purchased by the Carnegie Museum, Pittsburgh. It is especially rich in the genera *Partula* and *Helicina*, the Melanians, both American and exotic, *Unionidæ*, and Polynesian marine shells. It contains most of the types of new species described by Dr. Hartman, others being in the collection of the Academy of Natural Sciences. The *Achatinellidæ* were purchased some years ago by the Hamburg Museum. In acquiring this collection the trustees of the Carnegie Institute have made an extremely important addition to their museum, as the formation and study of this collection was the life-long work of Dr. Hartman. The specimens are well identified, as we know by frequent use of them, and afford a solid basis for conchologic work to students in Pittsburgh and the adjacent cities of Pennsylvania and Ohio.

TAMIOSOMA CONRAD, A SESSILE CIRRIPEDE.—Prof. W. H. Dall has recently examined specimens of this problematic fossil, formerly supposed to be molluscan, and finds that the supposed tubes are the vesicular, elongated bases of a *Balanus*-like cirripepe.—*Science*, Jan. 3, 1902.

PLANORBIS BICARINATUS STRIATUS n. var.—Shell similar to that of typical *bicarinatus*, but with a deeper, narrower umbilicus, and with the spiral lines raised, very numerous and distinct, and with the longitudinal sculpture almost obsolete. Diameter 10, altitude of aperture 6 mill.

From sewer excavation, eight feet below the surface of the ground, Cold Spring Park, Milwaukee, Wisconsin, collected by Charles E. Brown.

This pleistocene fossil, of which no living examples have yet been seen, seems to differ from the typical *bicarinatus* sufficiently for varietal distinction. Twelve specimens have been examined, which are all uniform with the above description, and which are readily distinguishable from typical *bicarinatus*.—FRANK COLLINS BAKER.

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A REVISION OF THE CARINATE VALVATAS OF THE UNITED STATES.

BY BRYANT WALKER.

Valvata tricarinata was originally described by Say in 1817 as *Cyclostoma tricarinata*. It is one of the most abundant of the smaller operculates of the Northern States and Canada, ranging from the Atlantic coast westwardly at least as far as Manitoba and Iowa, and south to Virginia and the Ohio river. It has three well-marked varieties, which differ from the typical form only in the smaller number or entire absence of the revolving carinæ.

In 1841 Dr. Isaac Lea described a *Valvata* from the Schuylkill river, Pa., as *V. bicarinata*.

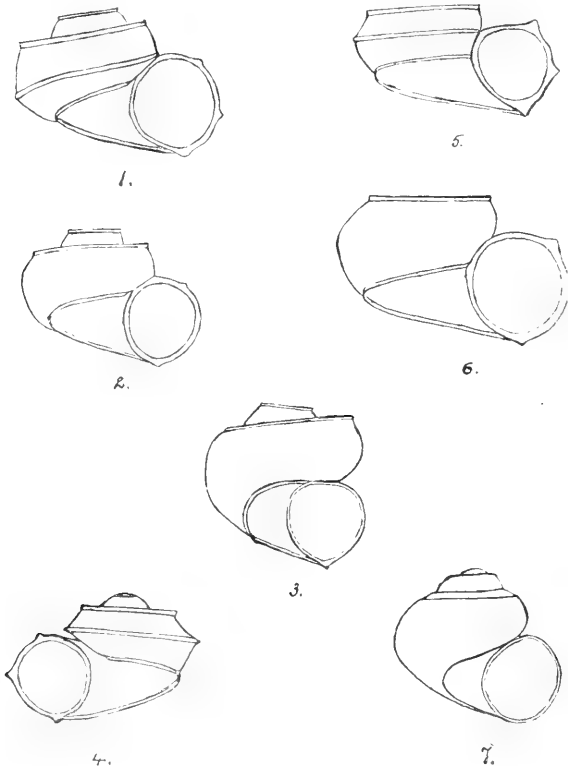
Haldeman in his "Monograph" (145) doubtfully refers Lea's species to *V. tricarinata* as a bicarinate variety. W. G. Binney, in 1865 (L. & F. W. Shells III, p. 9), states that from an examination of both Say's and Lea's types he is "convinced of the identity of the two." Tryon in his Continuation of Haldeman (1870) does not mention the subject, and evidently acquiesced in Binney's decision.

In this he has been followed by all subsequent writers so far as I have been able to ascertain, with one exception. Mr. W. A. Marsh in his "Brief Notes on the Land and Fresh Water Shells of Mercer Co., Ill." (Conchologists' Exchange II, p. 80, 1887), separated the two forms and recognized the validity of Lea's species.*

From a careful examination of the material in my possession I am

*The validity of *V. bicarinata* has been recognized by all recent Philadelphian conchologists. See NAUTILUS, VIII, p. 138.—Ed.

convinced that Lea's *bicarinata* is not the bicarinate form of Say's *tricarinata*, but is a distinct species, which also has a tricarinate form. I have the typical form of *V. bicarinata* from Columbia and Philadelphia, Pa., and Port Oram, N. J., and the tricarinate form from Muscatine, Ia., and Utica, Ill. Within the last few weeks I have had occasion to examine critically hundreds of specimens of *V.*



tricarinata in its various aspects [from Michigan, and a considerable number from at least ten different states and Canada, and I have yet to see the first specimen that in any way seems to connect the two.

In comparison with *V. tricarinata*, Lea's species is larger, discoidal; the upper surface of the whorls slopes downwards from the carina to the suture, giving a concave appearance to the upper surface

as a whole; the spire is depressed, not appearing above the superior carina of the body whorl, the umbilicus is very wide and more shallow, exhibiting all the whorls. In *tricarinata*, on the other hand, the whorls are more closely coiled, making a round, deep, funnel-shaped umbilicus; the penultimate whorl is elevated and only the apex of the spire is depressed.

The relation between the two species is very similar to that between *Pyramidula perspectiva* Say, and *striatella* Anth.

The recognition of the specific distinctness of these forms not only involves some changes in nomenclature, but also renders necessary a re-description of the various recognized forms.

The following re-arrangement of the group is offered as an attempt to satisfactorily differentiate the different forms.

I. *Valvata tricarinata* Say (fig. 1).

Shell turbinate, thin, translucent, shining; horn-color or pale green; whorls about $3\frac{1}{2}$; flattened between the carinæ; shouldered; the upper surface sloping upwards from the carina to the suture; spire elevated, depressed at the apex; lines of growth faintly marked; suture distinct; body whorl tricarinate, superior carina revolving nearly to the apex, the peripheral carina on the whorls of the spire being usually covered by the lower whorl; carinæ sharp, elevated and lighter in color than the body of the shell; aperture circular, slightly modified, however, by the carinæ; lip simple, sharp, continuous, slightly appressed to the body whorl; umbilicus round, deep, funnel-shaped, bordered by the inferior carina. Height $3\frac{1}{2}$, width $5\frac{1}{2}$ mm.

