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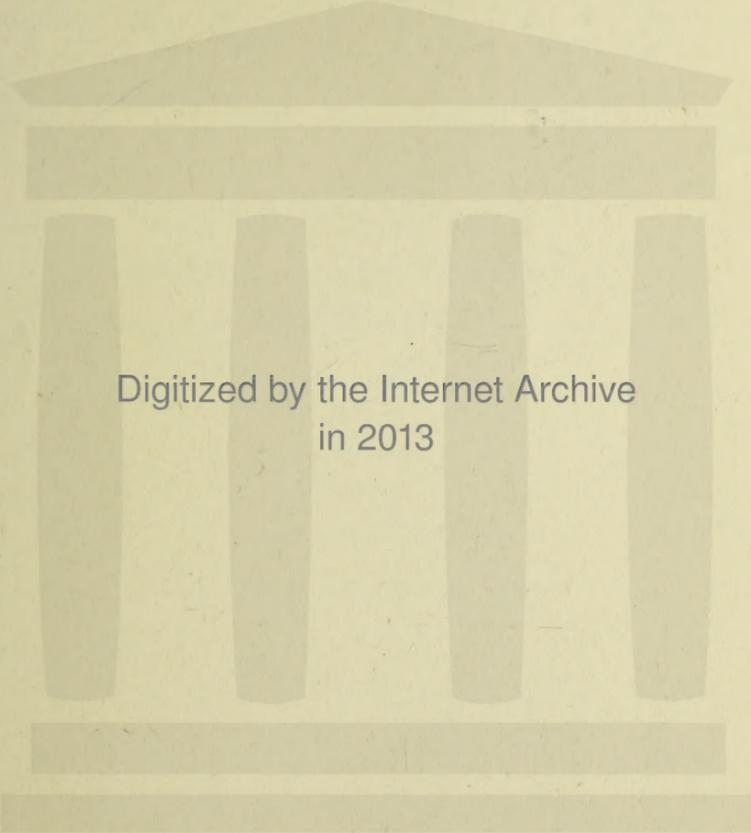
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NAUTILUS

A QUARTERLY JOURNAL
DEVOTED TO THE INTERESTS
OF CONCHOLOGISTS

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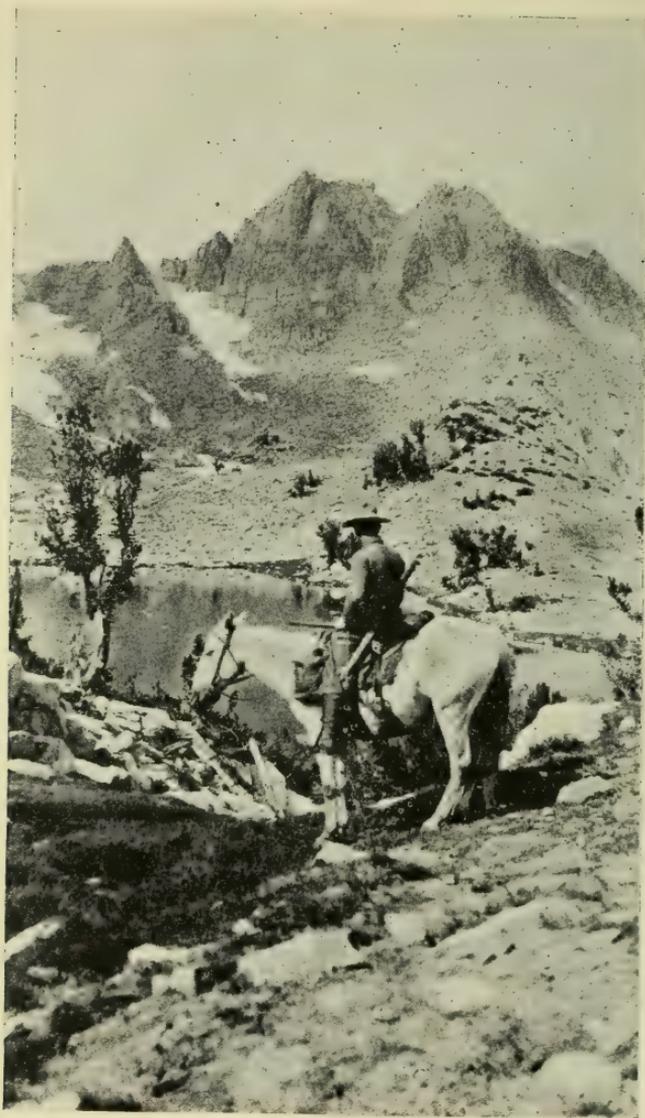
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SNOWBANKS IN AUGUST—GODDARD PASS, SIERRA NEVADA.
NINETY ABOVE IN JANUARY—TWIN CACTI CAMP, ARIZONA.

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Vol. XXXII.

JULY, 1918.

No. 1

NOTES ON THE GENUS TRACHYDERMON CARPENTER.

BY WILLIAM HEALEY DALL.

Iredale has already called attention to the two names for Chitons by Gray in 1821. A little fuller discussion of the consequences of the adoption of Gray's name *Lepidochitona* seems desirable to make the situation perfectly clear. The synonymy which is pertinent is as follows:

Lepidochitona Gray, London Medical Rep., XV, p. 234, 1821.

Chiton marginatus (Pennant, = *cinereus* L., not of Montagu).

Stenosemus Middendorff, Malac. Ross. 1, pp. 103, 109, 117, 122, 1848; (1st sp. *C. marmoreus* Fabr.).

Ischnochiton sect. ††, Gray, Guide Moll., p. 182, 1857 (*Chiton marginatus*).

Trachydermon Carpenter, Suppl. Rep. Br. Assoc., 1864, p. 612 (*Chiton dentiens* Gould); *ibid.*, p. 649: Bull. Essex Inst., p. 153, 1873 (*Chiton ruber* (L.) Lowe, not of Spengler).

Craspedochiton G. O. Sars, Moll. Reg. Arct. Norv., p. 114, 1878 (*Chiton marginatus* Pennant, = *cinereus* L., not of Montagu).

Leptochitona Pilsbry, Man. XIV, p. 150, 1892 (err. typ.).

Section *Tonicella* Carpenter.

Platysemus Middendorff, (part) Mal. Ross. 1, p. 98, 1848 (*C. submarmoreus* Midd.).

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Tonicella Carpenter, Bull. Essex Inst. V, p. 154, 1873 (*Chiton marmoreus* Fabricius).

Boreochiton G. O. Sars, Moll. Reg. Arct. Norv., p. 116, 1878 (*Chiton ruber* L., and *C. marmoreus* Fabricius).

Toniciella Thiele, Gebiss d. Schnecken, II, p. 389, 1891 (*T. marmorea* Fabr.).

Section *Cyanoplax* Pilsbry.

Cyanoplax Pilsbry, Man. XIV, pp. 40, 44, 1892 (*Chiton hartwegii* Carpenter).

Subgenus *Spongioradsia* Pilsbry.

Spongioradsia Pilsbry, Man. XV, p. 65, 1894 (*Trachyradsia aleutica* Dall).

In view of the similarity of names the following synonymy may be useful:

Genus LEPIDOPLEURUS Risso.

Lepidopleurus (Leach Ms.) Risso. Hist. Nat. Eur. Mérid. IV, p. 267, 1826 (1st sp. *L. cayetanus* (Poli) Risso); G. O. Sars, Moll. Reg. Arct. Norv., p. 110, 1878.

Section *Leptochiton* Gray.

Leptochiton Gray, P. Z. S., 1847, p. 127 (*Chiton cinereus* Montagu (not Linné) = *C. asellus* Spengler); Carpenter, Suppl. Rep. Brit. Assoc., pp. 530, 612, 650, 1864 (1st sp. mentioned as a real member of the genus is *Leptochiton nexus* Carpenter).

‡ *Lepidochiton* Carpenter, Rep. Brit. Assoc., pp. 317, 349, 1857 (1st sp. *C. lividus* Midd.). Includes also *C. mertensii* Midd., *C. scrobiculatus* Midd., and *C. proprius* Reeve; the latter = *C. dispar* Cpr., not Sowerby.

I confess to an inability to get anything like systematic order out of Middendorff's extraordinary tangle of names, except where some subsequent author has fixed a species as type, as in the case of *Symmetrogephyrus* (Midd., Feb. 1848), which Chenu (Man., p. 383) has declared to be typified by

Chiton pallasii Middendorff, thus displacing the more familiar *Amicula* (auct. not Gray, 1847) for that group.

Lepidochitona Gray, supersedes *Trachydermon* as indicated by Iredale (Proc. Mal. Soc. London, XI, p. 127, 1914). With the first mention of the latter genus Carpenter associates only two species, *C. pseudodentiens* Cpr. (= *dentiens* Gould) and an undescribed *C. gothicus*. The former must therefore be taken as type, instead of *flectens*, though they are really congeneric. As type of *Lepidochiton* Carpenter, I select his first species, *C. lividus* Midd., which is an *Ischnochiton*, but Carpenter apparently regarded it as synonymous with *Lepto-chiton*, to which he refers the species in his index of 1872. Pilsbry refers the species, in the order above cited, respectively to *Ischnochiton*, *Lepidozona*, *Ischnochiton*, and *Ischnoradsia*. The genus would best be considered a synonym of *Ischnochiton*, especially as no one seems to have quoted it after Carpenter, and he did not clear it up in his MS.

In regard to *Lepto-chiton*, I am inclined to agree with Berry that the west coast and Arctic forms are so different from the typical *Lepidopleurus cayetanus* that a sectional separation is appropriate.

CAMPING IN THE SIERRAS AND THE DESERT. PLATE I.

BY JAS. H. FERRISS.

Late in June of last year, facing westward I departed from the home snailery in search of adventure, and returned about the first of May this year.

At the Grand Canyon of the Colorado a couple of very warm days was devoted to the Bright Angel trail, digging vainly for *Sonorella betheli*.

The Vernal Falls, Yosemite Valley, California, offered another opportunity, with a yield of three Epiphragmophoras, one of these the *E. hillebrandi yosemitensis*, discovered there by Mr. Herbert N. Lowe. This was the opening of another season of delight in the California mountains. For nearly a

month we camped with the Sierra Club at the Tuolumne Meadows, making side trips from there in search of snails and other kinds of trout. Then eastward with our own pack train for more than another month over the high passes, with a side trip to Silver Lake, down into the branches of the San Joaquin, and over the John Muir Pass to the Middle Fork of the Kings River. At Tehipite valley we left the Middle Fork, westward crossed the North Fork, and hit the main river at Trimmer, where we left our mules and took the auto stage for Sanger and Fresno.

Out for health, and in no hurry, the opportunities for collecting were the best. The high altitudes, glaciers and snow banks were another world. In the valleys, with a wealth of flowers, birds, and trout, and the grandest scenery upon the continent, we rested several days at every camping place, as a rule. At Palisade creek we halted nearly a week and had golden trout for every meal.

But the snails were small, and few in number of specimens and species. Riding up the zigzag out of the Tehipite valley the silvery track of a snail was found on the trail, and in half a day I dug up a dozen Epiphragmophoras, looking like *E. traski*, the only large shell found since leaving the Yosemite. Like a *Sonorella*, they were living in a pile of rocks well covered with leaves and rotten wood.

Between trips we hunted up old friends and collections. Some of these were mail-order friends of long standing, and we were greatly pleased to see what they looked like. At Berkeley it was the Alaska bear skins, H. S. Swarth and Robert Grinnell. At Oakland, Fred L. Button, who gave us a two-night exhibition of his shells. At the Academy of Sciences, Golden Gate Park, Barton W. Evermann and the Henry Hemphill collection of western land shells. At the Leland Stanford University, Mr. and Mrs. Oldroyd and the Hemphill duplicates. At Los Angeles, the fossil bones from the asphalt beds. The collections and the collectors demonstrate the California spirit, and were far beyond our expectations.

Tucson likewise, Thornber, Cummins, Voorhies and Taylor at the University of Arizona, McDougal and Shreve at the

Carnegie Desert Laboratory are "live wires" in the natural sciences. Also explorers. Exploring begets good health, and good health begets enthusiasm. Also, Arizona is apparently the head center of natural history, so many species in botany and zoology have their beginning here. By the way, a newspaper reporter at Tucson gave us a reputation for the discovery of 650 new species of snails in Arizona! In figures it is well to give out type-written copy to the press. Then no embarrassing apologies to university clubs will be needful.

To eliminate a limp which interfered with snail-catching more and more, I went into a hospital at Tucson, and a month or two was taken out of this great vacation; but on the whole a large collection was made. With mules for the high desert ranges and a Ford for the smaller ones, one in the convalescent stage may make a good showing. Some of the hills are only 150 feet in height, and with a level desert floor we could almost collect from the machine. At one point it was not more than ten feet from snails to Ford. We seldom walked ten miles in one day, for with the larger mountains and their long and rough mesas we could ride within a half-mile of the snails.

Within the recent geologic period apparently there was a heavy rainfall (Noah's perhaps), so heavy that the large boulders were thrown out upon both sides of the channel, and thus these gulches are often heavily diked on the lower slopes of the mountain. These dikes are often the best collecting grounds, especially in dry weather; the fortifications of five or six feet in depth and twenty wide are easily explored. To catch a live snail at home in some of the larger slides higher up, a steam shovel and a full equipment of quarrymen is needed.

On horseback, with Frank Cole as guide, a trapper, hunter, prospector, forester, now a good snail-hunter and a wonderful cook, I made another trip through the Catalinas and Rincons, finding more of the rough-barked *Sonorellas*. Then into the Galuras, where we captured a smooth-bark *Sonorella* with a diameter of 32 millimeters. At Tucson my partner on the California trips and many others joined the party for a winter

in the desert. To her it seemed a dreary prospect, but a short trip into the Tucson range with its mesas forested with orchard-like trees and giant cactus, the ever-changing botanical societies, wild pigs, deer, mountain sheep, quail and very toothsome cottontails, told another story. The desert was as interesting as the mountains, and the weather in winter was summer-like without excessive heat or annoying insects. With extra tanks of gasoline upon our running-board, any place was home, the tent a parlor, and auto cushions a mattress. There was no lack of firewood or water.

The Tucson range, only an hour or so from the city, was particularly home-like. The first day in camp, Cole brought in a wild pig and baked it. With hot biscuit and steaming coffee, and the fruit and goodies brought from town, we had such a Christmas dinner, with surely as good an appetite, as in ye good old days, and it was on Christmas day. And, too, in a dining hall with columns and arches of living green, with pricklers so long an unruly guest would not scratch the varnish. Our mistletoe decorations were generous, for there are eleven species and varieties in Arizona. Here we found our largest catch in Sonorellas, the rare fern *Cheilianthes pringleyi* and the most beautiful member of the fish-hook group of cactus, *Echinocactus lecontei*. From our camps westward towards the Silver Bell range, twenty miles away, it was a thick forest of the giant cactus, paloverde, mesquite and iron wood as far as the eye could see. Cole brought in a good pair of mountain sheep horns laid out by some lion or wolf about a year ago, and I dug up a nice diamond rattler the second day out. There are eleven species and varieties of rattlers in this state also.

We made seven camps on the west side of the range—Pictured Rocks, Rattler, Sheephorn, Wild Pig, Twin Cacti (Plate I), Cat Mountain and Limekiln. Sonorellas were found at 37 stations in five weeks. I worked about half time.

We also gave about the same amount of time to the ranges west, going as far as Ajo, and then I was in trim to work full time. These mountains west of the city of Tucson rise from a lower level than the Catalinas, Santa Ritas and the ranges

eastward. The higher peaks are supposed to run up to 8,000 feet above the sea. Very few are named, and so far as we could learn none have been surveyed. The Baboquivari system starts at the Mexican line and runs a little west of north. As the Baboquivaris, they are 40 miles in length, then known as Coyotes for 7 miles, as the Roskrige 20, as the Abbie Waterman 10, and as the Silver Bell 10 miles. We hit only a few high spots in the first three, and I collected at one small slide in the latter.

On the road to Ajo we had good success in Sonorellas in the small hills along the Comovo route, and here we first saw the organ cactus and the crucifix tree. Around the Ajo mountains—Wall's Wells and Montezuma Head—and the several nearby ranges, we were unable to find any traces of Sonorellas. The last Sonorella station west was at a small group of hills where the sign board of the Interior Department read "Tucson 101 miles". Beyond that the basalt rocks were covered with white dust that may have been alkali, or the granite had a face so sharp and dry the snails on a hike would require tennis shoes and a canteen. A mining prospector afterwards told us shells were to be found near the south end of the Big Ajo range where there was a small spring and walnut trees, and that they were also in the Mesquites, a range near the Mexican border. We anticipated a change in conditions, and perhaps Mexican or new groups of snails, and we still feel that something may be found in this field—perhaps in the Mesquite and border ranges, or in the Growlers, a forty-mile range west of Ajo—when the Mexican bandits are a little less active among the southern cattle ranges.

On the back track we returned by way of the Covered Wells and White Wells crossing the Quijota range, but found only a few Pupas, Succineas, and other small ones until we camped near some abandoned silver prospects in the southern end. We hunted the placer holes for rattlers without success but found a tiger rattler and Sonorellas in the rocks. We also had further luck in the foot-hills at the southern end of the Cababi range, where Mr. Cole had found Sonorellas in 1914.

Nearly all of this western half of Pima County is occupied

by the Papago Indians. Their horses, cattle, corn and wheat fields, and villages are numerous, and we were under many obligations to them for their good wells. Converted by the Catholic Fathers some three hundred years ago, and with the assistance of the Presbyterians since, they have become an industrious people, fat and very rich. Their housing is not pretentious, as with wealthy white men, but evidently sanitary, for the male in weight averages about 260 and his helpmeet about 180. The white men covet the Papago's grass and browsing, and would like a mix-up; but Uncle Sam at present is plainly giving the Indian a square deal.

Between the Tucson Range and the Ajo we collected at 55 stations, sampling the hills here and there. Other expeditions were made to the Serritas, to the Rosemont and Greaterville mining districts on the east side of the Santa Ritas, and to the Empire and Mustang Ranges on our way to visit old friends in the Huachucas. A. F. Berner, an old friend of the botanists and snail hunters, was found in hard luck. He is now blind and has been confined to his bed with rheumatism for two years. The entomologist, Biedermann, is more fortunate. He has been remarkably successful with beetles and moths, and he is now an acknowledged leader in grafting. With 99 per cent success he has made the Carr Canyon walnuts produce the best of European walnuts, and the Black Hamburgs are now picked from the wild vines of his homestead. He hopes to exhibit home-grown chestnuts in another year, from the mountain oaks. They do it in France. Happy Jack is a prosperous merchant on the Ocean-to-Ocean auto way.

In the Empire Range, draining into the Santa Cruz River, and the Mustangs, draining into the San Pedro, we found both *Holospira* and *Oreohelix* as well as *Sonorella*. Here was further evidence of ancient "Noah flood" mischief. Deep in the clay of the gulches of the Mustang slopes were *Sonorellas* and *Oreohelix*, not to be found alive, or mixed in with the species now living. I worked hard a day and a half to find them alive or freshly dead, but other peaks and gulches had only subfossils of their kind. A like condition existed along the Bright Angel trail in the Grand Canyon. Since my former

visit floods had cut the clay banks and turned up a subfossil species of *Oreohelix* not now found alive on the south rim.

Thus ends my longest adventure, and perhaps the most fruitful. Collections were made at 187 stations, and with something over 140 sets of duplicates thrown into the basket by generous California friends, we will have about 500 separate lots to check up and discuss later.

Joliet, Ill., June, 1918.

NEW VARIETIES OF NAIADES FROM LAKE ERIE.

BY N. M. GRIER.

While the general distinction between the Naiades of Lake Erie and their parent forms of the Ohio drainage have already been commented upon by Walker, (1) representatives in Lake Erie of at least three of the parental forms have never been given the varietal distinction they deserve. The parent species following the nomenclatorial changes proposed by Frierson (2) and Vanatta (3) are *Fusconaia flava* (Raf.), *Elliptio dilatatus* (Raf.), and *Symphynota* (*Lasmigona*) *costata* (Raf.). The comparisons between them and their Lake Erie representatives were made with the aid of Simpson's Descriptive Catalogue.

ELLIPTIO DILATATUS var. *STERKII*, new variety.

Differs from typical *dilatatus* by its smaller size, less elongated and proportionately higher shell. Always inflated, not so pointed posteriorly. Ventral line rather straight, beaks more anterior in position. Epidermis in *dilatatus* dark brown and horn or yellowish, surface usually with uneven growth lines. In *sterkii*, epidermis always smooth or polished, light olive green to yellowish brown to reddish brown. Nacre in *dilatatus* mostly dark purple, salmon and white; that of *sterkii* is lavender, light reddish purple, pearl-blue.

The following table gives maximum, minimum and mean dimensions of 52 shells each of parent and variety:

<i>E. dilatatus</i>			Var. <i>sterkii</i>		
Length	Height	Diameter	Length	Height	Diameter
130 mm.	60 mm.	35 mm.	87 mm.	46 mm.	28 mm.
86 mm.	41 mm.	24 mm.	59 mm.	31 mm.	18 mm.
30 mm.	16 mm.	7 mm.	26 mm.	13 mm.	7 mm.

Factors obtained from above by comparison of length with height and diameter show that greater height and inflation rest with *sterkii*—51% and 30% as against 48% and 25%. In variety *sterkii*, the average distance of the beaks from the anterior extremity of the shell is 18% of the total length; in *dilatatus* this is 25%. There appears to be no substantial difference between values obtained with Simpson's measurements and my own.

This new variety is respectfully dedicated to Dr. V. C. Sterki, who first commented upon the distinction between it and the stream forms. (4) Type no. 61. 4268, card catalogue Carnegie Museum.

LASMIGONA COSTATA var. EREGANENSIS, new variety.

Variety *eriganensis* is smaller, less elongated and proportionately lower than *costata*. Ventral line straight. Epidermis in *costata* light horn-color to dark chestnut in old specimens, surface usually with uneven growth lines. In *eriganensis* always smooth or polished, greenish olive to reddish brown to chocolate-brown, even growth lines. Nacre in *costata* cream-color to lavender or blue. In variety *eriganensis*, pinkish, buff or salmon-color.

Average for 20 shells:

<i>costata</i>			var. <i>eriganensis</i>		
Length	Height	Diameter	Length	Height	Diameter
137 mm.	78 mm.	42 mm.	90 mm.	46 mm.	31 mm.
96 mm.	55 mm.	27 mm.	72 mm.	40 mm.	23 mm.
55 mm.	31 mm.	14 mm.	65 mm.	36 mm.	19 mm.

Factors secured as previously show that *costata* is proportionately higher than var. *eriganensis*, 56% against 53%, but

is not so inflated 27% against 32%. My measurements of *costata* check readily with those of Simpson.

Type no. 61.4720, card catalogue, Carnegie Museum.

FUSCONAIA FLAVA var. PARVULA, new variety.

Variety *parvula* differs chiefly in size from *flava*, being smaller although proportionately higher and more inflated. Epidermis of *flava* yellowish to dark horn-color; in var. *parvula*, yellowish green, greenish olive. Surface with even growth lines. Nacre of typical *flava* mostly white, tinged with salmon in the beak; of *parvula*, pinkish-color or to pale blue.

Dimensions:

<i>flava</i>			var. <i>parvula</i>		
Length	Height	Diameter	Length	Height	Diameter
91 mm.	60 mm.	37 mm.	59 mm.	45 mm.	30 mm.
36 mm.	43 mm.	25 mm.	36 mm.	28 mm.	18 mm.
27 mm.	24 mm.	25 mm.	13 mm.	11 mm.	8 mm.

Ratio of length to height and diameter in *flava*—77% and 42%.

Ratio of length to height and diameter in var. *parvula*—79% and 51%.

Similar results are obtained from Simpson's measurements of *flava*.

Type no. 61.4513 card catalogue, Carnegie Museum.

The type specimens of the above three new varieties were collected by Dr. A. E. Ortmann at Big Bend, Presque Isle Bay, Lake Erie, July 8-12, 1910, and kindly entrusted to me for description. They appear to be generally distributed throughout Lake Erie.

1. Walker, Bryant. "Unione Fauna of the Great Lakes." Nautilus, 27, 1913.
2. Frierson, L. S. "Remarks on Classification of Unionidæ." Nautilus, 28, 1914.

3. Vanatta, E. S. "Rafinesque Type of Unio." Proc. Acad. Nat. Sciences, Philadelphia, 1916.
 4. Sterki, V. "A Preliminary Catalogue of the Land and Freshwater Mollusca of Ohio." Proc. Ohio Acad. Science, IV, pt. 8.
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A FURTHER NOTE ON THE GENUS TRACHYDERMON.

BY S. STILLMAN BERRY, REDLANDS, CALIFORNIA.

Since the publication of my note on the chiton genus *Trachydermon* in the Proceedings of the California Academy of Sciences, (4), vol. 7, p. 245, September, 1917, Mr. Tom Iredale has supplied me with the interesting information that *Trachydermon* Carpenter 1864 is preoccupied, and hence cannot be used in *Polyplacophora* in any sense. This considerably clarifies the whole situation by rendering needless any further investigation as to which species is properly to be regarded as the type of the genus. At the same time the peculiar group of West American chitons comprising the old *Trachydermon flectens* Carpenter and the remarkable *Mopalia heathii* of Pilsbry is automatically left without a name. Having ascertained from Mr. Iredale that he is chiefly concerned with certain other consequences of the nomenclatural tangle we have discussed and has, himself, no intention of taking up the present question, I feel at liberty to propose the new generic name, *Basiliochiton*, based upon *Mopalia heathii* Pilsbry 1898 as its typical representative. A cogent argument for the selection of this rather than the older species as the type of the genus is that the whereabouts, if not the very existence, of the type specimen of Carpenter's *flectens* appears to be unknown. I had supposed it to be in the British Museum, but Mr. Iredale writes me that it is not there. It is possible that it was destroyed along with so many other Carpenterian specimens in the San Francisco conflagration of 1906.

A further and fuller discussion of this group of chitons will appear in a forthcoming publication.

THE SYSTEMATIC POSITION OF TWO SPECIES OF MUSSELS FROM THE
OZARKS.

BY DR. A. E. ORTMANN.

EURYNIA (MICROMYA) VENUSTA (Lea).

Lampsilis venusta Simpson, Synopsis, 1900, p. 543. — Descr.
Catal., 1914, p. 89.

A large number of specimens has been received from L. S. Frierson, collected by A. A. Hinkley on July 30, 1914, in James River, at Galena, Stone Co., Mo.

Specimens of this lot have been sent to B. Walker, who also believes them to belong to *U. venustus* Lea, a species closely allied, on the one hand, to *L. ellipsiformis* (Conr.) (Simpson, 1914, p. 128), and, on the other hand, to *L. pleasi* (Marsh) (Simpson, p. 129). In fact, the latter is hardly anything else but a smaller and thinner *venusta*. I have no doubt that all three group together, and very likely the anatomy will be the same. Utterback (Amer. Midl. Natural, 4, 1916, p. 141) places *ellipsiformis* in the genus *Nephronaias*, but I do not think that this is correct, since he describes the *papillæ* on the mantle edge.

Call (Tr. Acad. St. Louis, 7, 1895, p. 57) believes that *pleasi* is identical with *venustus*, and, according to Frierson (in litt.), *venustus* is the same as *ellipsiformis*. Meek & Clark (Bur. Fisher, Doc. no. 759, 1912, p. 19) mention, from Big Buffalo Fork, *Lampsilis venusta*, which, according to their remarks, is this form.

Anatomy: Soft parts (3♂♂ and 3 sterile ♀♀ are at hand) of the usual *Eurynia*-structure. Anal and supraanal openings separated by a moderate mantle connection. Anal with distinct crenulations, branchial with papillæ. Posterior margins of palpi connected at base only. Inner lamina of inner gill entirely connected with abdominal sac.

Marsupium in posterior half of outer gill, with a rather larger non-marsupial section at posterior end. Ovisacs about 15 to 20. *Mantle margin*, in front of branchial, slightly lamellar, with small, irregular papillæ, which are not crowded.

and extend forward nearly to the middle of the lower margin, becoming quite distant and small in front.

Color of soft parts whitish, with black pigment around anal and branchial openings, and a brown or blackish streak running forward on mantle margin on the inside of the papillæ. Edge of marsupium with brown pigment.

This species undoubtedly belongs near the group, of which *E. vanuxemensis* may be regarded as the type. The anatomy is practically the same, and the papillæ on the mantle margin are very much alike. Also in the shell are certain common peculiarities, since *E. venusta* has, in the female, an indication of that peculiar "constriction" seen in the *vanuxemensis* group. Our species, however, differs in the more elongate shell, weak development of postbasal expansion of the female, which is located rather more anteriorly, thus suggesting, to a degree, the shape seen in *Medionidus plateolus* (= *conradi*), with which species *U. pleasi* has been compared by Marsh. My specimens have a strong tendency to become more or less intensely of a salmon-color in the nacre.

This seems to be a species characteristic for the Ozark region.

LAMPSILIS BREVICULA (Call).

L. brevicula and *L. brevicula brittsi* Simpson, 1900, p. 533.—1914, pp. 57, 58.

L. brittsi Simps. is an absolute synonym of *brevicula* Call: the differences mentioned by Simpson do not hold good at all. The emargination of the posterior basal margin of the female shell is not always present, probably only in old specimens [as in *L. satura* (Lea)]. Among my material there are no specimens which show it.

A number of individuals is at hand from James River, Galena, Stone Co., Mo., and from White River, at Cotter and Norfolk, Baxter Co., Ark. (L. S. Frierson donor). From Galena and Cotter I have specimens with soft parts, collected July 31 and August 2, 1914 (by A. A. Hinkley). Among them is a gravid female, caught in the act of discharging glochidia (July 31), so that this date indicates the end of the breeding season.

Anatomy of the *Lampsilis* type, and agreeing almost completely with that of *L. luteola* (see: Ann. Carn. Mus., 8, 1912, p. 348). The mantle flap is of the same shape as in this species, with the edge irregularly toothed, the largest teeth standing on the free, anteriorly projecting lobe, giving it a lacerated appearance. Also the color markings are the same (streak of black or brown pigment, and I think I can distinguish in some of my specimens an indistinct eye-spot).

Glochidia suboval, agreeing in shape and size with those of *L. luteola*; their L. is 0.23, their H. 0.28 mm. Surber has figured them [Rep. U. S. Comm. Fish. for 1914, App. 1915 (Fish. Doc. no. 313), pl. 1, f. 14]. His measurements are: 0.230×0.290 , while Utterback (for var. *brittsi*, Am. Midl. Nat., 4, 1916, p. 173 gives: 0.250×0.305).

According to its anatomy, this species falls in the *luteola* group of *Lampsilis*, and represents a peculiar type of it, which seems to be restricted to the Ozark region, and may be regarded as having the same relation to *L. luteola* as has *L. fasciola* (= *multiradiata*) to *L. ventricosa*. (Smaller, thin-shelled form, with numerous fine, broken rays; the shell is, in the average, less elongated than that of *luteola*).

I do not understand why Utterback (l. c.) places this species in the genus *Eurynia*, since he describes very well the *flap* of the mantle margin.