Cyclostoma tricarinata Say, Jour. Phil. Acad. Nat. Sci., I, 13 (1817).

Canada and eastern United States to, at least, as far west as Manitoba and Iowa, and south to Virginia and the Ohio River. (Utah, Ingersoll.) As all gradations between the typical form and the different varieties can be found in any considerable suite of specimens; it is deemed best to draw the lines between the recognized varieties upon the presence or absence of well-developed carinæ. Angulations of the body whorl, however acute, should not be considered in determining the position of any particular specimen.

This species is one of the most abundant forms in the Post-Pleistocene deposits of Michigan, and apparently was then more

subject to variation than at the present time. In the NAUTILUS, XI, p. 121, will be found an account of several specimens in which an additional carina was developed. In a large amount of material from the marl deposits of the State recently examined, two examples were found in which the superior and peripheral carinæ are present, but the basal one is obsolete, while in a deformed specimen from the deposits at White Pond, N. J., only the basal one is present. Two specimens from Michigan marl deposits have the last whorl near the aperture, entirely separated from the body whorl. None of these variations have been noticed so far as I am aware in recent specimens. In the collection of the late Dr. Jas. Lewis, now in my possession, is a sinistral specimen (fig. 4).

As these variations occur only in very few instances, they are to be classed as individual variations or "sports," rather than as distinct forms worthy of varietal names.

Var. *confusa* n. v. (fig. 2). Body whorl bicarinate, peripheral carina obsolete; periphery rounded or angulate. *Valvata tricarinata* var. *bicarinata*, authors generally, not of Lea. A curious scalariform specimen is in the collection of Mr. J. H. Ferriss, of Joliet, Ill. (fig. 3).

Var. *unicarinata* DeKay. Unicarinate, peripheral and basal carinæ obsolete, periphery rounded, base rounded or angulate. *Valvata unicarinata* DeKay. N. Y. Moll., p. 118, pl. VI, f. 129 (1843).

Var. *simplex* Gld. Ecarinate, whorls usually more or less flattened above. *Valvata tricarinata* var. *simplex*, Gld., Invert Mass., p. 226, f. 126 (pars.), (1841).

The citations of *Valvata humeralis* Say from Michigan by Miles (Geo. Sur. Mich., p. 237, 1860) and from Canada by Bell, Whiteaves, etc., referred to by Binney (L. & F. W. Shells, III, p. 14), are in all probability based upon this form.

II. *Valvata bicarinata* Lea (fig. 6).

Shell discoidal, flattened above, rather thick, shining; horn-colored or tinged with green; whorls $3\frac{1}{2}$, shouldered, upper surface sloping downward from the carina to the suture, which is deeply impressed; spire greatly depressed, not rising above the carina of the body whorl when viewed from in front; lines of growth faintly marked; body whorl bicarinate, superior carina revolving nearly to the apex, periphery rounded or bluntly angulate; carinæ sharp,

elevated; aperture nearly circular, slightly flattened above and modified by the carinæ; lip simple, sharp, appressed to the lower half of the body whorl; umbilicus wide, exhibiting all the whorls. Height $3\frac{1}{2}$, width $6\frac{1}{2}$ mm.

Valvata bicarinata Lea, P. A. P. S. II. 81, 83 (1841). Schuylkill river, Pa. (Lea), Columbia, Pa., Philadelphia, Pa., and Port Oram, N. J. (Walker), and Mercer Co., Ill. (Marsh).

The distinguishing characteristics of this species as compared with *V. tricarinata* have already been stated. The localities above mentioned are the only ones brought to my notice, but it will probably be found in the intermediate region.

Var. *normalis*, n. v. (fig. 5). Body whorl tricarinata, otherwise like the type. Muscatine, Ia. and Utica, Ill.

As in the case of *Polygyra andrewsæ* W. G. Binn., the typical form of this species is really only a variety of the real specific type. In a single specimen from Utica, Ill., collected by J. H. Ferriss, a fourth carina is developed on the upper surface of the last whorl at about its first third, and revolves parallel with the suture to the aperture, the space between forming a deep groove.

III. *Valvata utahensis* Call. (fig. 7).

Shell turbinate, thin, translucent, shining; yellowish horn color at the apex, white or greenish white below; whorls 4, convex, regularly increasing, minutely striate, the uppermost shouldered, with a single, well marked carina which becomes obsolete on the body whorl; spire obtusely elevated, apex depressed; suture well impressed; aperture circular, slightly angled posteriorly; lip simple, nearly continuous, appressed to the body whorl; umbilicus small, round, defined by a more or less obvious angle around the base of the shell. Height $4\frac{1}{2}$, width $4\frac{1}{2}$ mm. Utah Lake and Bear Lake, Utah.

Valvata sincera v. *utahensis* Call, Bull. U. S. Geol. Sur., No. 11, p. 44, Pl. VI., f. 1-3 (1884). *Valvata utahensis* Call, Proc. Dav. Acad. Nat. Sci. V, p. 4, Pl. I, fig. 1-3 (1886).

This species, which is more nearly related to *V. tricarinata* var. *unicarinata* than to any other of the eastern forms of *Valvata*, is well characterized by its more elevated spire, more globose form, the obsolescence of the carinæ on the body whorl and the much smaller umbilicus.

PISIDIUM STRENGII, N. SP.

BY DR. V. STERKI.

Mussel of moderate size, regularly inflated, rather short; beaks slightly posterior, small, narrow, approximate, somewhat projecting over the hinge margin; superior and inferior margins well curved, the supero-anterior slightly so and forming a steep slope to the somewhat angled anterior end; the posterior end subtruncate; scutum and scutellum indistinct; angles in front of and behind the beaks slight, rounded; shell rather thin, translucent; surface very finely striate, appearing smooth, with a few fine, irregular lines of growth, and with a slight, dull gloss; color of epiconch pale horn shading into grayish, whitish or yellowish; nacre almost glassy, muscle scars very slight; hinge fine, plate narrow; cardinal teeth small, thin; the right one curved, its posterior end deeply cleft, the left anterior curved or almost straight, the posterior short, oblique; lateral teeth small, somewhat pointed, the outer ones of the right valve quite small but distinct; ligament small. Long. 4, alt. 3.7, diam. 2.6 mill. (average).

Hab.: Michigan to New York, Ohio and Indiana. It seems to be a form mainly inhabiting smaller lakes. Perch lake, Mich., collected by Mr. L. H. Streng (in whose honor the species is named) and Dr. Kirkland; Reed lake and Little Bostwick lake, Mich.; Bass lake, Ind. (among shells taken from the stomach of catfish), by Mr. L. E. Daniels; Meyer's lake, Ohio (Sterki); Little Lakes, N. Y., found among materials in the collection of the late Dr. Jas. Lewis, now in possession of Mr. Bryant Walker.