NEW LANDSHELLS FROM THE PHILIPPINES.¹

BY PAUL BARTSCH.

HEMIPLECTA SAGITTIFERA BATANENSIS, new subspecies.

Mr. Walter F. Webb, of Rochester, N. Y., has sent to the U. S. National Museum two *Hemiplectas* from the island of Batan, off northern Luzon, which belong to the *sagittifera* complex. This is a dark-colored race, which agrees fairly well in size with typical *sagittifera* from the Sinit region of Luzon, the type locality of *Hemiplecta sagittifera*, but is considerably

¹ Published by permission of the Secretary of the Smithsonian Institution.

more depressed and of much darker coloration. The basal portion of the last whorl is also less inflated. The aperture is proportionately longer and more compressed. The type, Cat. No. 218765, U. S. N. M., has 4.4 whorls and measures: altitude, 23 mm.; greater diameter, 50.2 mm.; lesser diameter, 38.5 mm.

OBBA LISTERI BATANENSIS, new subspecies.

The *Obba* from the island of Batan, is also distinct from any of the other forms known from the Philippines, as shown by specimens received from Mr. Webb. It belongs to the *Obba listeri* complex. It is nearest related to *Obba listeri costata* Semper, from the island of Camigin, of the Babuyan Group, north of Luzon. It differs from this markedly by its more regularly conic outline, somewhat greater elevation, paler ground color, and rougher incremental sculpture. The type, Cat. No. 218764, U. S. N. M., has 4.4 whorls and measures: altitude, 10 mm.; greater diameter, 26.7 mm.; lesser diameter, 22.1 mm.

COCHLOSTYLA POLYCHROA BURIASENSIS, new subspecies.

Specimens of the *Cochlostyla polychroa* complex sent to the U. S. National Museum for determination have made it necessary to critically examine that group. This examination has revealed the fact that most of the specimens in collections passing under this name are from the island of Burias. The type locality for *Cochlostyla polychroa* is Temple Island, an island adjacent to Burias. A series of specimens from this island in the collection of the National Museum show that the shells of the typical form, that is *Cochlostyla polychroa polychroa*, are larger, decidedly more elevated and conic than the specimens from the island of Burias. The coloration, too, is much more vivid in the Burias shells than those from Temple Island. I shall therefore bestow the name *Cochlostyla polychroa buriasensis* upon the shells from Burias Island.

The type of this shell, Cat. No. 218788, U. S. N. M., has 4.7 whorls and measures: altitude, 35 mm.; greater diameter, 30.7 mm.

NOTES ON THE GLOCHIDIA OF STROPHITUS EDENTULUS PAVONIUS
(LEA) FROM COLORADO.

BY M. M. ELLIS AND MARIE KEIM.

While collecting material for class use from St. Vrain Creek, near Longmont, Colorado, December 6, 1817, 25 specimens of *Strophitus edentulus pavonius* (Lea) (det. J. Henderson) were obtained. Of these, 15 contained large numbers of well-developed glochidia. These glochidia soon freed themselves from the cords when the cords were placed in water after being removed from the gills of the parent mussels, and each individual glochidium began active snapping movements. Many individuals lived for two or three days after leaving the cords and continued active all the while.

This record of gravid specimens of *Strophitus edentulus pavonius* is later in the year than any record given by Surber (Bur. Fish. Doc. 771, 1912) for *Strophitus edentulus* from the Mississippi River, November being the last month in which he found glochidia-bearing individuals of that species.

When compared with the figures and description given by Surber (l. c.) for *Strophitus edentulus*, the glochidia of these Colorado mussels of the variety *pavonius* were found to differ in both size and proportion from the *Strophitus edentulus* type. As these differences may have some taxonomic significance, occurring as they do in the glochidia of a variety of *Strophitus edentulus* taken near the western edge of the range of that variety, the following description of the glochidium of *Strophitus edentulus pavonius* is given.

General shape that of the *Anodonta* type as given by Surber (l. c.) but of a form intermediate between that of *Strophitus edentulus* (fig. 3, l. c.) and that of *Anodonta grandis* (fig. 45, l. c.); hinge line straight; depth slightly greater than the length; marginal spines three, well developed, the median spine being slightly longer than the two lateral spines; from seven to ten rows of spines, counting the marginal row, on each valve; end of the adductor muscle showing from 35 to 50 distinct bundles of fibers. The exact measurements of 20 specimens are given below.

<i>Length in micra</i>	<i>Depth in micra</i>	<i>Length in micra</i>	<i>Depth in micra</i>
254	280	260	264
256	260	260	264
258	264	260	280
260	266	264	274
260	280	266	272
260	272	266	272
260	270	268	272
260	272	270	280
260	270	272	280
260	270	272	280

The modal average of the specimens examined gives an average length of about 260 and an average depth of about 270, the range of variation being 254 to 272 for the length and 260 to 280 for the depth. Surber (p. 8, l. c.) states that the length is greater than the depth in *Strophitus edentulus* and gives 350 for the length and 285 for the depth as average measurements.

The behavior of the living glochidia was interesting in the light of the work of Lefevre and Curtis (Bur. Fish. Doc. 756, 1912) on the metamorphosis of *Strophitus edentulus* without parasitism. These writers state (p. 173) that they were unable to bring about the attachment of the glochidia to fish. Our glochidia of *Strophitus edentulus pavonius* were offered gills from the Topminnow, *Fundulus zebrinus* Jordan & Gilbert and of the Sunfish *Lepomis cyanellus* Rafinesque (these two species of fishes are found in St. Vrain Creek) immediately after the gills were removed from the body of the fish. Fish blood caused an evident increase in the activity of the glochidia and several glochidia seized gill filaments. Once attached the glochidia remained on the gill filament until the experiment was discontinued, i. e. for several hours. No attempt to infect living fish with the glochidia of *Strophitus edentulus pavonius* was made, but the behavior of the living glochidia suggests physiological differences between the glochidia of *Strophitus edentulus* and these western specimens of *Strophitus edentulus pavonius*.

University of Colorado, May, 1918.

NOTES ON NIDIFICATION IN GILLIA AND AMNICOLA.

BY FRANK COLLINS BAKER.

Observations on the nidification and embryology of our American fresh-water mollusks are rare; and contributions to our knowledge of this subject, though they may not be extensive, are of value. With this need for additional knowledge in mind, the writer ventures to present the following fragmentary notes on the nidification of two common genera of American Amnicolidæ, two species of which have but recently been described.

The observations were made while conducting quantitative studies of the animal life of Oneida Lake, New York State's largest inland body of water. The eggs of four genera of mollusks were observed at this time (the latter part of July and the first part of August), *Gillia*, *Amnicola*, *Galba*, and *Physa*. Only the first two genera are considered in this paper. It was hoped that time would permit a more extensive study of these embryos, but the quantitative studies extended to such a late date that there was no opportunity to carry on the very interesting studies on the development of these snails, which would have been of great interest and some value. The information gathered, however, may be considered a contribution to our knowledge of the embryology of these mollusks and may stimulate other students to a study of our fresh-water gastropods.

Gillia attilis (Lea). Pl. 2, figs. 1-8.

Gillia attilis is a very common species in Oneida Lake in the quiet bays, among vegetation. Egg-laying apparently takes place late in June or early in July. In eggs examined July 31st, the embryos were nearly ready to be hatched, the embryonic shell being fully formed. Eggs were observed on six species of plants; *Vallisneria spiralis* (abundant near base), *Potamogeton robbinsii* (on lower three or four leaves), *Potamogeton perfoliatus*, *Scirpus smithii*, *Scirpus americanus*, and *Sagittaria latifolia*.

The eggs are laid singly (never in a capsule as in the

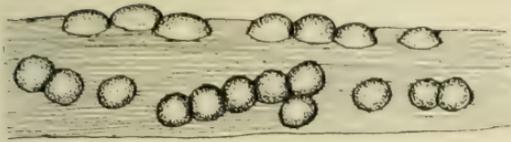
fresh-water pulmonates), either alone or in groups of one, two, or more, but never exceeding six in any one group (as far as observed). As a rule, many eggs were crowded in a small space on the plant surface (see figures 1-3). On some plants but one side of a leaf contained eggs while other leaves contained eggs on both sides of the leaf. Several areas of the leaves of different plants were measured and the number of eggs in this area were counted, with the result shown in table No. 1. These figures indicate the great abundance of the eggs of this mollusk. The leaf used for attachment was generally of a living plant, but in many cases the dead and partly decayed leaves and pieces of plants were utilized for this purpose. In the table all leaves were about 6 mm. wide.

TABLE NO. 1. Number of Eggs of *Gillia attilis* on Plants.

Plant.	Length of Leaf.	No. of Eggs.
<i>Vallisneria spiralis</i>	50 mm.	70
“ “	60 mm.	160
“ “	50 mm.	22
“ “	100 mm.	69
“ “	75 mm.	132
“ “	75 mm.	73
“ “	90 mm.	68
“ “	45 mm.	33

The eggs are somewhat hemispherical in form, 1.25 mm. in diameter, the thickness being about a third of the diameter. Upwards of 80 per cent of the eggs contained living embryos, the balance being dead; a number of these were filled with protozoa. The envelope of the egg is very transparent and the embryo is transparent enough to permit some of the organs of the body to be seen through the mantle and transparent shell. The heart, placed near the aperture of the shell, was observed to pulsate very rapidly in all the embryos, in one individual 87 pulsations per minute.

Nearly all of the embryos were in an advanced stage of development, the embryonic shell as well as the external organs of the body—rostrum, tentacles, eyes, operculum, etc.—being fully formed (fig. 4). The embryos moved about in the egg



1



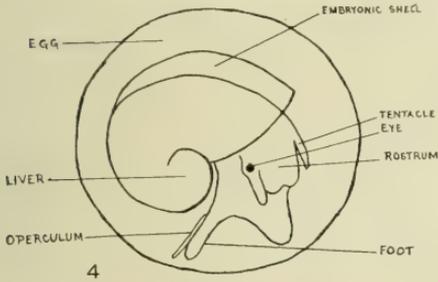
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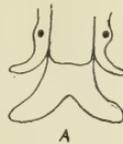
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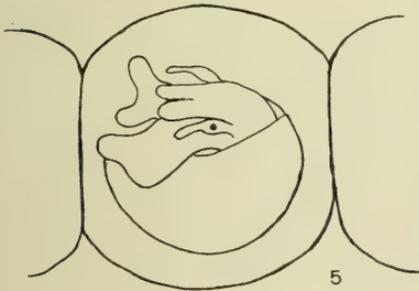


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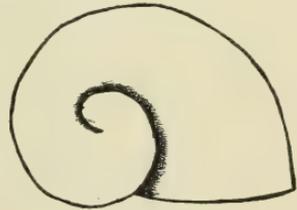


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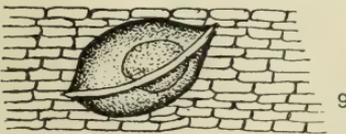
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8



9



10

in the same manner that adult *Gillia* and other Amnicolidæ browse over vegetation, the proboscis moving slowly about and the radula being protruded as in the adult animal. There appeared to be a regular circular movement of the embryo around the area of the egg capsule. A favorite position of the young animal when at rest is shown in figure 5. The rostrum appears to be cleft at the extremity in some individuals and the anterior part of the foot varies greatly in form when the young animal is active (fig. 6).

The embryonic shell is transparent, spermaceti-white in color and about 1.25 mm. in diameter. It consists of rather more than one whorl which enlarges rapidly (fig. 7). The nucleus and a large part of the shell is covered with very fine spiral lines, the lines of growth beginning abruptly near the aperture. The umbilicus is of medium size and rather deep (fig. 8).

Amnicola oneida or *bakeriana* Pilsbry. Pl. 2, figs. 9, 10.

The lenticular eggs of *Amnicola* (figs. 9, 10) were notably abundant in many localities covering all objects on the bottom, including living and dead vegetation, dead and living shells, and bottom debris. Two species, recently described,¹ are represented. It is impossible to differentiate the eggs of the two species, as both occurred with the eggs, but it is suspected that the narrower form of egg (fig. 9) is from *oneida* and the wider form from *bakeriana* (fig. 10). It will be noted that the form of these eggs differs from the figure given by Stimpson² for *Amnicola limosa* in which the egg is much attenuated at both ends. The eggs of the new *Amnicola* were especially abundant in filamentous algæ (*Cladophora fracta* and *Ædogonium* species), the long filaments often being covered with the lens-shaped eggs. *Scirpus*, *Vallisneria*, and other plants were also used for attachment. An effort was made to ascertain the number of eggs on certain species of plants in a measured area, with the result shown in table No. 2. In *Vallisneria*, eggs occurred on both sides of the leaf.

¹ Pilsbry, NAUTILUS, XXX, pp. 44-46, 1917.

² Researches upon the Hydrobiinae, etc., Smith, Miss. Coll., fig. 7, 1865.

TABLE No. 2. Number of Eggs of *Amnicola* on Plants.

Plant.	Size.	No. of Eggs.
<i>Vallisneria spiralis</i>	70 x 5 mm.	44
“ “	70 x 5 mm.	27
“ “	153 x 5 mm.	257
“ “	140 x 5 mm.	58
“ “	140 x 5 mm.	222
“ “	89 x 5 mm.	23
“ “	53 x 5 mm.	93
<i>Potamogeton perfoliatus</i> , leaf ..	64 x 10 mm.	16
“ “	165 x 28 mm.	150
“ “	25 x 5 mm.	21
<i>Potamogeton perfoliatus</i> , stem ..	72 x 2 mm.	42
<i>Potamogeton robbinsii</i> , leaf	19 x 10 mm.	55
“ “	38 x 10 mm.	42
<i>Scirpus occidentalis</i>	95 x 12 mm.	33
“ “	111 x 12 mm.	54
“ “	77 x 6 mm.	76
“ “	77 x 8 mm.	141
<i>Scirpus americanus</i>	111 x 3 mm.	200
“ “	111 x 3 mm.	36
“ “	165 x 3 mm.	150

Quantitative studies show that *Amnicola* is the dominant genus of mollusks in the part of Oneida Lake examined, and the vast number of the eggs of this snail indicates that the group is fully maintaining itself. This fact is of importance economically, as several fish of food value—perch, pumpkinseed, bluegill, sunfish, catfish, sucker—as well as a few smaller fish preyed upon by larger and valuable food fish, use these snails as food. The eggs of *Amnicola* were observed in mid-summer (July 25 to Aug. 4), and the condition of the embryos (in the trochosphere stage) indicate that they would be hatched from the middle to the latter part of August.

EXPLANATION OF FIGURES, PLATE 2.

1. Eggs of *Gillia atilis* on leaf of *Scirpus smithii*.
2. Eggs of *Gillia atilis* on leaf of *Vallisneria spiralis*.
3. A single egg of *Gillia* on leaf of *Vallisneria*.
4. Embryo of *Gillia* about ready to hatch.
5. Embryo of *Gillia* in resting position.

6. Embryo of *Gillia*; forms assumed by fore part of foot.
7. Shell of *Gillia altilis*, top view showing rapid enlargement of whorl.
8. Shell of *Gillia* viewed from the front.
9. Egg of *Amnicola* (? *oneida*) on leaf of *Vallisneria*.
10. Egg of *Amnicola* (? *bakeriana*).

**PLEISTOCENE FOSSILS OF MAGDALENA BAY, LOWER CALIFORNIA,
COLLECTED BY CHARLES RUSSELL ORCUTT.**

BY WILLIAM HEALEY DALL.

In a recent visit to Magdalena Bay, Mr. Orcutt obtained a series of Pleistocene fossils from a deposit on Magdalena Island which prove very interesting. A number of the species average larger than the recent forms of the same name, others, like *Strombus granulatus*, are uniformly smaller. Many of the species have not been reported from so far north in the recent state, and on the whole the assembly has a more topical aspect than that of the recent fauna. One or two of the largest forms appear to be new. The list follows:

Bullaria aspersa A. Adams.	Vasum caestus Broderip.
Terebra armillata Hinds.	Oliva incrassata Solander.
Conus fergusonii Sowerby.	Olivella dama Mawe.
Conus vittatus Hwass.	Phyllonotus stearnsii Dall, n. sp.
Conus, cf. ximenes Gray.	Phyllonotus bicolor Valenciennes.
Conus purpurascens Broderip.	Phyllonotus princeps Broderip.
Conus lucidus Mawe.	Solenosteira anomala Reeve.
Conus tornatus Broderip.	Patellipurpura patula Lamarck.
Surecula maculosa Sowerby.	Thais biserialis Blainville.
Crassispira nigerrima Sowerby.	Thais kiosquiformis Duclos.
Cancellaria obesa Sowerby.	Macron aethiops Reeve.
Cancellaria candida Sowerby.	Arcularia tegula Reeve.
Cancellaria cassidiformis Sowerby.	Strombina dorsata Sowerby.
Lyria (Enaeta) cumingi Broderip.	

- Strombina solidula* Reeve.
Strombus gracilior Sowerby.
Strombus granulatus Wood.
Cypraea annettae Dall.
Trivia radians Lamarek.
Cerithium gemmatum Hinds.
Turritella nodulosa King.
Neverita recluziana Deshayes,
 small variety.
Polinices uber Valenciennes.
Crepidula excavata Broderip.
Crucibulum imbricatum Sowerby.
Crucibulum spinosum Sowerby.
Fissurella volcano Reeve.
Fissuridea murina Carpenter.
Astraea undosa Wood.

Ostrea veatchi Gabb.
Pecten circularis Sowerby.
Cardium biangulatum Sowerby.
Cardium procerum Sowerby.
Metis alta Conrad.
Tagelus violaceus Carpenter.
- Parvilucina approximata* Dall.
Phacoides lamprus Dall.
Phacoides lingualis Carpenter.
Diplodonta (Felaniella) sericata Reeve.
Diplodonta orbella Gould.
Divaricella eburnea Reeve.
Aligena cerittensis Arnold.
Dosinia ponderosa Gray.
Macrocallista squalida Sowerby.
Macrocallista orcutti n. sp.
Chione succincta Valenciennes.
Chione undatella Sowerby.
Anomalocardia rugosa Sowerby.
Cyathodonta undulata Conrad.
Cryptomya californica Conrad.
Schizothaerus nuttallii Conrad, var. *capax* Gould.
Panope generosa var. *taeniata* n. var.

Macrocallista orcutti n. sp.

Shell ovate-triangular, convex, inequilateral, solid and very heavy, six inches long, the beaks two and one-half inches behind the anterior end, incurved, prosocoelous, having neither lunule nor escutcheon; the surface smooth except for slight incremental undulations, irregular, but stronger toward the ends and near the base, where they are sometimes supplemented by fine striations; anterior slope more abrupt than the posterior, both ends rounded, the posterior moderately attenuated, the base roundly arcuate; hinge of the type of that of *M. squalida* but more concentrated, the posterior ear-

dinal more than half as long as the nymphal callosity; muscular scars large, the anterior deeply impressed; there is no subumbonal cavity; pallial sinus short, extending forward less than half the length of the shell, acute, subtriangular; margin of the valves smooth. Length of shell 158; height 135+; diameter of right valve 40 mm.

A single slightly imperfect right valve was obtained on Magdalena Island. Than its nearest recent relative, *M. squalida*, it is larger, more rounded, much heavier, with a less uniformly smooth surface, and more concentrated hinge. In *M. squalida* the right posterior cardinal is less than one-third the length of the nymph, and the pallial sinus somewhat more than half as long as the shell. The type specimen is in the National Museum collection. It seems to be the heaviest Venerid of the coast except *Tivela stultorum*.

Panope (generosa Gould var.?) *taeniata* n. sp.?

Shell in a general way resembling *P. generosa*, from which it is best distinguished by a differential diagnosis. The shell of *taeniata* is more arcuate, more attenuated behind, less squarely truncate, the valve more inflated, with more of a cavity under the beak, with a shorter ligament, and with the posterior adductor scar nearly circular, while in *generosa* it forms an elongate oval; the anterior scar is also larger and wider than in *generosa*. Length of shell six and three-quarter inches, height three and seven-eighths, diameter of left valve an inch and a quarter. Compared with *generosa* the dimensions are as follows in millimeters.

M. taeniata, lon. 170, alt. 103, diam. 60, truncation 65.

M. generosa, lon. 172, alt. 97, diam. 48, truncation 78.

The left valve of *taeniata*, from which this description is drawn up, has a narrow rounded low rib extending from near the beak to the lower margin near the base of the truncation, but none of the specimens of *generosa* show anything of the kind. This, however, may be an individual mutation and requires confirmation by other specimens. The valve described was found on the beach, probably washed out of the deposit from which the fossils were obtained.

Murex (Phyllonotus) stearnsii new species.

Shell small, white, tinted with reddish brown on the varices of which there are eight, thick and wide, on the early whorls and seven on the last whorl; nucleus small, smooth, of two whorls, followed by about five subsequent whorls; shoulder high, rounded, the space between it and the suture pit-like between the varices; spiral sculpture of nine or ten low, strong ridges, incurved and guttered on the summit of the varices, with an intercalary series of smaller cords, the whole sharply spirally threaded and crossed by fine, rather sharp axial threads between the cords; aperture oval, hardly lirate, canal short, broad, almost closed, the base of the whorl somewhat constricted. Height 50, diameter of shell 35, length of aperture and canal 33 mm.

Fossil on Magdalena Island. Recent from Acapulco to Manta, Ecuador.

This is nearest to *P. humilis* Broderip, of Panama, which has recurved spines, is generally more compact, and when adult much smaller.

LIST OF SHELLS FROM ANGEL AND TIBURON ISLANDS, GULF OF CALIFORNIA, WITH DESCRIPTION OF A NEW SPECIES.

Collected by L. C. Decius and A. D. Fyfe, November, 1917.

BY I. S. OLDROYD.

ACANTHINA ANGELICA, n. sp.

Shell elongate with sloping shoulders, surface with heavy revolving striæ crossed by fine longitudinal ribs, which overlap forming a net-work; color grayish with markings of chocolate-brown here and there. Whorls five; aperture purplish within; columella straight, same color as aperture; outer lip thickened, dentate and with a strong tooth at its base. Alt. 26, diameter 13 mm. Canal short, open. It is nearest to *Acanthina engonata* Conr., but differs from it in slope of shoulders, sculpture, and color of aperture.

Type is in the Stanford Collection.

Type locality, Redondo Bay, Angel Island, Gulf of California.

ANGEL ISLAND SPECIES.

<i>Polinices reclusiana</i> Desh.	<i>Acanthina</i> sp. worn.
<i>Columbella fuscata</i> Sowb.	<i>Cassis coarctata</i> Gray.
<i>Trivia solandri</i> Gray.	<i>Pecten circularis</i> Sowb.
<i>Pecten subnodosa</i> Sowb.	<i>Phyllonotus bicolor</i> Val.
<i>Fusinus dupetithouarsi</i> Kien.	<i>Olivella dama</i> Mawe.
<i>Bullaria gouldiana</i> Pils.	<i>Paphia grata</i> Say.
<i>Pecten dentatus</i> Sowb.	<i>Modiolus modiolus</i> Linn.
<i>Pododesma adamsi</i> Gray.	<i>Glycimeris giganteus</i> Rve.
<i>Arca multicostata</i> Sowb.	<i>Crepidula onyx</i> Sby.
<i>Chione undatella</i> Sowb.	<i>Cerithium interruptum</i> C. B.
<i>Crucibulum imbricatum</i> Brod.	Ad.
<i>Turbo flexuosa</i> Wood.	<i>Conus regularis</i> Sowb.
<i>Murex elenensis</i> Dall.	<i>Thais haemastoma</i> Linn.
<i>Cassis abbreviata</i> Lam.	<i>Acanthina muricata</i> Brod.
<i>Conus dalli</i> Stearns.	<i>Surcula olivaceus fumiculata</i>
<i>Pinna rugosa</i> Sby.	Val.
<i>Trivia solandri</i> Gray.	<i>Chiton</i> 2 sp.
<i>Cypraea annetta</i> Dall.	<i>Chione fluctifraga</i> Sowb.
<i>Phacoides</i> sp.	<i>Turritella gonostoma</i> Val.
<i>Cardita affinis</i> Sby.	<i>Alectrion versicolor</i> C. B. Ad.
<i>Hipponix barbatus</i> Sby.	<i>Arca solida</i> Sby.
<i>Nerita</i> sp.	<i>Tegula viridula reticulata</i>
<i>Diplodonta orbella</i> Gld.	Wood.
<i>Opalia crenatoides</i> Cpr.	<i>Alectrion affinis</i> Sby.
<i>Terebra variegata</i> Gray.	<i>Arca reeviana</i> Orb.
<i>Natica bifaciata</i> Gray.	

TIBURON ISLAND SPECIES.

<i>Diplodonta sericata</i> Rve.	<i>Diplodonta orbella</i> Gld.
<i>Paphia grata</i> Say.	<i>Olivella dama</i> Mawe.
<i>Pecten dentata</i> Sby.	<i>Conus ximenes</i> Gray.
<i>Hipponix antiquata</i> Linn.	<i>Cardita affinis</i> Brod.
<i>Heterodonax bimaculatus</i> Orb.	<i>Hipponix barbata</i> Sby.
<i>Arca reeviana</i> Orb.	<i>Pododesma adamsi</i> Gray.

A NEW SPECIES OF CUSPIDARIA FROM MONTEREY.

BY I. S. OLDROYD, STANFORD UNIVERSITY, CALIFORNIA.

CUSPIDARIA (TROPIDOMYA) NANA, n. sp.

Shell small and slender; subventricose, the surface sculpture with numerous fine concentric lines of growth; the umbo anterior to the middle of the shell. Anterior portion obese, posterior slender, prolonged and slightly twisted, not gaping; with a sulcus reaching from the umbones to the rear of the shell. Hinge with no lateral teeth, a small anterior cardinal in the right valve, ligament obsolete, internal resilium strong, set in a prominent, posteriorly inclined resiliifer with a strong quadrate lithodesma immediately in front of it. Pallial sinus short rounded, margins entire. Length 25, height 13 mm.

Type in the Oldroyd collection, Stanford University, Cal.

Type locality, Monterey Bay, California. Living in clay. Two specimens were found.

There is one specimen in the Hemphill collection, collected by Mr. Hemphill at Bolenas, California.

ANOTHER "MARTYN".

BY BRYANT WALKER.

The arrival in this country of a third¹ four-volume copy of Martyn's "Universal Conchologist" seems worthy of record, especially as this differs in several details from those that have been described by Dall, Johnson and Dautzenberg.

It was obtained from Messrs. William Wesley and Son of London, England, and is now in my library. There is nothing to show who had previously owned it.

The four volumes are bound as two in finely-tooled calf,

¹ This is probably a fourth copy, as a four volume set was acquired a few years ago by the Academy of Natural Sciences, No. 406 Conch., of the library.—Eds.

which was rather the worse for wear when received. The plates measure $12\frac{13}{16}$ by $10\frac{1}{2}$ inches.

None of the circulars mentioned in connection with certain other copies are found with this.

Bound in with the original indices is a MSS. index written in a large engrossing hand. The plates are numbered consecutively in the upper right-hand corner in ink and evidently by the same hand that wrote the index, with the following exceptions: Plate 5 has no number at all; twenty-four plates have the original engraved numbers in the upper right-hand corner and eleven others, in addition to the written numbers in the upper corner, have the original engraved number, running longitudinally with the page, in the lower right-hand corner. Of these thirty-five engraved numbers, three are simply numerals. The others have in addition to the number a letter appended. Thus plate 8 is engraved "Fig^e 8—d" and plate 153 is engraved "Fig^e 153 —ppp". All of the plates with written numbers in volumes I and II are written "No I", &c., while those in volumes III and IV, down to and including plate 155, are written "Fig. 81", &c. The remaining plates have simply the numerals.

In all of the four volumes there are considerable differences in the neat-lines surrounding the figures. Some have an inner border of three lines, of which the center one is much the heavier and an outer narrow one, while others have only a single heavy line for the inner border. Eighteen of the plates in volumes III and IV have no neat-lines at all. The neat-lines, when present, were evidently added by hand and not engraved.

Plate 73 and eighteen others in volumes III and IV are initialed "H", evidently in the same handwriting as the written index, and plate 82 has endorsed on it: "(26 plates) H".

Two of the additional plates in volume IV are signed "E. Sewell", one in plain Roman letters and the other entirely in capital letters.

Volumes I and II, with the possible deviations noted above, are in all other respects the same as the copy in the National Museum described by Dr. Dall in 1905, excepting:

(1) That the French title-page reads "Les Figures", &c., instead of "Des Figures", as in that copy.

(2) There are two plates numbered "30—1" and "30—2" giving an upper and under view of the shell figured, and two numbered "72—1" and "72—2". The written index states that "72—2" is a variety of "72—1".

(3) Plates 43 and 59 have two views of the shell as in the Henderson copy, but plate 57 has only one figure as in the National Museum copy. The figures on plates 61 and 63 are also arranged as in the Henderson copy.

Volumes III and IV have no separate title-pages, simply the engraved explanatory tables. These tables agree with those quoted by Dr. Dall from the Sydney copy except that the generic name is frequently omitted in the second column, usually from lack of room when a varietal name was given.

The first species on plate 109 is given as "Pellis Armeniana" and not Arminiana.

Plate 129 is indexed as (Voluta) "Aplustre Ducis Navalis".

The second species on plate 135 is given as "Denrachates".

The first species on plate 137 is indexed as "Cælata".

Plate 143 is given as (Cochlea) "Albida".

Plate 154 is given as "Ostrea Echinata".

The first species on plate 156 is indexed as "Tellina cinnamea".

There are forty-three plates in volume III.

Plate 88 is a costate shell and would seem to agree with the name given in the engraved index. Plate 88* is a smooth shell. No specific names are given for either species in the written index.

Plate 115 is duplicated. The first plate contains two figures of the typical form of *Amphidromus aureus* (Martyn) corresponding to those given in the Manual of Conchology, XIII, pl. 54, figs. 70 and 71. The front view is of a sinistral specimen, the back view is from a dextral one. The second plate gives two views of a dextral specimen of the unstriped form corresponding to fig. 72 of the plate in the Manual of Conchology.

Plate 116 is also duplicated and represents two color forms

of a beautiful sinistral *Amphidromus*, which I cannot assign to any of the species figured in the Manual of Conchology. The habitat is given as "Barbadoes", an impossibility, and the shells figured are stated to be in the cabinet of Mr. Forster. In the introduction (p. 18) Martyn states that "For exquisite taste and judgment in the various subjects of Conchology, Mineralogy and every other species of fossil bodies, perhaps no collector has more distinguished himself than Mr. Jacob Forster, to whose constant application in the pursuit of everything rare and beautiful in these branches it is chiefly owing that such matchless specimens now adorn his own, as well as other principal cabinets of Natural History in this kingdom".

A very large proportion of the shells figured in volumes III and IV are stated to be in Mr. Forster's collection. His address is given as "Piazza, Covent Garden".

There are fifty-two plates in volume IV.

In addition to the forty plates enumerated in the engraved index, there are twelve additional plates numbered 161 to 172 inclusive. It is probable that these plates are part, at least, of those prepared for the fifth volume before the project was abandoned as stated by Chenu (Dall, 1905, p. 420).