Pisidium strengii has a resemblance to some smaller forms of *P. abditum* Hald., *nov-eboracense* Pr., and with *politum* Sterki, but can be recognized by its high form, the small, approximate beaks, especially noticeable in front (or rear) aspect, the peculiar, dull gloss of the surface, and the strongly cleft posterior end of the right cardinal tooth. The latter feature was found constant in normal specimens from widely distant places; but it may be added that the species appears to be particularly inclined to abnormal, and even monstrous formation of the cardinal teeth. As to size, shape and general appearance, the mussel does not vary greatly, so far as seen.

This species was first noticed as different from others, and named, in 1895. Yet, considering the great variability of our *Pisidia* as well as the fact that it does not show a striking variance from others, in general appearance, it was thought best to wait until sufficient evidence was gained of its being really distinct.

NOTE ON THE NAMES ELACHISTA AND PLEUROTOMARIA.

BY W. H. DALL.

My attention has been called by Mr. Cockerell to the fact that the name *Elachista* Dall and Simpson, in the Porto Rico Report, Mollusca, p. 427, 1901, is preoccupied in Lepidoptera by Treitschke, since 1833. For this peculiar group of *Bittium*, typified by *B. cerithioides* Dall, and which extends in time as far back as the Eocene in both Europe and America, I would substitute the name *Alabina*, in reference to its resemblance to *Alaba*, a name which, so far as I am able to discover, has not hitherto been used.

I have frequently called attention to the ill-effects of the absurd European proposition that names such as *Cyprinus* and *Cyprina* should not be allowed to exist in nomenclature simultaneously. Very few of those who support this view have any idea of the havoc in nomenclature which the rigid enforcement of such a rule would produce, with no benefit, but a very serious detriment to science. Finding the name *Nassaria* challenged on this ground, I hunted up the earlier use (1806) in Duméril's *Zoologie Analytique* and took the occasion to make a full list of Duméril's names, which all end in *arius* and are all synonyms. Some appear in the text and others in the Latin index only, with references to the pages where the French equivalent is to be found. Among the latter I discovered *Pleurotomarius*, Duméril's name for *Pleurotoma*. If the idiotic rule above-mentioned was put in force, this superfluous synonym would deprive us of the right to use *Pleurotomaria* J. Sowerby, which dates only from 1821, and perhaps also *Pleurotomarium* Blainville, another rendering of DeFrance's French name, which dates from 1825. I may add that any rule admitting anonymous names, taken into consideration with the above-mentioned one, would upset about half of the best-known names in Molluscan Zoology, including such as *Oliva*, *Cypræa*, etc. Can any one mention any good results to be obtained from such a course?

THE ORIGINAL LOCALITY OF LIMNÆA AMPLA MIGHELS.

BY OLOF O. NYLANDER.

In 1842 Mr. Alexander W. Longfellow discovered in Second Eagle Lake *Limnæa ampla*. Prof. Edward L. Morse visited the same lake in 1851 and called it Mud Lake. On the maps of Maine it is generally called Second Lake, but Mud Lake is the only name

used among the people. It is located on the east branch of Fish river, between Long and Cross lakes, in Township XVII, Range 4, Aroostook county, Maine. Some parts of Fish river have been visited every summer since 1897, and the shells collected published at various times in the NAUTILUS. Mud Lake (Second Lake) being of special interest to conchologists, as *Limnæa ampla* was described from specimens found in this lake, I examined it for the first time in August and September of last year (1901).

The name *Limnæa ampla* is in use from Maine to Alaska by different collectors. The question arose at an early date if *L. ampla* really could be a distinct species or only a variety of some previously described form. The best authors agree it is only a variety of Say's *L. emarginata* (also described from Maine in 1821) and my observations go to confirm the same.

Mud Lake is about $2\frac{1}{2}$ miles long and one wide, shallow, with mud, gravelly and rocky bottom, the forest growing all around it down to the water's edge. There are no settlements upon the lake, and in all probability it looks just the same as when Mr. Longfellow first collected his shells in 1842. A paper privately published, 4 pp., 4 plates and 85 figs., illustrating the variation of *Limnæa emarginata* of Fish river, was prepared in Oct., 1901, and a more elaborate one will appear when all the lakes on Fish river have been examined and a map prepared.

A careful survey was made in every part of Mud Lake and collections made in all parts of it from the shore to 15 feet in depth, and the following species were obtained :

Physa ancillaria Say. A few thin, fragile shells, nearly as clear as glass, were dredged in 3 to 6 feet of water at the upper end of the lake on muddy bottom.

Limnæa emarginata Say. Very abundant at the inlet in all stages of growth. (The original locality of *Limnæa ampla* Mighels.) Smaller colonies were found in the upper part of the lake and on the left side of lake near the outlet.

Planorbis companulatus Say. Dredged.

Planorbis bicarinatus Say. Dredged.

Planorbis hirsutus Gld. Dredged in the lake and the thoroughfares above and below the lake; very variable.

Planorbis parvus Say.

Ancylus parallelus Hald. One specimen in thoroughfare below the lake.

Valvata tricarinata Say. One specimen.

Valvata sincera Say. One specimen in the lake and a few in the thoroughfare below the lake.

Annicola limosa Say. Common.

Unio complanatus Sol. Common.

Margaritana undulata Say. Few dead shells at the inlet, and the thoroughfare between Long and Mud Lakes.

Anodonta fragilis Lam. Common (small forms).

Sphaerium striatinum Lam. Living and dead shells abundant on rocky bottom in the thoroughfare between Mud and Cross Lakes.

Calymene securis Prime. At the inlet not many found.

Pisidium pauperculum nylanderii Sterki. Few specimens.

Pisidium ferrugineum Prime. Few very fine specimens at the inlet.

Caribou, Maine, Feb., 1902.

COLLECTING SHELLS IN MONTANA.

BY MORTON J. ELROD, UNIV. OF MONTANA.

[Continued from page 112.]

Limax montanus Ingersoll. One specimen taken at Missoula, June 29, '97. Slugs are rarely seen in this region.

Euconulus fulvus Drap. A few specimens taken near Missoula, June 5, '97.

Succinea nuttalliana Lea. At the upper end of Flathead lake, in a swampy bog, quantities of *Limnaea palustris* Müll. with dark shells, were discovered. Among these was an occasional *Planorbis trivolvis* Say. Four specimens of *S. nuttalliana* Lea, were all that could be found, though diligent search was made. These delicate shells appear to be very scarce, since they have been taken no place else.

Polygyra devia Gld. var. *hemphilli* W. G. B. On May 8, 1900, Arbor Day, we took to the woods along the beautiful Lo Lo creek, south of Missoula, and extending up into the Bitter Root mountains a distance of some 75 miles. Lunch was eaten some four miles from the mouth of the creek, when we sought for specimens along the banks of the stream in overflowed pools. Among and in the abundant fresh deer-tracks were found scattered specimens of this species and *P. townsendiana* Lea, var. *ptychophora* A. D. Br. The species was not abundant, only about 15 being taken. They were much scattered, in holes, under decaying vegetation, difficult to discover.