No names are given on any of the plates except No. 169, which has the following legend in ink:

"Strombus Fusus."

"This curious shell was taken up by the anchor of the Albion, East Indianman, in the Straits of Macassar (quere Sunda) in 1794 by Wm. Wells Esq'r and given to Mrs. Robson, who sold it and it was afterwards in the possession of Mr. Troward."

Only a portion of the species represented by these plates are identified in the written index. The following are named:

- Plate 161. *Murex neritoideus* (*Ricinula* Lam.).
- 162. *M. hippocastaneum* "
- 165. Cook's Turbo.
- 169. *Strombus fusus*.

170. "Same as 89."

172. *Murex babylonius*.

Plate 156 was represented only by a blank, but numbered, page in this copy when received. Through the courtesy of Mr. C. W. Johnson, I have been able to supply the omission by an admirable water-color copy of the plate in the copy owned by the Boston Society of Natural History.

The written index, while of course of no scientific value, is of interest both as showing the changes that had been adopted in current nomenclature between the date of the engraved index and that of the written one and as affording an, at least, approximate date when the present copy was put together and bound.

In the nomenclature of the species represented on the 160 plates covered by the engraved index, there are no less than 89 changes in generic and 87 in specific names in the written index. The accepted nomenclature of the written index is apparently that of Gmelin, whose *Systema Natura* was published in 1788-1792. Thus the two species illustrated on plate 67 are given in the engraved index as *Limax nucleus* and *L. faba*. The former is now known as *Cassidula nucleus* (Martyn) and the latter as *Partula faba* (Martyn). In the written index both are referred to "*Helix*". According to Pilsbry (*Man. Con.*, XX, p. 236) Gmelin was the first to designate the latter as "*Helix faba*" in 1791, and according to Kuster (*Con. Cab., Auriculacea*, 1841, p. 29) he also referred *nucleus* to the same genus.

Everything in the make-up of this copy seems to indicate that it must have been one of the latest copies issued and was made up of such plates as were then on hand. The entire omission of plate 156 would seem to show that there were no copies left of that plate. The numeration, part written, part engraved, and some both written and engraved; the lack of uniformity in the matter of the neat-lines and the addition of twelve plates not included in the original work, all point in the same direction.

In the written index under plate 67 (*Cypræa aurantium*) is appended the following note: "N. B. See *Ency. Brit.*, v. 9,

p. 508. A fine young shell of this species was brought from Guam, one of the Ladrona Islands in the Pacific Ocean near Japan, in 1822 and was sold for £25”.

This clearly fixes the date of the written index as later than 1822.

Plate 67 has written on it in the lower corner in pencil and in a handwriting entirely different from that of the written index (presumably by some subsequent owner), “This is not plate 69”. The same note and in the same handwriting also appears on plates 94, 111, 135 and 152. Possibly a comparison with a perfect copy would show that the missing plates are included in the additional plates in volume IV and were misplaced by careless handling in arranging the plates for the binder.

BOSTON MALACOLOGICAL CLUB.

The Boston Malacological Club has held its regular meetings during the past season—its eighth year. These meetings have been well attended; many interesting papers have been given and specimens exhibited. The general enthusiasm and good-fellowship prevailing shows that the Club has a permanent place among the scientific activities of Boston.

At the October meeting Mr. William F. Wells, Scientific Assistant in Shell-fish, U. S. Bureau of Fisheries, gave an interesting communication on the “Possibilities of Scientific Oyster Culture.” The Club also had the pleasure of a visit from Dr. William H. Dall, of the U. S. National Museum.

In November the Rev. Oliver P. Emerson gave a talk on “Collecting Achatinellidæ.” A residence in Hawaii for thirty-five years gave him every opportunity for studying these interesting shells and to make a large and beautiful collection.

In December Mr. J. Henry Blake spoke on “Collecting at Provincetown, Mass.,” noting the many changes that have occurred affecting the molluscan fauna. Mr. C. J. Maynard spoke on collecting Cerion in the Bahamas. The Club at this

meeting also had the pleasure of a visit from Professor William A. Bryan, of the College of Hawaii, Honolulu. He gave a very interesting account on the variation of species of Melaniidæ in different parts of the same stream.

The January meeting was devoted to paleontology, Dr. Hervey W. Shimer, speaking on the Cephalopoda and Pelecypoda, and Dr. Percy E. Raymond on the Gastropoda.

In February Mr. Charles W. Johnson spoke on the variation of *Litorina rudis*, *L. obtusata palliata* and *Thais lapillus*, illustrated by a large series of specimens from various localities on the New England coast and Europe.

At the March meeting Dr. Edward C. Van Dyke, of San Francisco, spoke on collecting on the Pacific slope, and gave some interesting points bearing on the zoogeography of the region. It being the annual meeting, Mr. J. Henry Blake was elected president to succeed Mr. John Ritchie, Jr.

In April Mr. John Ritchie, Jr.'s subject was "Miscellany," and Mr. Arthur F. Gray exhibited photographs and letters of noted conchologists.

At the May meeting an interesting discussion was presented by Professor Edward S. Morse on "Protective Coloration," and by Mr. Francis N. Balch on "Problems of Coloration in Mollusca."

The field meeting of the year was to Fresh Pond, Cambridge, classic collecting ground for fresh-water mollusks.

E. G. HUMPHREY, *Secretary.*

NOTES.

OLIVELLA BIPLICATA ANGELENA, var. nov.

This variety differs from Sowerby's type in being more delicate and slender, with callous not so heavy, spire more elevated, sloping more gradually from the middle of the shell to the apex. Sowerby's type came from Monterey and does not occur near San Pedro living, but is found fossil there in the Pliocene and lower Pleistocene. Variety *angelenae* is found fossil in both the upper and lower San Pedro beds of the Pleistocene.

Length of type 27, width 13 mm.

Type is in the Oldroyd collection, Stanford University.

T. S. OLDROYD.

PRESSODONTA rediviva.—In some notes on the *Unionida* recently published (Occ. Papers, Mus. Zool., Univ. Mich., 49, 1918, p. 2) I proposed to replace *Pressodonta* Simp. (1900) by *Calceola* Sw. (1840) on the ground of priority, both groups having the same type. Dr. Dall has since called my attention to the fact that "*Calceola* was used by Lamarek in 1799 for a coral (long supposed to be a Brachiopod)." This restores *Pressodonta* to its place as the proper name for the subgenus. The error is one of the unfortunate results of not having access to a general scientific library.—BRYANT WALKER.

Mr. Horace F. Carpenter has presented to the City of Providence and has installed in the museum at Roger Williams Park his entire collection of minerals and shells. It consists of about 4,000 species of shells, 75,000 specimens, 1,200 species and varieties of minerals, over 200 rare chemical salts, and 50 wooden models of mineral crystals. A microscope with accessories for conchological and mineralogical work, and a library of about 200 volumes on natural history and chemistry, worth about \$1,500. This collection represents a life labor of 60 years. Mr. Carpenter has spent nearly a year in installing, arranging and labeling these specimens at the museum.

PUBLICATIONS RECEIVED.

NOTES ON WEST AMERICAN CHITONS, I. By S. Stillman Berry. Proc. Calif. Acad. Sci., 4 ser., vol. vii, pp. 229-248., Sept. 1917 (received May 17, 1918). These interesting notes are based on a large and valuable collection made by Mr. George Willett in southern Alaska, comprising 25 species and 622 specimens. Two new species, *Ischnochiton (Lepidozona) willetti* and *Placiphorella rufa*, are described and figured, followed by a note on the genus *Trachydermon*.

PRELIMINARY DESCRIPTIONS OF NEW SPECIES OF PULMONATA OF THE GALAPAGOS ISLANDS. By W. H. Dall. Proc. Calif. Acad. Sci., 4 ser., vol. ii, pt. 1, pp. 375-382, Dec. 1917 (received May 17, 1918). Thirteen new species of *Bulimulus* subgenus *Naesiotus*, a new *Helicina* and *Williamia galapagana* are described.

NOTE ON CHRYSODOMUS AND OTHER MOLLUSKS FROM THE NORTH PACIFIC OCEAN. By W. H. Dall. Proc. U. S. Nat. Mus., vol. 54, pp. 207-234, 1918. An exhaustive account of the genus and the allied forms now grouped under the family Chrysodomidæ. The nuclei or larval shells of the various genera present several distinct types and numerous mutations. "In many cases, as in *Buccinum* and *Busycon*, it was shown many years ago by Lovèn and others that a single ovicapsule contains a number of ova fertile and unfertile. The unfertile eggs serve as food for the larvæ developed from the fertile ones and there is a certain amount of competition between the larvæ in the capsule which results in the most vigorous larvæ getting more food and making a larger growth than the more weakly coinhabitants of the capsule. Thus at the time of leaving the capsule and coming into the outer world, it sometimes happens that there will be perceptible differences between the individuals issuing from a single capsule, not only in actual size but in the length of the coil of whorls and the size and compactness of the larval apex." The rules of nomenclature necessitates the use of *Chrysodomus* instead of *Neptunea*. Under the genus *Searlesia* is placed the *C. dirus* of the west coast. The other genera comprising the family are: *Ecphora*, *Colus*, *Siphonorbis*, *Kryptos*, *Plicifusus*, *Exilia*, *Volutopsius*, *Pyrulofusus*, *Beringius*, *Liomesus* and *Ancistrolepis*. Fifteen new species are described. C. W. J.

NOTES ON THE NOMENCLATURE OF THE MOLLUSKS OF THE FAMILY TURRITIDÆ. By W. H. Dall. Proc. U. S. Nat. Mus., vol. 54, pp. 313-333, 1918. A very useful and timely paper.

THE NAUTILUS.

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No. 2

THE AVICULA CANDEANA OF D'ORBIGNY, FROM BERMUDA.

BY CHARLES W. JOHNSON.

Among the mollusca collected by Mr. Owen Bryant at Bermuda in the summer of 1903, was a specimen referable to the genus *Malleus* of authors. At the time I urged Mr. Bryant to describe it and he started to do so. I do not wonder that the monographs in the *Conchologia Iconica* (Vol. XI) and in the *Conchylien Cabinet* (VIII, 1) baffled him, and when I showed him d'Orbigny's description of *Avicula candeana* in La Sagra's *Cuba*, he "threw up the sponge," and on leaving Boston turned the specimen over to me.

The specimen was put aside, and the press of museum work has prevented me from recording this interesting shell before. At this time the pleasure of doing so is greatly marred by the possibility that the appropriate and familiar name of *Malleus* Lamarck 1799, might have to fall before the older name of *Pinctado* Bolten, 1798.

My friend Mr. Charles Hedley in his list of the mollusca of New South Wales, ingeniously places *Malleus vulgaris* under the genus *Pinctado* and *M. albus* under *Malleus*. This is a very nice way of arranging them so as to retain the old genus *Malleus*; but do they really represent two genera? What shall we do with all of the smaller, auriculate forms? Although the species seem difficult to separate in the early stages of their growth, the adult shells of the auriculate species are quite readily separated from the true "hammer oysters," and the simplest plan would be to adopt provisionally a third name to cover these.

In 1884 De Gregorio proposed the name *Fundella* for a shell, with the hinge as in *Malleus*; structure of the shell and inequality of the valves as in *Ostrea*; cardinal line straight, and a wing as in *Avicula*, shell gaping on one side; external aspect of the summits as in *Anomia*; interior as in *Ostrea*. Type *F. lioyi*, n. sp., 25 mm., in a sponge from the abyssal zone of the mediterranean, off Tunis. E. von Martens, who compiled the mollusca in the Zool. Record for 1884, in commenting on the species says: "photograph, not very clear figure, much resembles the young state of *Malleus regula* (Forsk.) from the Red Sea." Fischer in his Manuel makes *Fundella* a section of *Malleus*, with the following diagnosis: anterior ear obsolete, and with a longitudinal, median ridge on the interior of the valves; giving as the type, *M. candeanus* d'Orbigny. Did Fischer consider De Gregorio's species to be the same as d'Orbigny's? I am inclined to think he did. From the description and figures I see no characters to separate them. Orbigny looked upon it as a deformed *Avicula* (*Pteria*), with the characteristics of that genus when young and of *Malleus* when in the adult stage. Dr. Dall under *Electroma* Stoliczka, (type *Avicula smaragdina* Reeve) says: "The latter (*Electroma*) may be represented in the recent fauna of the Antilles by *Avicula candeana* Orb., which seems to owe its characters to commensalism with sponges."

FUNDELLA CANDEANA (d'Orbigny).

Avicula candeana d'Orb. Hist. de Cuba, La Sagra, Moll. II, 343, pl. 28, figs. 25-27, 1853.

Malleus vesiculatus Reeve, Conch. Icon. (*Malleus*) XI, pl. 3, fig. 12, 1858.

Malleus rufipunctatus Reeve, Conch. Icon., XI, pl. 3, fig. 8, 1858.

Fundella lioyi De Gregorio, Bull. Soc. Mal. Ital., X, 73, pl. 4, fig. 6, 1884.

Malleus candeanus Fischer, Manuel de Conch., p. 954, 1887.

Electroma (?) *candeana* Dall., Trans. Wagner Free Inst. Sci., III, pt. 4, p. 668, 1898.

The shell in question was removed from a coralline growth and is greatly deformed as so many of the species of this group

usually are. It measures 45 mm. in length and is of a dark purplish color, with a dull yellowish margin; the structure of the shell is vesiculate, making it thin and brittle; umbones smooth followed by a radial sculpture, which soon changes to irregular, concentric laminae. At this point the growth of the shell was arrested and commenced to grow at right angles to the hinge; byssal opening large, affecting both valves. The pallial line is conspicuously raised, forming a deep, nacre-lined body cavity; from about the middle of the pallial line and extending to the margin of the shell is a median, longitudinal ridge. The object of this ridge seems to be that of strengthening the thin vesiculate portion of the shell, for it is much more prominent in the smaller than in the larger and thicker species, including the two "hammer oysters." This ridge is not present in *Pteria*.

From the descriptions and figures given by Reeve, this species cannot be satisfactorily separated from several species from the Pacific, especially *Malleus vesiculatus* from Isle of Plata, West Columbia. It also resembles except in color *M. rufipunctatus* and *M. aquatilis* from the same locality.

The metropolis of the Malleaceae being the Central Pacific, their presence in the Antillean waters might possibly be due to water connection by the Isthmus of Panama during the late Eocene or early Oligocene, a period when so many of the analogous species now living on the west coast of Central America and in the West Indies, probably had a common origin, but its occurrence in the Mediterranean makes this theory less plausible.

EXPLANATION OF PLATE III.

- FIGS. 1 and 2. *Fundella candeana* (d'Orb.). Bermuda. Specimen in the Museum of Comparative Zoology.
- FIGS. 3 and 4. *Fundella candeana* (d'Orb.). From a photograph of d'Orbigny's figures.
- FIG. 5. *Malleus rufipunctatus* Reeve. From a photograph of Reeve's figure.
- FIG. 6. *Malleus vesiculatus* Reeve. From a photograph of Reeve's figure.

A MOLLUSK HUNT IN WYOMING.

BY JUNIUS HENDERSON.

The recent molluscan fauna of Wyoming is probably less known than that of any other state in the Union. A number of mountain chains, more or less isolated by broad expanses of plains unfavorable to land snails, promise interesting results from a conchological exploration of the region, especially with reference to the genus *Oreohelix*. I have long looked in that direction with covetous eyes. In 1917 it was my privilege to spend the two weeks from August 23 to September 7 in that region, in company with Edward L. Schwabe. We traveled hastily by auto, with camp outfit, passing almost entirely across the state from south to north. The great distance traveled, together with long stretches of barren territory between collecting places, and the lack of opportunity for side trips into more favorable territory, prevented great results, but we obtained an acquaintance with the region that will be invaluable in planning another and longer season's work in the future. Unfortunately the war conditions have prevented a continuance of the work during the present year. Dr. H. A. Pilsbry has rendered valued assistance in the determination of some of the land shells, and Dr. Bryant Walker has identified or confirmed the identity of most of the fresh-water snails. The *Pisidia*, of which we found very few, were submitted to Dr. V. Sterki some time ago, but as yet I have no report from him. In the card index of the University of Colorado Museum, I find noted the published records of the following species and subspecies for Wyoming:

- Columella alticola* (Ing.)
- Euconulus fulvus alaskensis* Pils.
- Lymnæa apicina* Lea
- Lymnæa binneyi* Tryon
- Lymnæa elodes* var.?
- Lymnæa jacksonensis* Baker
- Lymnæa proxima* Lea
- Lymnæa traski* Tryon
- Oreohelix cooperi* (W. G. B.)
- Oreohelix cooperi minor* (Ckll.)

- Oreohelix cooperi maxima* Pils.
Oreohelix pygmaea Pils.
Oreohelix strigosa Gld. (*depressa* Ckll.?)
Oreohelix strigosa extremitatis Pils. & Ferr.
Physa sayi Tappan
Planorbis bicarinatus (antrosus) Conr.)
Pomatiopsis robusta Walker
Pupilla muscorum (L.)
Pyramidula cronkhitei anthonyi Pils.
Pyramidula striatella Anth.
Succinea avara Say
Vallonia cyclophorella Ancyey
Vitrina pfeifferi Newc. (*alaskana* Dall)

Oreohelix cooperi minor should be eliminated from the list, because, in the first place, a re-examination of the material so recorded shows that it is true *cooperi*, and in the second place, investigations recently carried on by me at the type locality of *minor* convince me that the small form so named was based upon examples merely dwarfed by adverse conditions in one portion of a normal *cooperi* colony. Baker has placed the Ft. Bridger record of *Lymnaea elodes* var. in the synonymy of *L. palustris*. The *Pyramidula striatella* record is probably *P. c. anthonyi*, which would still further reduce the list, but it may possibly be *P. shimeki cockerelli* Pils. *Pupilla muscorum* is probably *P. m. xerobia* Pils., but one cannot be certain of it. *Physa sayi* is doubtful, but if not that, it refers to some other *Physa*, so its elimination would not reduce the number of species. This leaves a list of about 22 species, 12 of which are confined to two genera, with no recorded pelecypods at all. Possibly some recorded species have been overlooked by me. The only large land snails are in the genus *Oreohelix*; *Polygyra*, which occurs to the northward in Montana, not having been found in Wyoming. *Oreohelix* is an ancient genus in the state, *O. grangeri* Ckll. & Hend. and *O. megarche* Ckll. & Hend. occurring in rocks of Eocene age.

Our two weeks' work, besides furnishing new localities for some of the species already recorded from the state, adds the following species, including four additional genera, two of which are pelecypods:

Agriolimax campestris (Binn.)
Ferrissia rivularis Say
Lampsilis ventricosa (Barnes)
Lymnæa bulimoides cockerelli Pils. & Ferr
Lymnæa caperata Say
Lymnæa humilis modicella Say?
Lymnæa obrussa Say
Physa anatina Lea
Physa gyrina Say
Physa integra Hald.?
Physa sayi warreniana Lea?
Physa walkeri Crand.
Planorbis parvus Say
Vallonia gracilicosta Reinh.
Zonitoides arborea (Say)

In a recent paper Daniels and I asserted the probable occurrence of *L. b. cockerelli* in Wyoming, which is now confirmed.

Following is an account of the stations visited and the mollusks obtained at each:

Sta. 232, reservoir where the road from Cheyenne to Casper crosses Lodgepole Creek, about thirteen miles north of Cheyenne.

Pisidium sp.
Agriolimax campestris (Binn.)
Lymnæa obrussa Say
Physa sayii warreniana Lea?
Planorbis parvus Say
Succinea avara Say
Vallonia gracilicosta Reinh.

Sta. 233, a branch of Bear Creek, north of Horse Creek.

Pisidium sp.
Lymnæa obrussa Say
Physa walkeri Crand.

Sta. 234, small reservoir six miles northeast of Wheatland.

Lymnæa caperata Say
Physa gyrina Say
Planorbis parvus Say

Sta. 235, bridge over Laramie river, below Uva.

Lampsilis ventricosa (Barnes)
Lymnæa obrussa Say
Lymnæa humilis modicella Say? (two specimens)
Oreohelix cooperi (W. G. B.)
Pyramidula cronkhitei anthonyi Pils.
Succinea avara Say
Vallonia gracilicosta Reinh.
Zonitoides arborea (Say)
Physa gyrina Say
Physa integra Hald.?
Planorbis parvus Say

Only a single broken example of the *Oreohelix* was found, in the river bottom, and it may have been brought by the stream from far away in the spring flood.

Sta. 236, creek bottom about ten or twelve miles north of Uva, under willows and cottonwoods.

Vallonia gracilicosta Reinh.
Vitrina alaskana Dall.
Zonitoides arborea (Say)

Sta. 237, five miles northwest of Douglas, in a small spring brook.

Lymnæa obrussa Say
Physa gyrina Say
Planorbis parvus Say

Sta. 238, Boxelder Creek, about 18 or 20 miles northwest of Douglas.

Ferrissia rivularis Say
Lymnæa obrussa Say
Physa gyrina Say
Planorbis parvus Say
Pyramidula cronkhitei anthonyi Pils.
Succinea avara Say
Vallonia gracilicosta Reinh.
Vitrina alaskana Dall
Zonitoides arborea (Say)

Sta. 239, a very small reservoir formed by throwing an earth dam across a dry draw to catch the storm waters for stock, four miles west of Arminta. A few very rotten shells of *Lymnæa bulimoides cockerelli* Pils. & Fer. were found.

Many dead salamanders were along the bank and a few live ones were seen in the water. This shallow water-hole did not look as though it could have existed very long, and it was a long distance from any other water. We were much surprised to see several great blue herons fly from the water at our approach, and wondered what they were feeding upon, or we should not have looked for any mollusks there. It would be interesting to know by what agency they got there. Hand (NAUTILUS, XXVII, 1914, p. 144) noted *Planorbis vermicularis* in a small artificial pond in California, and raised the same question, "How did they get there?"

Sta. 240, at base of a rocky sandstone ledge about twelve miles north of Lost Cabin on the road to Ten Sleep.

Pupilla muscorum xerobia Pils.
Vallonia cyclophorella Ancey

Sta. 241, creek bottom about three miles above Ten Sleep.

Agriolimax campestris (Binney).
Oreohelix cooperi (W. G. B.) ?
Physa gyrina Say ("peculiar long form")
Pyramidula cronkhitei anthonyi Pils.
Succinea avara Say
Vallonia gracilicosta Reinh.
Vitrina alaskana Dall
Zonitoides arborea (Say)

Only one fragment of *Oreohelix* was found, apparently *O. cooperi*, and it may have been brought down from up-stream in the spring flood. *Agriolimax* is represented by two very small examples.

Sta. 242, creek bottom at Hyattville, among willows, narrow-leaved cottonwoods, etc. *Vallonia gracilicosta* Reinh.

Sta. 243, bottom lands on Shell Creek, at mouth of White Water Creek, about five miles east of Shell.

Lymnaea obrussa Say
Physa anatina Lea
Planorbis parvus Say
Pyramidula cronkhitei anthonyi Pils.
Vallonia gracilicosta Reinh.

Physa anatina is so identified by Dr. Bryant Walker. We have another lot of the same species, also identified by Dr. Walker, collected by Mr. Don W. Walker two and a half miles east of Shell.

Sta. 244, just within the mouth of Shell Creek Canyon, on south side of creek, about two miles above Sta. 243, on limestone ledge devoid of shrubbery and other vegetation except close-clinging lichens on the rock. *Oreohelix yavapai extremitatis* Pils. & Ferr. was plentiful, clinging to the open face of the rocks in plain sight, though the weather was hot and dry. This form has been recorded from the same canyon by Dr. Pilsbry. There were no rock slides or other cover, such as *Oreohelix* usually requires, anywhere near. We obtained 145 live examples and over 200 dead shells in a short search, one of the latter being reversed. I have never before seen any member of this genus in such an exposed position.

Sta. 245, about a mile or so from Sta. 244, same side of creek, under shrubbery. We obtained 31 *Oreohelix yavapai extremitatis* Pils. & Ferr. and 46 *O. pygmæa* Pils. alive, together with many dead shells. This is the type locality of the latter. Two of them were albinos. We also found *Pupilla muscorum xerobia* Pils., *Vallonia gracilicosta* Reinh., and *Zonitoides arborea* (Say).

Sta. 246, just within the mouth of White Creek Canyon, on south side, a couple of miles south of Sta. 245, in a small brush patch a few feet in diameter at the base of a low cliff near an old log building.

- Euconulus fulvus alaskensis* Pils.
- Oreohelix cooperi* form *obscura* Hend.
- Oreohelix pygmæa* Pils.
- Oreohelix yavapai extremitatis* Pils. & Ferr.
- Pupilla muscorum* (L.)
- Vallonia gracilicosta* Reinh.
- Vitrina alaskana* Dall.

Sta. 247, bluff 50 yards east of Sta. 246. *O. y. extremitatis* Pils. & Ferr. abundant, clinging to rocks and under scant mountain mahogany, clematis, etc., a few out on open ground, all active after the rain of the night before. Two dead shells

of *O. pygmæa* Pils. and seven dead shells of *O. s. obscura* were also found here. The *extremitatis* from this canyon are much less prominently carinated than those from Shell Creek Canyon.

Sta. 248, at base of bluff from 100 to 150 yards east of Sta. 247, under fairly good cover of shrubbery. *O. c. obscura* numerous, with quite a number *O. y. extremitatis* (two albinos) and a few *O. pygmæa*.

Sta. 249, a short distance up the canyon from Sta. 248, where the vegetation about small rock slides at the foot of a high cliff forms good cover for snails, which were very abundant. In a short time we observed 600 live *O. pygmæa*, the same number of *O. c. obscura*, and 58 live *O. y. extremitatis*. Four of the *pygmæa* and six of the *obscura* are albinos.

OREOHELIX COOPERI OBSCURA new form.

Ordinarily forms of *Oreohelix* based upon color alone are of doubtful value, but in this case the color is so striking and so uniform that I feel justified in giving to the form from this canyon a name. Of the hundreds of live examples and more hundreds of dead shells examined from stations 246, 247, 248 and 249, not one resembles typical *cooperi* in color, though I detect no other difference. With the exception of the eight albinos, they are all very dark, mostly quite black, not dark red or brown usually, with a rather broad light peripheral band, though this is wanting in many examples. In color they resemble *O. peripherica albofasciata* (Hemph.), but would not be mistaken for that form by anyone familiar with *Oreohelices*. In numbering thousands of *O. cooperi* in the last few weeks I have noticed that there is a scratch beneath the pen, as though it were being dragged across a fine sharp file, quite different from the sensation experienced in using the pen on other species, of which I have numbered thousands recently. This scratch I noticed in the color form now described.

Most of the shells of the *yavapai* group in White Creek Canyon have the spire much more elevated, scarcely any being as flat as those from Shell Creek Canyon, and, as would be expected, the keel is much less pronounced. In fact, many

of them have the keel as rounded as in *O. s. depressa* (Ckll.) and some have the color bands well developed. A striking feature of this district is the number of albinos occurring in both *pygmaea* and *obscura*. Another unusual feature is the occurrence of three forms of *Oreohelix* intermingled. It is seldom that I have found even two together until the season of 1917, and never before have I found three together, yet at all of the stations in White Creek Canyon this occurs. These stations are really different portions of one great colony, as scattered dead shells were found all along the canyon as far as we traversed it, but we divided it into stations because of differences in cover and other conditions, and variance in the proportionate numbers of the several forms.

A NEW PRIOTROCHATELLA FROM THE ISLE OF PINES, CUBA.

BY WM. F. CLAPP.

PRIOTROCHATELLA TORREI, n. sp.

Shell depressed, trochiform, thin, fragile, above with numerous oblique plications, crossed by raised spiral lines; below smooth; whorls, nine, the first smooth, white, the spiral lines beginning on the fourth. Suture of early whorls simple, of later whorls denticulate, and of the last two or three whorls covered with a white moderately denticulate flange. Last whorl descending slightly, aperture very oblique. Color yellow, with irregular white patches and white denticulate sutural flange above, uniform yellow below.

Greatest diam. 13 mm., l. d. $11\frac{1}{2}$ mm., alt. 8 mm. Type in Museum of Comparative Zoölogy, Cambridge, Massachusetts. No. 36888.

This species was discovered by Mr. W. S. Brooks near the southern end on the eastern face of the Sierra de Casas, Isle of Pines, Cuba, and later a large series was collected by Mr. Brooks and Dr. Thomas Barbour.

No genus of the great host of West Indian land mollusks is so famed for its beauty and delicacy of structure as *Priotrocharella*. Hitherto but two well-defined species have been known,

and it is indeed rare good fortune to be able now to associate with a third the name of Dr. Carlos de la Torre of the University of Havana. No one has shown a keener or more sympathetic appreciation for, or knowledge of, the shells of his native land than has he.

P. torrei differs from the two species of *Prietrochatella* previously described, *P. constellata* Morelet and *P. stellata* Velasquez, in having the base of the shell smooth, instead of granulose as in *P. constellata*, or with transverse plications as in *P. stellata*. The sutural flange is less coarsely denticulate than in *constellata*, more strongly than in *stellata*. In *P. constellata* the average number of teeth on the periphery of the last whorl is less than 40, in *P. torrei* between 40 and 50, and in *P. stellata* more than 50. *P. constellata* Morelet,¹ was described as from "Sierra de Cristalles." In the southern part of the Isle of Pines there is a hill called the Sierra de Cristales, but the entire local formation is igneous and therefore this certainly was not the type locality of the species. It is possible that some one told Morelet that the Sierra de Casas was called the Sierra de Cristales, which he misspelled. Poey² gives the habitat of *constellata* as "Sierra de Caballa, esta sierra esta al Sud de la poblacion llamada Nueva-Gerona." This locality is now definitely known as the Sierra de Casas.³

Poey transposed the names of the two mountain ranges in the northern part of the Isle of Pines, referring to the Sierra de Casas by the name of Sierra de Caballa, and to the Sierra de Caballas by the name of Sierra de Casas. Pfeiffer⁴ repeats Morelet's locality of Sierra de Cristales. Arango⁵ in 1878 gives the habitat of *constellata* correctly as "En los paredones de las faldas E. y. O. de la Sierra de Casas situada al O. de Nueva Gerona en Isla de Pinos," probably as a direct result of Gundlach's own collecting. Crosse⁶ repeats the last named habitat.

¹ Morelet: Rev. Zool., p. 144, 1847.

² Poey: Mem. Cuba, I, p. 116, t. 5, fig. 15-17, 1851.

³ Todd: Ann. Carnegie Mus., vol. X, pl. XXVII.

⁴ Pfeiffer: Mon. Pneum., I, p. 334, 1852.

⁵ Arango: Contribucion a la Fauna Malacologica Cubana, p. 45, 1878.

⁶ Crosse: J. de Conch., vol. 38, p. 310, 1890.