Polygyra townsendiana Lea, var. *ptychophora* A. D. Br. These were taken rather abundantly, some 60 being the result of a two hours' search along the Lo Lo creek on May 8, 1900, in connection with *P. devia* Gld., var. *hemphilli* W. G. B. For details see under the latter species for information. Also found in small numbers at other places near Missoula. The species was also taken at both McDonald lake and Sin-yale-a-min lake in the Mission mountains, a couple of dozen being taken at the former place and but a few at the latter.

Zonitoides arboreus Say. A half dozen of these little shells taken at Missoula June 5, 1897.

Pyramidula striatella Anth. Only a very few of this species taken near Missoula in June, 1897.

Pyramidula elrodi Pils. This beautiful shell has been termed by an admiring friend "the queen of the Pyramidulas." It has thus far been found only along the banks of McDonald lake in the Mission mountains of Montana, living on the crags and among the loose talus. The first collecting produced some forty specimens, all dead. During the summer of 1900 about three quarts were secured. It will be interesting to the reader to give some of the opinions regarding this shell. For beauty the quotation above is certainly very flattering. W. G. Binney writes, Oct. 12, 1900, "I call it a depressed form of Hemphill's *Wasatchensis*. You might make a dozen species out of my series, and feel like tearing your hair afterwards in despair!" Dr. W. H. Dall says "the shell is larger than any *strigosa* I ever saw, and differs in sculpture from any in our collection. *Strigosa*, var. *Hemphilli* has the same form, but its sculpture is predominantly spiral and the shell the usual size. Conchologically speaking, it is a coarsely sculptured form of Stearns' shell (*circumcarinata*)." Dr. H. A. Pilsbry considers it sufficiently different from any existing species to be described as a distinct species.

THE SHELL-BEARING MOLLUSCA OF RHODE ISLAND.

BY HORACE F. CARPENTER.

[*Conclusion.*]

210. *Anomia aculeata*, Gmel.

Shell small, round; beaks obtuse, terminal; surface covered with fine hairy, radiating lines on the upper or convex valve; lower valve thin, smooth and flat, color yellowish white or gray; interior shining; aperture circular. Length and height about one-half inch each.

Habitat from Long Island to Greenland and northern coasts of Europe, rare south of Cape Cod. It has been found at Greenport and Montauk, L. I. (S. Smith); Stonington, Conn., 4 to 5 fathoms; Off Gay Head, 10 fathoms, but as yet no specimens have been obtained in R. I. waters. Its station is among roots of fuci, attached to stones and shells.

211. *Anomia glabra*, Verrill, 1872.

Syn: *Anomia ephippium*, Gld. and American authors, non Linné. *Anomia electrica*, Gld. (Binney's), non Linné. *Anomia squamula*, Gld. (young), non Linné.

Shell rounded, oval or irregular in form; beaks small, pointed, not quite reaching the margin; substance of the shell scaly, consisting of numerous overlapping layers of pearly material resembling talc, of a greenish tinge in living specimens—this substance in dead

shells is rubbed off, showing the golden and silvery hues of the real surface; upper valve convex, lower valve flat, with an ovate aperture which reaches the margin by a fissure. Diameter about one inch.

Habitat from Maine to Florida, but rare and local north of Cape Cod. It is sometimes very abundant in R. I. and at other times quite rare. Generally in the fall months it is seen adhering to small stones between tides at Opponang in Greenwich Bay, but during the rest of the year it is rare to find one near the shore, its station being among oyster beds. When growing upon the valves of *Pecten irradians*, as it does sometimes, the *Anomia* conforms to the shape of the Pecten and is ribbed like that species.

The *Anomia ephippium* of Linnæus is a very common European shell, and the great naturalist was deceived in our American shell, supposing it to be the same species, and called it by the same name, giving as its habitat, Pennsylvania. All authors since have known it under that name, even down to Dall's revision of the Mollusca of Mass., Mar. 16, 1870, but Prof. A. E. Verrill has shown it to be a distinct species and named it *Anomia glabra*, V., Am. Jour. Sci., iii, 213, 1872.

The shell described in Binney's Gould, second edition, under the name of *Anomia electrica*, Linné, is found among oysters and is distinguished from *A. glabra* by its sulphur yellow color, its defined edge and its very convex upper valve. It is generally distorted, semi-transparent and not so scaly as the preceding species. I think it is merely a variety, and the variety is much more common with us than the type.

Family *Ostreidae*.

The oysters commenced in the Carboniferous and are found in every age since the present time. Some of the fossil oysters are two feet in length. Of the living species, the most peculiar in its habitat is the tree oyster, which grows upon the roots of the mangrove. There is but one genus in this family and about 70 species.

212. *Ostrea borealis*, Lam.

Syn.: *Ostrea Canadensis*, Brug, Lam, Hanley.

213. *Ostrea Virginica*, Lam.

Syn.; *Ostrea Virginiana*, Lister, Sby, Gld.; *O. rostrata maxima*, Chem.; *O. elongata*, Solander.

These two species are so variable in shape that it is impossible to give an accurate description of them. They are very irregular and inequivalve, the larger valve generally attached to some object and the smaller one moving forward as the shell grows. *O. borealis* is obliquely rounded ovate, with short curved beaks, while *O. Virginica* is long and narrow, with long and pointed beaks. In both species the large valve is the lower one and the upper valve is the smallest, flatter and smoother; surface of *borealis* flaky, greenish, that of

Virginica somewhat lead color. Interior chalky or greenish white, with a dark violet muscular impression in the centre.

A. *Virginica* sometimes attains a length of twelve to fifteen inches, but seldom over three inches in breadth, while in *borealis* the breadth is about one-half the length; specimens six inches in length are about three in breadth.

Oysters have many enemies, among which are sponges, star-fish, drills and man. The drills or borers, *Urosalpinx cinerea*, are extremely abundant in our bay, and can destroy a great many oysters in a short time.

Ostrea edulis of Europe is considered by some authors to be identical with our northern oysters. I cannot see enough resemblance in either shell or animal to agree with them. Experienced oyster-eaters can tell the difference between *borealis* and *Virginica* instantly by the taste, having no knowledge whatever of the shells. Having tried to eat English, Scotch, French and Dutch oysters, judging from that standpoint I could never believe they were the same species as the *Ostrea borealis*, the finest eating oyster in the world.

[The following species were omitted in their proper place:]

175. *Pisidium variabile* Prime.

Shell heavy, oblique inequilateral, inflated, anterior longer, narrower and angulated at the end; beaks full, prominent, not approximating at the apex; valves solid, interior light blue; epidermis glossy, color variable, straw or greenish-brown, with a yellow zone on the basal margin; cardinal teeth united; lateral teeth short and strong. Length $\frac{2.1}{100}$, height $\frac{1.8}{100}$, breadth $\frac{1.7}{100}$ inch.

Described by Temple Prime in Proc. Bost. Soc. Nat. Hist., IV, 163, 1851. Inhabits the Eastern and Middle States. A very common species found in nearly all small streams.