The true habitat of *Priotrochatella constellata* is the northern portion of the Sierra de Casas, that of *P. stellata* the Sierra de Caballos and possibly in its northern extension now called the Sierra de Columbus. I do not know of any records of either species being found on the opposite side of the river from its true habitat. Due to the fact that *P. torrei* does not possess a rapidly descending ultimate whorl, as in *P. constellata*, therefore lacking that species' pagoda-form appearance, one would be inclined to suppose that it is most closely related to *P. stellata*, in spite of its habitat in that region theoretically occupied only by *P. constellata*. Admitting as a possible premise that *P. constellata* and *P. stellata* are derivatives of a common ancestor; that due to separation on opposite sides of the river Sierra de Casas, the two species have assumed characters rendering them specifically distinct, there are then several possible explanations of the origin of *P. torrei*. 1. A direct descent from the original *Priotrochatella* stock isolated by geographical change in its own particular habitat at approximately the same period as *P. constellata* and *P. stellata*. 2. A more recent geographical separation from either *P. stellata* or *P. constellata*. In an attempt to throw some light on this question I have examined the radulae of three specimens of each of the three species of *Priotrochatella*. That too much stress must not be placed on the value of the radula as an important character in deciding specific values has been repeatedly demonstrated. I nevertheless believe that sufficient differences appear in the radulae of the species mentioned to furnish some foundation for my belief that *P. torrei*, in spite of its outward similarity to *stellata*, is probably more closely related to *constellata*.

The name *Priotrochatella* was given as a subgenus by Crosse⁷ to those species of *Eutrochatella* possessing an operculum similar to that of *constellata*. Wagner⁸ raises *Priotrochatella* to a genus and includes the species *constellata* Mor. and *stellata* Vel. As far as I know no figures of the radulae of *Priotrochatella* have been published.

⁷ Crosse: J. de Conch., vol. 41, p. 88, 1893.

⁸ Wagner: Denkschriften Akad. Wissenschaften. Band LXXVII, p. 369, 1905.

The radula of *P. torrei* is approximately 14.5 mm. long, and 1 mm. wide, and contains in the vicinity of 250 rows of teeth. The central tooth and the four laterals on each side are perpendicular to the long axis of the radula, the rest of the row comprised of approximately 100 uncini, curves back toward the posterior end of the radula. The central tooth (pl. 4, fig. 1, c.) has a very slight cusp at its summit. The laterals (i, ii, iii) possess very strong cusps which are not denticulate. The major lateral (iv) cannot be described as denticulate, the cutting edge being merely slightly sinuous. In this respect the radula of *Priotrochatella* differs from that of any of the other Helicinidae. If this major lateral is composed of two teeth, they are so firmly interlocked that I have been unable to separate them. The uncini (Fig. 1, u) (Fig. 2) are numerous and densely packed. The innermost (1, 2) are simple, possessing but one cutting edge, later (38, 39) becoming bidentate. In the 45th (45) tooth of the radula figured, the inner denticle is again divided, and the increase in the number of denticles continues to about the 98th row where the cusp is twelve-denticled. The curve of the outer edge of the radula causes the cutting edge of the outermost uncini to be turned inward toward the center of the radula and parallel to its long axis. The three or four outermost uncini are very broad flat plates and the denticles entirely disappear.

The radulae of *P. constellata* and *P. stellata* are very similar to that of *torrei* excepting in the central teeth. In *P. stellata* (Fig. 4) the central tooth is large, with a very strong broad cusp. In *P. constellata* (Fig. 3) and in *P. torrei* the central teeth are very similar in size, differing only in the shape of a very small cusp. There do not seem to be any constant differences in the radulae of the *Priotrochatella* excepting in the central teeth.

Summary (1). The radulae of the three species of *Priotrochatella* exhibit sufficient differences in structure from other groups of Helicinidae to sustain the raising of *Priotrochatella* to generic rank.

Summary (2). The similarity of the radula of *P. torrei* to that of *P. constellata* is of sufficient importance to lend consider-

able weight to a theory that *P. torrei* is more closely related to *P. constellata* than to *P. stellata*.

EXPLANATION OF FIGURES, PLATE 4.

All figures were drawn with the aid of a camera lucida.

Fig. 1. *P. torrei*: c. central; i, iv laterals; u. uncini.

Fig. 2. Uncini 1 and 2, 38 and 39, 45, 55, 70, 90, 102 (the outermost).

Fig. 3. Central tooth of *P. constellata*.

Fig. 4. Central tooth of *P. stellata*.

Figs. 5, 6, shell of *P. torrei*.

LAMPASILIS VENTRICOSA COHONGORONTA IN THE POTOMAC VALLEY.

BY WM. B. MARSHALL.

In the NAUTILUS for October, 1917, I recorded the finding of two valves (belonging to the same individual) of this shell by Manly D. Barber in the Potomac River, at Great Falls, Maryland, about eighteen miles above Washington, D. C. Dr. Ortman had already recorded the finding of a single specimen as far south as the Shenandoah River, at Harper's Ferry, W. Va., some fifty miles above Great Falls, and the finding of others at places farther up the river.

On July 7, 1918, Dr. C. Wythe Cooke of the U. S. Geological Survey, found a superb specimen living in a sandy pass at Midriver Island, which is only about a mile and a half above the Falls.

On July 28, 1918, he and I donned bathing suits and made a careful examination of the spot in the hope of finding more specimens, and especially the very young. For two or three hours we explored the sand and the mud beneath with our fingers and toes and passed quantities of sand and mud through our hands and through a fine mesh sieve. The spot thus investigated was about 20 feet wide and 75 feet long. Our efforts were rewarded by the finding of four specimens of *cohongoronta*, the smallest having a length of 40 mm., the largest a length of

72 mm. The specimen found by Dr. Cooke on July 7th had a length of 90 mm. Their occurrence thus in a colony and of different ages establishes *cohongoronta* as a member of the naiad fauna of that vicinity. That the locality is well fitted for them is shown by the great beauty of the specimens, which are highly polished, much rayed with dark green on a ground color varying from yellowish-olive to light green and to very dark brownish-olive. The shells are perfect except for a slight erosion of the beaks. The posterior ridge is high and fairly sharp. The angle at the junction of the posterior and ventral margins is prominent.

Other naiads found at the same station were *Lampsilis cariosa* (9), *Strophitus edentulus undulatus* (1), *Symphynota viridis* (1 dead), *Alasmidonta undulata* (2), *Margaritana marginata* (6), *Unio complanatus* (many), *Unio productus* (many).

Until the present time *Unio productus* and *Unio fisherianus* have been the only naiads in this vicinity which have offered any great difficulty in identification. They are not yet well understood. Further study may show that they belong to the same species or, on the other hand, it may bring to light characters which will more surely differentiate them. *Lampsilis cariosa* and *L. ochracea* have been confusing to some students. Simpson¹ has pointed out the differences between them. To me very rarely have they offered any difficulty. The coming of *cohongoronta* into this neighborhood may probably lead to problems in future times. With passing time this shell, in accommodating itself to new surroundings, may be modified in form and color, and these modifications may trend in the direction of *cariosa*, making it difficult to distinguish between the two species. Whence *cariosa* came and how and why it came we have no positive knowledge, but it has been here since prehistoric times and its make-up must be well established and best suited to its environment. We hardly may expect any great change in this species. *Cohongoronta* is a new arrival. It may find conditions here approximately like those in its an-

¹ Nautilus, VIII, pp. 121-123, 1895. Both species are figured, but the legends beneath the figures should be transposed.

cestral home, but it is more probable that it will find some conditions different. Environment will not make a change to suit the mollusk and hence if its residence is not to its liking the naiad will have to adapt itself to the residence or else retire from the field.

Then, too, there is a possibility that the two species will hybridize and produce one or more other forms or races. Hybridizing might wipe out either *cariosa* or *cohongoronta*, or it might wipe out both of them, replacing them by a race of mixed blood. Bearing a resemblance to each other close enough to suggest a common ancestry or a converging development and living now side by side in the same spot, it seems to the writer that a crossing of the two species will be not only possible but highly probable. Indeed, one of the specimens of *cohongoronta* collected in that spot may be a hybrid. Its anterior portion has the glossy, peculiar straw-colored periostracum of *cariosa*, while the other features of the shell are distinctly those of *cohongoronta*. It will be interesting and profitable to note the future history of the two species in this vicinity, especially as the specimens of *cohongoronta* in the U. S. National Museum (Cat. Nos. 219057 and 219058) will show the characters of the shell at the time of its first arrival and form a basis of comparison with the shells of future generations. The specimens of *cariosa* collected at the same time and place form catalogue number 219059.

THE STATUS OF LOBOA BRUNOI VON IHERING.

BY PAUL BARTSCH.

In the "Nautilus" for February, 1917, vol. 30, on pl. 4, fig. 7, and in the number for March, 1917, pp. 121-122, Dr. H. von Ihering describes a new genus and species of landshell from the Island of Trinidad, as *Loboa brunoi*.

During a recent visit to Washington, Dr. Carlos Moreira, of Brazil, submitted a shell to me for determination. This specimen, which is in a subfossil state, also came from the Island

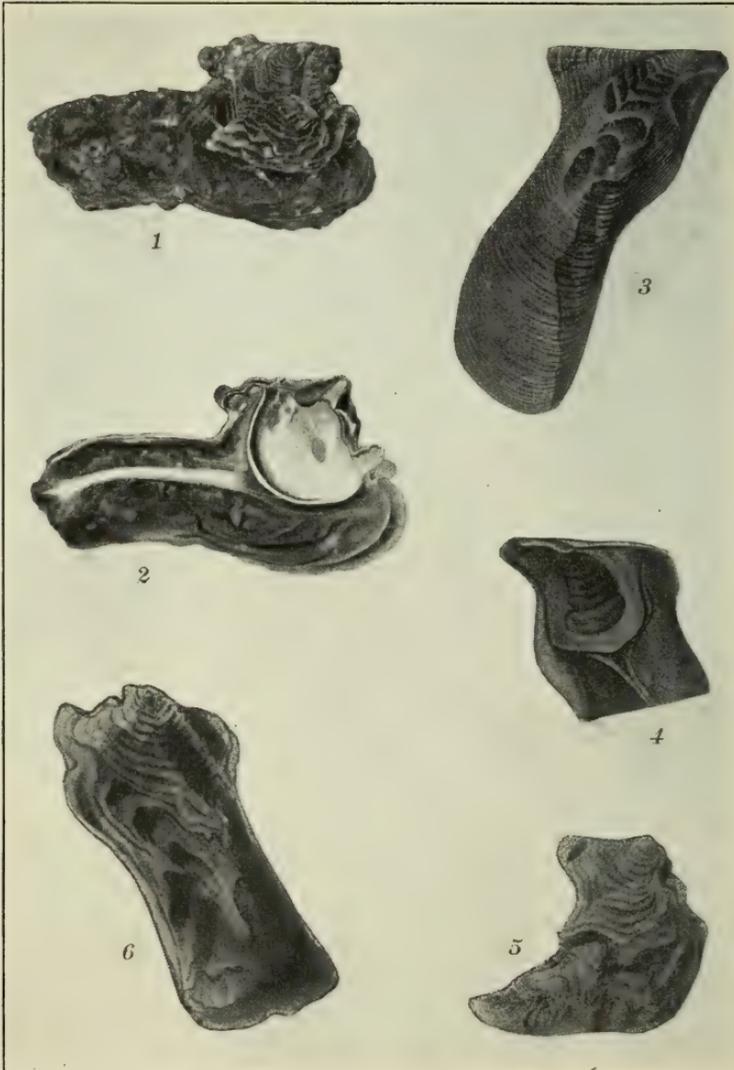
of Trinidad, off the coast of Brazil, in approximately latitude 21° S., longitude 29° W. Comparing it with the description published by Dr. von Ihering, I feel certain that it is the species described by him. In fact, I am not altogether sure but what this may be the same specimen described by Dr. von Ihering.

Unfortunately, the figure cited above is a mere outline figure, and rather poor at that, so much so in fact that one would not recognize the present shell were its status dependent upon the figure alone, but the description is positive. The rareness and isolated distribution of this species justifies rediagnosis and a good photographic figure, which are here presented. The shell will have to be known as *Bulimulus (Protoglyptus) brunoi* von Ihering (Plate IV, fig. 7).

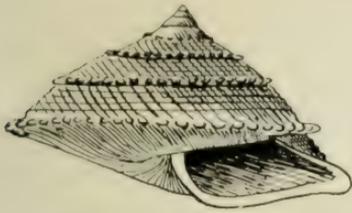
Shell very elongate-ovate, dingy white. The nepionic portion consists of not quite one turn, which is well rounded, and marked by slender, slightly protractively slanting axial riblets. The succeeding turns are well rounded, appressed at the summit, and separated by a somewhat constricted suture. They are marked by almost rib-like, decidedly retractively curved incremental elements and slender spiral lirations, the junctions of which form feeble tubercles. Base somewhat prolonged, moderately rounded, very narrowly perforated, marked by the continuation of the rib-like elements and spiral lirations, both of which agree in strength with those on the spire, but becoming more crowded on the anterior portion of the base. Aperture oval; posterior angle acute (outer lip fractured at the edge); inner lip slightly sinuous and narrowly reflected; parietal wall covered by a moderately thick callus.

The specimen, which may be the type, belongs to the National Museum of Brazil. It has 7.3 whorls, and measures: altitude, 19.5 mm.; greater diameter, 8.3 mm.

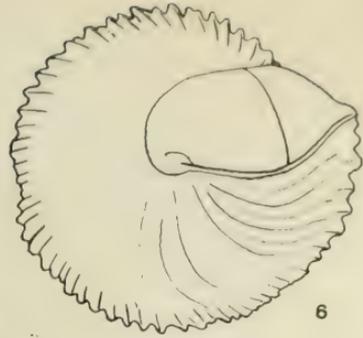
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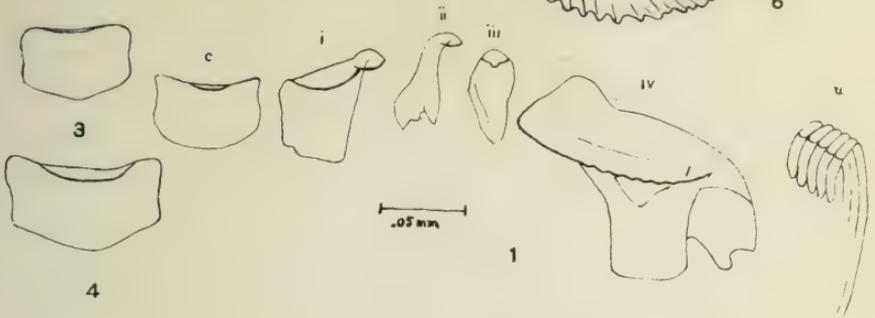
JOHNSON : FUNDELLA CANDEFANA D'ORBIGNY



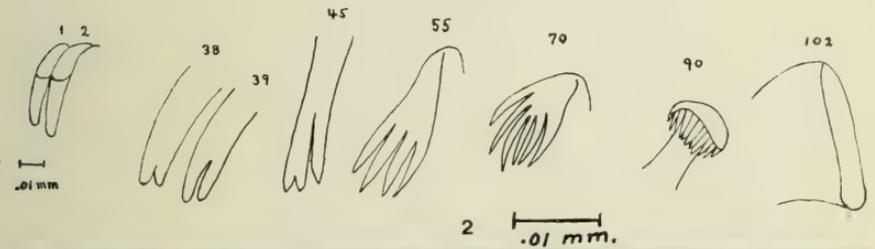
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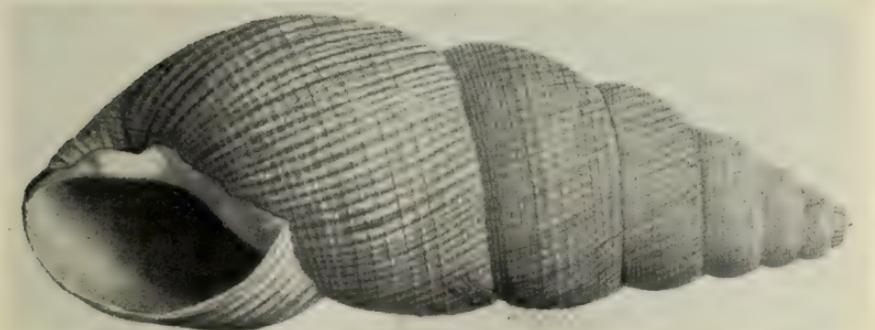
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7

1-6. W. F. CLAPP: A NEW PRIOTROCHATELLA.