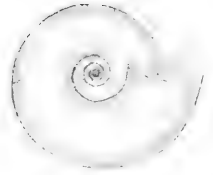
176. *Pisidium Virginicum* Gmelin.

Shell thick, oblique, very inequilateral, coarse and robust in appearance; anterior rounded, posterior broader, subtruncated at the extremity, beaks large; valves solid, interior light-blue; epidermis greenish-brown to chestnut, with zones of a darker shade; hinge margin curved; cardinal teeth two, shaped like the letter V reversed; lateral teeth short and strong. Length $\frac{3.5}{100}$, height $\frac{2.9}{100}$, breadth $\frac{2.1}{100}$ inch.

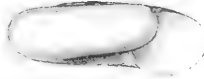
This is one of the largest species of *Pisidium* in America. It inhabits running streams in New England and Canada, and throughout the Middle States, and in a few of the Western States. Say, in 1819, described this shell under the name of *Cyclas dubia*, and it is generally known to collectors under this name, but Mr. Prime has shown it to be identical with one described by Gmelin, in 1788, as *Tellina Virginica*; he, therefore, changes the name to its present one as adopted above.



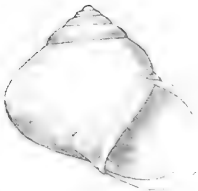
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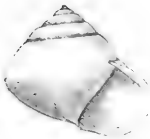
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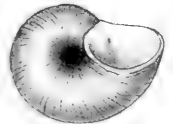
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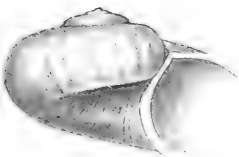
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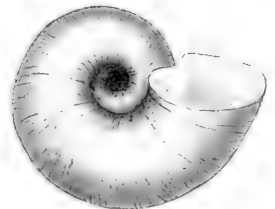
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NEW LAND SHELLS FROM THE SANTA MARTA MOUNTAINS, COLOMBIA.

BY H. A. PILSBRY AND G. H. CLAPP.

The species described below were collected by Mr. and Mrs. Herbert H. Smith, in the course of their recent collecting tour in the Santa Marta region.* The country explored proved to be singularly unproductive in land mollusks, both species and individuals being, with the exception of a few forms, very scarce. However, the proportion of new forms was high, and indicates considerable local specialization, as would be expected from the topography of that portion of Colombia.

Glandina callista n. sp. Pl. vii, fig. 7.

Shell fusiform, very thin, pale brownish-yellow with a few indistinct darker streaks, more numerous on the spire, and encircled by numerous narrow, inconspicuous buff spiral lines between the periphery and suture and on the spire. Surface but slightly glossy, sculptured with fine, somewhat irregular striae, and weakly scored by fine, close spiral striae, better developed below. Suture distinctly margined with a row of small bead-like folds, each formed usually by the coalescence of two, or the knob-like enlargement of one of the striae. Spire acuminate. Whorls nearly 7, but slightly convex, the last more inflated, tapering below. Aperture slightly oblique, four-

*The *Bulimulidæ* collected have been noticed in the current volume of the *Manual of Conchology*, two being there described as new. Two other species, *Pleurodonte clappi* and *Nenia smithæ*, have already been described and figured in this journal.

sevenths the length of the shell; outer lip evenly arcuate; columella very concave, truncate as usual below. Parietal wall covered with a very thin wash of callus, which swells broadly out upon the whorl in the middle, and is abruptly retracted above. Length 68.5, diam. 26 mm.; length of aperture 38, greatest width 15.5 mm.

Santa Marta Mts. at Valparaiso, in forest at 4500 ft. elevation.

A charming species, remarkable for its acuminate spire, fusiform contour and thin texture. It differs from *G. striata* by its sculpture and the absence of distinct dark varices. *G. plicatula* is a smoother, more obese shell, with shorter aperture. No other South American species is nearly related.

Circinaria ponsonbyi n. sp. Plate vii, figs. 1, 2, 3.

Shell much depressed, flat above, broadly and openly umbilicate, thin, slightly greenish yellow-corneous, with a few faint darker streaks; subtransparent. Surface glossy, irregularly sculptured with wrinkles of growth. Spire almost perfectly flat, the inner whorls hardly perceptibly raised. Whorls a trifle over 5, convex, separated by a deeply impressed, narrowly margined suture, the last whorl wide, evenly rounded at the periphery, convex beneath. Umbilicus about one-fourth the shell's diameter, regularly narrowing, all the whorls being plainly visible. Aperture somewhat oblique, lunato-oval. Peristome simple and thin, the upper termination inserted far above the periphery of the preceding whorl. Alt. 4.9, diam. 13 mm.

Santa Marta Mts. at Cacaguelito, 1500 ft. elevation, under dead leaves.

It is named for our valued friend and correspondent John Ponsonby, of London.

A paler and slightly less depressed form, which may be called *C. ponsonbyi clara*, was taken at El Libano, at 6000 ft. elevation. It is pellucid, faintly greenish-corneous—the largest specimen measuring, alt. 5, diam. 12 mm., whorls $4\frac{1}{2}$. The whorls are somewhat more convex beneath, and the apex is larger.

Aperostoma sanctamarthæ n. sp. Plate vii, figs. 9, 10.

Shell openly umbilicate, depressed, rich chestnut colored with some yellowish streaks and darker lines at irregular intervals; moderately solid. Surface glossy, sculptured throughout with close, fine, rib-striae, which are distinctly wavy or crimped, and occasion-

ally anastomosing or splitting. Whorls $4\frac{1}{3}$, convex, tubular, rapidly enlarging, the last becoming almost free from the preceding near its termination. Aperture but slightly oblique, subcircular, a little angular above. Peristome obtuse, continuous, a trifle excised and retracted on the parietal margin. Umbilicus ample, showing all the whorls, its width contained $4\frac{1}{2}$ times in that of the shell. Alt. 20, diam. 31.5 mm. Length of aperture with peristome 14.5, width 14.3 mm.

Operculum solid, perfectly flat, dull and white externally, composed of about 7 whorls, which are raised in a low ridge or welt on the inner edge, and very obliquely striated, the nucleus a little sunken, and not raised inside. Diam. 12 mm.

Las Nubes estate, Santa Marta Mts., Colombia, at 4000 ft. elev. A single specimen.

Related to *A. popayanum*, but the umbilicus is wider, the striæ stronger, and with another color-pattern. A close examination shows some very faint traces of spiral bands.

Aperostoma smithi n. sp. Pl. vii, figs. 5, 8.

Shell rather narrowly, deeply umbilicate, low-turbinate, very dark chestnut with indistinct wide, black streaks, the eroded inner whorls dull red; moderately solid. Surface glossy, with sculpture of close rib-striæ, which are a little waved or crimped. Whorls fully 4, convex, rapidly widening. Aperture large, moderately oblique, circular, a trifle angular above. Peristome blunt, continuous, in contact with the preceding whorl for a short distance only. Umbilicus deep, its diameter contained 9 or 10 times in that of the shell.

Alt. 14, diam. 20 mm.; length of aperture 10.5, width 10 mm.

Alt. 14.5, diam. 19.5 mm.; length of aperture 10.8, width 10 mm. Operculum whitish externally, composed of about 6 flat whorls around a sunken, corneous nucleus about 1 mm. diam. Internally there is a slight central mucro, which lies just within the edge of the dull scar of attachment. Diam. 9 mm.

Santa Marta Mts. at El Libano, at 6500 ft. elevation, under decaying leaves in forest.

It is about the size of *A. dysoni*, but with stronger, straighter rib-striæ and slightly more oblique aperture. *A. pazi* Crosse is somewhat similar, but has a wider umbilicus, smaller aperture and is more depressed. *A. smithi* has a much smaller umbilicus than *A. sanctæ*

marthæ at any stage of growth; the aperture is larger and more oblique, the color is darker, and the operculum differs. This species is respectfully dedicated to Mr. H. H. Smith.

Helicina sanctæmarthæ n. sp. Pl. vii, fig. 4.

Shell globose-conic, rather thin; variously colored; yellow, corneous-yellow or light red above, paler beneath, variegated with more opaque white or whitish in spiral lines and bands, continuous or interrupted; the suture generally having a dark red border above, apex white or tinted. Surface somewhat glossy, nearly smooth to the eye, but sculptured with fine growth-lines and sparse, unequal and irregularly spaced spiral lines of punctures. Spire straightly conic, rather acute. Whorls $4\frac{3}{4}$ to 5, somewhat convex, the last rounded at the periphery. Aperture oblique, semicircular; lip thin, expanded and reflexed, pale yellow. Basal callus spreading far forward, whitish in the middle, elsewhere transparent.

Alt. 11.5, diam. 13 mm.

Alt. 11, diam. 13.5 mm.

Operculum bluish-white with some darker concentric lines, concave and minutely papillose outside, the papillæ not crowded. Interior glossy blackish, shading to red and then yellowish towards the nucleus, a reddish border at the semicircular periphery. Straight margin yellow-bordered, strengthened by a moderate ridge, which is bent inward near the nucleus.

Santa Marta Mts., Colombia, at El Libano, 6000 ft. elevation, on trees, especially palm leaves.

This species closely resembles *H. columbiana* Phil. at first sight, but it has a more straightly conic spire and entirely different minute sculpture, *H. columbiana* being decussated with crowded spiral lines crossing the growth striæ. The operculum in *H. sanctæmarthæ* is thicker than in *H. columbiana*, and of a different color outside, but the internal structure and color are about the same.

Helicina cacaguelita n. sp. Pl. vii, fig. 6.

Shell globose-conic, thin, pale yellow or reddish-corneous, with the spire pale red, the suture margined with red above, last whorl encircled with several opaque whitish bands or lines. Surface nearly smooth, showing faint growth-lines and almost obsolete spirals under a lens. Spire straightly conic, rather acute. Whorls $4\frac{1}{2}$, somewhat convex, the last rounded peripherally. Aperture oblique and semi-

circular. Outer lip very narrowly reflexed, whitish, a little thickened within. Basal callus moderately spreading, whitish in the middle, elsewhere transparent.

Alt. 7.8, diam. 9.5 mm.

Alt. 7.2, diam. 8.3 mm.

Operculum thin, externally whitish at the nucleus and along the straight margin, a red area around the nucleus, outside of which it becomes pale blue, with a reddish bordering line; nearly smooth. Inside deep reddish, almost black, fading to whitish along the straight margin and near the nucleus. The straight edge is thickened outside and within.

Santa Marta Mts., Colombia, at Cacaguelito, at 1500 ft. elevation, on the ground in forest under decaying leaves.

A small edition of *H. sanctæmarthæ*, but differing in the less extensive basal callus, the minute sculpture, narrow lip, thinner shell and operculum. It is more globose than *H. tamsiana*. The coloring is similar in some specimens of *H. nemoralina* of Trinidad, but that shell has a more globular last whorl.

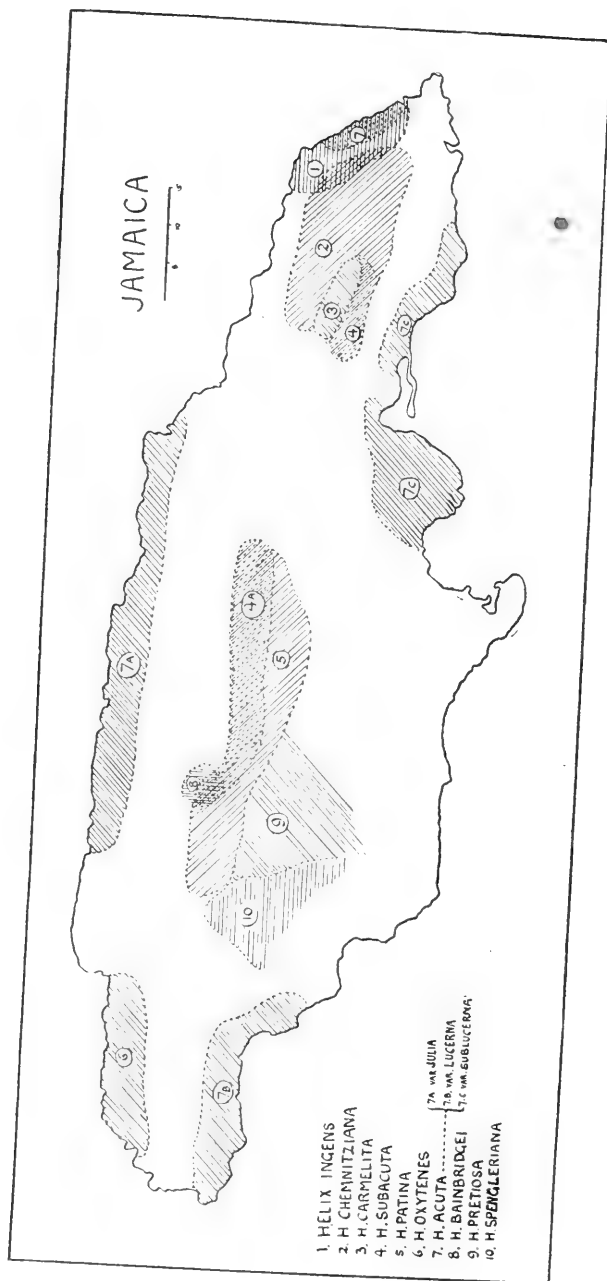
NOTES ON THE DISTRIBUTION OF THE PLEURODONTE ACUTA GROUP.

BY P. W. JARVIS.

As most of the Jamaican land shells in museums and private collections, are usually labelled "Jamaica," a very vague locality, a few notes giving the areas in which some of the species live may not be out of place.

Belonging to the group of which *H. acuta* is type, seven species are recognizable:

1. *Pleurodonte ingens* (Adams).
 2. *Pleurodonte chemnitziana* (Pfr.).
 3. *Pleurodonte carmelita* (Fér.).
 4. *Pleurodonte subacuta* (Pfr.).
 5. *Pleurodonte patina* (Ads.).
 6. *Pleurodonte oxytenes* (A. D. Brown).
 7. *Pleurodonte acuta* (Lam.).
- and three to the group of which *H. bainbridgei* is type.
8. *Pleurodonte bainbridgei* (Pfr.).
 9. *Pleurodonte pretiosa* (Ads.).
 10. *Pleurodonte spengleriana* (Pfr.).



1. *Pleurodonte ingens* (C. B. Ad.) is limited to the John Crow Mountains in Portland (No. 1 in map). It is a mountain species. The largest and most typical specimens come from Moore Town and its immediate neighborhood, but living or dead specimens are to be found scattered in all parts of this area amongst the limestone rocks.

The varieties described by Prof. C. B. Adams, viz., *indigna* and *imperfurata*, are not local forms, but simply individual variations, all three forms being occasionally found together.

2. *Pleurodonte chemnitziana* (Pfr.) has a much wider range than *P. ingens*, being scattered sparsely on the spurs of the Blue Mountain range, and found more plentifully towards the eastern limits of this area (No. 2). A small pale variety (which is otherwise typical), occurs at Bath, in St. Thomas parish.

3. *Pleurodonte carmelita* (Fer.) is limited to the higher regions of the Blue Mountain range. This species seems to thrive on the shaly soil, while all the other species are most plentiful in the limestone regions.

4. *Pleurodonte subacuta* (Pfr.) apparently has two habitats, the first on the southern slopes of the Blue Mountain range (No. 4 in map), where it is sometimes found in company with both *P. carmelita* and *P. chemnitziana*. The second habitat (No. 4 A) commences about thirty miles west, at Mount Diablo. Thence it occurs plentifully on the mountains running due west to Ulster Spring, where a few stragglers have been found. At present it has not been found in the intermediate space (which is very poor in land shells), but further search may possibly connect these two areas, or it may be found that the form of each area constitutes a distinct species.

5. *Pleurodonte patina* (C. B. Ad.) occupies a very large area. In the extreme east of it the variety *nobilis* of C. B. Adams is found on the slopes of Mount Diablo. A few miles west, at Cave Valley and Aenon Town, the largest and most typical form of *P. patina* crops up, and is undoubtedly the locality where Prof. Adams obtained his types. It spreads west through the higher parts of St. Ann's and Trelawny to Moore Town in St. James, gradually losing its most distinctive characteristics, such as the concavity of the shell above and below the periphery; though retaining both the smooth surface and the single small tooth.

6. *Pleurodonte oxytenes* (A. D. Brown) is limited to Hanover. It is a very clearly marked species, yet subject to considerable individual variation.

7. *Pleurodonte acuta* (Lam.) is found throughout the southern Parishes of St. Elizabeth, Manchester, Clarendon and St. Catherine; though in some localities slightly specialized forms occur, I have not yet been able to arrange them satisfactorily. As a rule the specimens from the higher lands are larger and with small teeth, sometimes only one tooth, whilst the coast and lowland forms are very small, and have large teeth.¹ The variety *acutissima* is not a local race, for in almost every locality of say three or four miles in extent it usually turns up as an acutely carinated form of the local variety.

7 A. *Pleurodonte acuta* (Lam.). The variety *julia* occurs on the hills near the sea on the northern coast. Acutely carinated shells with depressed spire are frequently found amongst the common and typical forms. This variety *julia* may ultimately prove to be the lowland variety of *P. patina*—not of *P. acuta*.

7 B. *Pleurodonte acuta*, var. *lucerna* (Müll.).² The most pronounced forms are found on the coast hills of Westmoreland. Further inland occur larger specimens with smaller teeth, and the aperture of the shell much wider. Prof. C. B. Adams' *fuscolabris* is a color variety.

7 C. *Pleurodonte acuta* var. *sublucerna* (Pilsbry) occurs in the lowlands of St. Catherine and along the coast hills of St. Andrew. Near Yallahs there is a very small depressed shell with very large teeth and the umbilicus uncovered. Prof. C. B. Adams mistook this shell for *P. lucerna* of Müller, and so named it in his collection at Amherst College; so when he had the Westmoreland specimens brought to him he described them as new under the name of *fuscolabris*. On the northeast slopes of the John Crow Hills, especially at Quaw Hill, a very large form of this umbilicated shell is found.

8. *Pleurodonte bainbridgei* (Pfr.) (No. 8 in map), occurs only in the neighborhood of U!ster Spring in Trelawny. It is distinguished by having the spire very much depressed.

9. *Pleurodonte pretiosa* (C. B. Ad.) is very widely distributed, being abundant in Manchester (No. 9 on map), and spreading eastward. It is difficult to give any eastern boundaries of this shell, as

¹Specimens of *P. acuta* were taken near Hope Bay, on the north coast in Portland parish, by C. W. Johnson and W. J. Fox, in 1891.—EDS.

²If *P. acuta* and *lucerna* are to be united, the latter will be the species, the former the variety, as *H. acuta* was described nearly fifty years later than *H. lucerna*.—EDS.

weathered specimens are occasionally found in Clarendon, and St. Catherine. Prof. C. B. Adams, who was unacquainted with *bainbridgei* of Pfeiffer, mistook the nearly allied Manchester species for it, and coming across the albino form, described it as the var. *pretiosa* of *bainbridgei*; consequently, his varietal name must be used to designate this species, which is usually of a rich chocolate color.

10. *Pleurodonte spengleriana* (No. 10 in map) is the St. Elizabeth species, and is readily distinguished by its smooth surface.

Before closing these notes I must acknowledge the kindly aid my Master in Conchology, Mr. Henry Vendryes, has always so generously given me. Had it not been for his help I should never have been able to send these communications. I must also acknowledge the aid my friend, Mr. Geo. Nutt, has given in helping me to map out most of the groups of Jamaican land shells.

NOTICES OF NEW LAND SHELLS OF THE JAPANESE EMPIRE.

BY H. A. PILSBRY.

Mandarina hirasei n. sp. Shell umbilicate, depressed-globose, solid and strong, smoothish, slightly marked with growth-striae, and under a lens seen to be densely striate spirally. Spire low-conoidal, the apex obtuse. Whorls $4\frac{1}{2}$, the last rounded peripherally and beneath, slightly descending in front. Aperture quite oblique, rounded-truncate; peristome thick, expanded, narrowly reflexed below, a little dilated at the columellar insertion, partially covering the umbilicus. Alt. 13, diam. 21 mm.

Chichijima, Ogasawara (Mr. Y. Hirase, No. 860).

Quite unlike any of the known species. The specimens are dead, without cuticle, and white. Like *M. ruschenbergeriana* and *M. palasiiana*, the species is probably extinct.

Hirasea diplomphalus n. sp. Shell very small, shaped like an Ammonite or like *Diplomphalus*, the base perforate, spire rather narrow and deeply sunken, periphery broadly rounded. Whorls $4\frac{1}{2}$, the last sub-angular above. Aperture vertical, narrowly crescentic, the outer lip thickened with a white rib within except near the upper termination. Alt. 3.2, diam. nearly 2 mm.

Chichijima, Ogasawara (Mr. Hirase, No. 863).

Hirasea goniobasis n. sp. Shell sub-perforate, dull brown, acutely

carinate at the periphery, low-conic, striate and terraced above, sub-angular at base. Whorls $5\frac{1}{2}$, slowly widening. Aperture vertical, narrow, trilobed, the outer lip thickened and sub-dentate within, columellar margin thickened. Alt. 2.2, diam. 3.8 mm.

Chichijima, Ogasawara (Mr. Y. Hirase, No. 864).

HIRASIELLA, gen. nov. Shell small, bullet-shaped, like *Euconulus* or *Kaliella*, polished, sub-perforate, the lip contracted and thickened within. The type of this group would be considered a *Kaliella* were it not for the characters of the peristome, which shows it to be allied to *Hirasea*. The young have a thin lip, like *Kaliella*.

Hirasiella clara n. sp. Shell sub-perforate, glossy and smooth, yellowish, elevated with convex outlines, bullet-shaped, the periphery rounded, base very convex. Whorls $6\frac{3}{4}$, convex. Aperture shortly lunate, contracted, the lip thickened within. Alt. 3, diam. 3 mm.

Chichijima, Ogasawara (Mr. Hirase, No. 867).

Diplomatina dormitor n. sp. Shell similar to *D. cassa* in shape, but a little larger; evenly sculptured with delicate, spaced rib-striae. Whorls 7, the last narrower and ascending as usual. Aperture sub-circular, the peristome continuous across the parietal wall. Columella toothed below, the tooth or fold moderate, ascending, not enlarged within the last whorl. Palatal fold short. Length 3, diam. 1.5 mm.

Kikaiga-shima, Osumi. Mr. Y. Hirase, no. 870.

This form has been found fossil in a (post-pliocene?) deposit containing many land shells. It differs from *D. cassa* in the much shorter palatal fold, and far less developed columellar lamella within the last whorl. Modern species of the same region, such as *D. saginata* of Oshima, are much smaller. This is the first *Diplomatina* known from Kikaiga-shima.

ALPHEUS HYATT.¹

Alpheus Hyatt died suddenly of heart disease at Cambridge, Mass., Jan. 15, 1902. He was born at Washington, D. C., April 5, 1838; prepared for college at the Maryland Military Academy and passed a single year at Yale. After a year's travel in Europe he

¹ Taken in part from the excellent memoir by Mr. Samuel Henshaw. *Science*, Vol. XV., p. 300, Feb. 21, 1902.

entered the Lawrence Scientific School at Harvard in 1858, graduating with the degree of Bachelor of Science in 1862.

He enlisted in the volunteer militia in 1862 and at the close of the Civil War was mustered out as Captain of the 47th Massachusetts Infantry. Returning to Cambridge, he resumed his studies under the guidance of Prof. Louis Agassiz, the greater part of his time being directed to work upon the fossil Cephalopoda. In 1867, Mr. Hyatt went to Salem, Mass., and was associated with Messrs. Putnam, Packard, and Morse in the care of the natural history collections of the Essex Institute and the Peabody Academy of Science, and in the editorial management of the *American Naturalist*. He remained in Salem until 1870, when, on May 4, he was elected custodian of the Boston Society of Natural History. By yearly choice Mr. Hyatt remained the scientific head of the Society until his untimely death.

For the head of a museum of Natural History, Prof. Hyatt had many marked qualifications; his knowledge of zoölogy, of paleozoölogy and geology was extensive; he was skilful in manipulation, suggestive in council, enthusiastic and approachable. His plan that a natural history museum should be arranged so that a visitor on entering should pass from the simpler groups to those more specialized, and that the specimens in each case should be similarly classified, though opposed as impractical, is both sound and feasible.

Prof. Hyatt's reputation as a teacher will rest largely on the work he did for the Teacher's School of Science. His management of this school was very skilful, and his lectures, of which he gave many courses, were uniformly successful.

In the pursuit of his investigations, Prof. Hyatt not only studied the accumulations preserved in museums in this country and abroad, but he partook in active field work; he dredged off the east coast at various points from Labrador to Noank, Conn., and explored many geological horizons in Canada, New England, New York and the far west.

The following are some of his more important papers on mollusca: On the parallelism between the different stages of life in the individual and those of the entire group of the molluscous order Tetrabranchiata. Fossil Cephalopods of the Museum of Comparative Zoölogy. The genesis of the Tertiary species of *Planorbis* at Steinheim. Genera of fossil Cephalopods. Genesis of the Arietidæ.

From the beginning Prof. Hyatt's researches were very largely devoted to evolutionary questions, and to the special study of fossil Cephalopods; at the time of his death he was one of the foremost authorities upon the fossil Cephalopoda. The true value of his work upon this group must be left for the future; memoirs such as the Genera of fossil Cephalopods, and the chapter on the Cephalopoda contributed to the English issue of Zittel's Palæontology cannot be properly estimated by the present generation; they require prolonged and detailed study founded upon large series of specimens. His theory of parallelism based on acceleration and retardation, and his discoveries concerning the laws of development, growth and decline were advocated with persistence and vigor; and while his treatment is not always lucid, he is to be credited as the originator of a distinct school, a school devoted to exact methods of research. The growth of this so-called Hyatt school, never of greater importance than at the time of his death, was a source of sincere gratification to him.

Prof. Hyatt possessed traits of character the worth of which cannot be exaggerated; his private life, though uneventful, was attended with many blessings; he had vigorous health, congenial work and many friends. He enjoyed scientific meetings and general society; his welcome to his own home, where he was the most charming of hosts, can never be forgotten.—C. W. J.

We record with great regret the death of Prof. A. G. Wetherby, which occurred Feb. 15. Further notice will appear next month.

GENERAL NOTES.

SERRIDENS OBLONGUS Cpr.—During one of my recent collecting trips to Pt. Loma and Pacific Beach, I found a number of these interesting little bivalves nestling under the mantle or clinging to the outside of the shell of *Ischnochiton conspicuus*. Their minute size seems to make it especially appropriate for them to depend on their big neighbors for protection and support. The specimens were identified by Dr. Dall, who tells me that *Pristophora* being pre-occupied, the genus has been named *Serridens*. He states that up to the date of my finding them here, only the single valve, found by Dr. Carpenter at San Diego, in 1866, was on record.—F. W. KELSEY, SAN DIEGO, CAL.

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