7. PAUL BARTSCH: BULIMULUS (PROTOGLYPTUS) BRUNOI X 5.

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HELIX AREOLATA.

BY C. R. ORCUTT.

The month of March, 1917, was spent by the writer almost entirely on Magdalena Island, Baja California, Mexico. One day was spent on Santa Margarita Island, separated from Magdalena Island by a channel about ten miles wide, which serves as the main entrance to Magdalena bay to-day, which can be entered, though by small boats, by the two other channels north and south which separate these islands from the peninsula. By dropping the "Santa," as is often done in conversation, we have "Margarita Island," so often mentioned in shell literature, which in turn lent its name to the bay which it helps to protect—hence "Margarita bay," where W. Harper Pease had collected for him seventy-four species of mollusks, as reported by Carpenter.

The industry in orchilla (*Rocella tinctoria*), for dye-stuff, that was developed about forty years ago, when, I am told, as much as a million dollars worth of this lichen was exported to Germany around the Horn in a single year, led to the present settlement on Magdalena Island. Mining for magnesite has now led to another settlement on Santa Margarita Island in recent years, though it seems probable that this settlement really antedated that on Magdalena Island.

Helix areolata was the only land shell reported by Carpenter from Margarita bay in the Pease collection. In vain I searched for the Pupae, found so abundantly further north at San Quintin bay in 1886, on *Rocella tinctoria*, but I doubt not these may yet be found in the vicinity of the bay, on the peninsula if not on the islands, by some more persistent observer upon more thorough exploration of the bay shores. One specimen, not at hand, that may have been *Assimineea californica*, two dead specimens of *Pedipes* (probably *P. lira-tus*), and numerous living *Melampus olivaceus* were found.

Pilsbry is no doubt right in taking Magdalena bay as the type locality for *Helix areolata* (see Proc. Phil. Acad. 1913, 391), but I would select Santa Margarita Island as probably the exact location.

I would select the same island as the type locality of *Helix pandorae*, credited by Dall to "Margarita Island," I believe, though Pilsbry selects the San Benito Islands, to the north-west of Cedros Island, instead.

Pilsbry selects San Bartolome bay, on the peninsula, as the type locality of *Helix levis*, but it seems to me that Santa Margarita Island could be selected with equal propriety, and this would give us these three "species" as from one "type locality." It can never be exactly known where these types were actually collected, so that any designation of a type locality must be more or less arbitrary.

My series of *Helix areolata* was all collected on Magdalena Island, in a space perhaps a mile square, extending from the ocean to the bay. The species was not confined to this area by any means, and probably occurs in equal abundance over the entire region around Magdalena bay. In places the ground is white with the dead shells, and millions may be found drifting in the adjacent sand hills on Magdalena Island.

The scant desert vegetation, such as agave, fouquiera, and other plants, often harbored considerable colonies of living snails. The shells on the bushes would often be found in the morning covered with sand, indicating that they burrow in the soil, probably climbing the plants for feeding purposes and some staying over time. All my specimens were obtained from the plants, however, and not by digging. I doubt not that every figure on Pilsbry's two plates (Proc. Phil. Acad. 1913, plates 15 and 16, figs. 1 to 52) could be matched by specimens living in the area of the square mile referred to.

Many specimens were a solid chalky white, with no trace of bands or color. Some have a strongly developed tooth; most of the individuals show no trace of one. Some specimens, old and mature, but usually rather small, were of a uniform pale olivaceous-brown color, without signs of bands or other color, that would answer well for Binney's figure of *Helix pandorae*. Some individuals were as elevated as *Helix veatchii* is figured as being, and other shells are nearly as depressed as *Helix Traskii*. Young individuals would answer for Pfeiffer's figures of *Helix decorata* or *H. levis*.

A colony of these snails, on leafy shrubs growing on sand hills near the ocean, supplied the smallest individuals. Snails on salicornia and other plants providing abundant shade furnished perhaps the largest number of solid white shells.

Midway between the ocean and the bay, on an exposed plateau, I found the largest number of highly-colored shells, many immature or just come to maturity, on leafless plants like fouquiera, where the variegated color was an excellent protection. It was very difficult to see these snails on the bushes, even near at hand, except as projecting knobs on the stems against a background of sky.

The usually chalky-white shell seems to have a chocolate-brown epidermis, which varies in intensity at different stages of its growth, often nearly or quite absent, thus producing the irregularly interrupted and very variable bands. This colored stratum is thin and can be worn away with a knife-blade without injury to the shell, and in age seems to naturally but irregularly wear away, producing as many designs as there are individuals.

I have collected thousands of specimens called *Helix levis* at San Quintin bay, at the Rosario mission some eighty miles southward, and on the peninsula east of Cedros Island, which seem to me to only differ from the Magdalena Island shells in size. All these localities are arid; rains occur at irregular periods, sometimes three years or more apart, but copious fogs from the sea nightly refresh the vegetation.

Pilsbry speaks of the known areas of *levis* and *areolata* as separated by a "long reach of coast whence no land snails are known." From Turtle bay (a portion of, and not synonymous with San Bartolome bay, as I am told) to Magdalena bay is an arid coast unexplored by naturalists, from the lack of water and landing places, mainly unknown because overland trails traverse this portion of the peninsula away from the sea. But there is no reason to doubt the presence of this snail in some form through the entire region from San Quintin bay to Cape San Lucas.

I presume that the older naturalists, like many modern naturalists, collected sparingly, but selected specimens show-

ing the extreme variations. These were usually described by other naturalists, not the collectors, who based upon them as many species as they had individuals, through ignorance rather than intent. In conclusion, therefore, I would express agreement with the opinion of the late Dr. R. E. C. Stearns, who said (in N. Y. Acad. Ann., 2: 136) that he regarded "*H. areolata*, *pandorae*, *veatchii* and *levis* as varieties of a single species." Pfeiffer's *H. decorata* may evidently be added to the long list of synonymy. Doubtless more than a hundred varietal names may consistently be given to the various insular and peninsular forms occurring between San Quintin bay and Cape San Lucas when the whole region is fully explored.

SOME PHILIPPINE SNAILS.

BY T. D. A. COCKERELL.

My friend and former student, Dr. Cipriana Subejano, returning from the Philippine Islands, kindly brought a number of living snails collected by Mr. Maximo Oro at Los Baños, Luzon. We have now had them alive for many weeks in glass bowls, feeding them on cabbage, lettuce and sliced apples. Some have died, but three of the immense *Rhysota ovum*, four *Cochlostyla metaformis* and one *C. rufogastra* still remain in good health. The following notes may be of interest; but I have not access to the large works of Semper, Hidalgo, etc., and do not know how far the observations are new.

Rhysota ovum Val.

When giving us the snails Miss Subejano stated that these emitted a cry at times, resembling that of a young child or small animal. For some time we wondered what she could have heard, but at length the snails favored us with several separate performances. The cry, a plaintive, high-pitched note, is produced as the snail contracts into the shell, and is due to the emission of air. It is very distinctive, but is only occasionally noticed. The habits of *R. ovum* are very different from

those of the species of *Cochlostyla*. It appears to be nocturnal, and is very inactive. Never once has it been seen stretched at full length. The animal is a remarkable creature. The mantle is whitish, and the lung is extremely capacious, with a wide orifice. The foot above is white, with a large caudal mucus gland. Anterior three-fifths of sole pale brownish-grey, the posterior two-fifths dull white, contrasting. Head blackish; oculiferous tentacles blackish, stout basally, eye-bulb pale ochreous; lower tentacles white at end, with the bulb pale ochreous. The shell has a diameter of about 75 mm.

Cochlostyla rufogastra Less.

Kindly determined by Dr. Bartsch, who states that it belongs to the typical subspecies. In both the species of *Cochlostyla* the foot is emarginate anteriorly, but in other respects the animals of the two present marked differences. *C. rufogastra* has the mantle black; and the very broad sole plumbeous in the middle, with the lateral areas (not so wide as the middle one) black; the extreme edge of the sole is narrowly reddish. The body above and on the sides is reddish-brown, with the conspicuous rugæ darker; the dorsum is strongly blackened. The eye-bearing tentacles are very long. A couple of these snails mated, and later one laid a great quantity of eggs, which, however, did not develop. The eggs are spherical, soft, opaque white, with a diameter of 7 mm.

Cochlostyla metaformis Fér.

A much smaller species than the last, with a pale-colored shell. There are two varieties, one banded, the other bandless; the soft parts are the same in both. The species was identified by comparison with a specimen determined by Dr. Bartsch. The oculiferous tentacles are very long, 24 mm.; head rather elongated, lower tentacles about 5 mm. from base of eye-bearing ones. Body anteriorly pale greyish-brown, tentacles reddish; posteriorly the body is pale grey dorsally, the sides of the foot washed with ochreous; mantle light reddish ochreous. The sole is light ochreous, without longitudinal zones differentiated by color, but the margin is suffusedly a little darker. Both species of *Cochlostyla* are quite active by daylight.

THE NOMENCLATURE AND SYSTEMATIC POSITIONS OF SOME NORTH AMERICAN FOSSIL AND RECENT MOLLUSKS.

BY JUNIUS HENDERSON.

Pholadomya undata Meek and Hayden (Proc. Acad. Nat. Sci., Phila., VIII, 1856, p. 81), now generally known as *Liopistha* (*Cymella*) *undata*, Cretaceous, Rocky Mountain region, is preoccupied by *P. undata* Dana (Wilkes U. S. Expl. Exped., X, 1849, p. 687, Atlas, Pl. 2, figs. 11, 11 a, 11 b), Carboniferous, Australia. It is unfortunate to have to abandon Meek and Hayden's name for the well-known American species, but the rules of nomenclature require it, so I propose the name *Liopistha* (*Cymella*) *montanensis*, in reference to both the type locality and the geological group from which it was described.

Anodonta parallela White, was described from the Cretaceous of Colorado in 1878 (Hayden Survey, IV, p. 709). Binney used the same name in his Bibliography of North American Conchology, Pt. I, 1863, p. 46, citing Ferussac, "Hyde, in litt." As neither Ferussac nor Binney, so far as I know, ever published any description to accompany that name, White's name will stand.

Unio rectoides White, Tertiary, Utah (U. S. Geol. Surv., Bull. 34, 1886, pp. 11, 15, 21), is preoccupied by *U. rectoides* Whitfield; "Cretaceous," New Jersey (U. S. Geol. Surv., Monog., Vol. 9, 1885, pp. 250, 258). As Pilsbry and others have shown, Whitfield's *rectoides* is itself a synonym of *Lampsilis recta* (Lam.), and is from Quaternary deposits, instead of Cretaceous. Under the circumstances it seems too bad to abandon White's name, but the rules adopted in the interest of ultimate stability of nomenclature require it. I propose for it the name *Unio whitei*. It should likely be removed to some other genus.

Unio browni Whitfield, Cretaceous, Montana (Bull. Am. Mus. Nat. Hist., XIX, 1903, p. 485), is preoccupied by *U. brownii* Lea, recent, Asia (Proc. Acad. Nat. Sci., VIII, 1856, p. 95), so Pilsbry renamed it *Parreysia barnumi* (NAUTILUS, XVIII, 1904, p. 12), a fact that seems to have been overlooked by subsequent writers, which is likely to be the case where new names

are proposed in brief notices of publications in reviews. Even if Conrad's Africo-Asiatic genus *Parreysia* is to be considered valid, the reference to it of Whitfield's species seems to me incorrect. In the present unsettled condition of the classification and nomenclature of recent Unionidæ, it is doubtful whether any good purpose is served by removing the fossil forms from the genus *Unio*, though perhaps few, if any, would be placed there if we had sufficient knowledge of the family, and had the anatomy and perfect shells with which to work.

Melania (*Goniobasis*?) *sculptilis* Meek, Tertiary, Hot Springs Mts., "Idaho" [Nevada] (Proc. Acad. Nat. Sci., Phila., XXII, 1870, p. 58), is preoccupied by *Melania sculptilis* Lea, recent, Tennessee (Transac. Philos. Soc., X, 1853, p. 297; Tryon, L. & F.-W. Shells, Pt. 1, 1873, p. 297), so Meek's name must be abandoned, but I refrain from renaming it until further investigation, for the following reasons: Meek himself later expressed a doubt as to whether *sculptilis* and *subsculptilis*, from the same locality and position, are distinct, and also suggested that it is not distinct from *M. taylori* Gabb. Furthermore, Dr. T. W. Stanton informs me that on Meek's separate copy of his paper in which *sculptilis* and *subsculptilis* are described is the following penciled note in Meek's handwriting: "Prob. the same named *M. decurata* Con. Am. Jour. Conch. 6, p. 200, Ap. 1871, and both are prob. synonyms of a species descr. by Gabb in Cal. Report." The reference to Conrad's *decurata* probably means *decursa*, which is said to have come from Colorado. The figure does not look like any of the species mentioned. Gabb's species to which he refers is *M. taylori* (Paleont. Cali., II, 1869, p. 13, Pl. 2, fig. 21), the figure of which is much more slender than Meek's figures, but perhaps because drawn from a more mature specimen, as Meek suggests. If Meek's *M. sculptilis* is the same as any or all of the other three, then no new name is needed. I believe it is identical with *subsculptilis*.

Melania convexa var. *impressa* Meek and Hayden, "Tertiary" [Cretaceous], Montana (Proc. Acad. Nat. Sci., Phila., IX, 1857, p. 138), is preoccupied by *Melania impressa* Lea (Proc. Philos. Soc., II, 1841, p. 83; Transac., IX, p. 19; Obs., IV, p. 19). Hence Meek and Hayden's name must be abandoned,

but as their *impressa* is probably not sufficiently distinct from their *convexa* to deserve a name, I propose the use of that name *convexa*, and do not rename it. Probably all should be referred to *Goniobasis*, as is usually done.

Cerithium tenerum Hall was described from the western Tertiary in 1845 (Fremont's Expl. Exped., Ore. & Cali., p. 308, Pl. 3, fig. 6), and was transferred to *Goniobasis* by Meek in 1870. Meantime, *Melania tenera* Anthony, was published by Reeve in 1861 (Monog. *Melania*, sp. 407), and was transferred to *Goniobasis* by Tryon in 1872 (L. & F.-W. Shells, Pt. 1, p. 264). This gives Hall's species priority, and Anthony's should be renamed unless it has already been renamed or is considered a synonym of something else. A revision of the group including *G. tenera* Anth., based upon adequate material, is desirable.

Melania multistriata Meek and Hayden, now known as *Campe-loma multistriata*, was described in 1856 from the Fort Union Tertiary (Proc. Acad. Nat. Sci., Phila., VIII, 1856, p. 124). Wheatley used the same name in 1845, attributing it to Lea (Cat. of Shells of U. S., p. 147). His catalogue was a list, without descriptions, and I do not find that Lea or anyone else ever used that specific name in either *Melania* or *Campe-loma*. Hence Meek and Hayden's name should stand. Dr. Pilsbry writes that he finds no specimens bearing such a name in Wheatley's collection in the Academy of Natural Sciences at Philadelphia. Dr. Bryant Walker, in a letter just received, says: "Neither Wheatley nor Lea ever described a species as *Melania multistriata*. The use of that name by both of them seems to be owing to a *lapsus calami* of Lea, who in his remarks on his *M. buddii* compared it with 'the striate variety of Mr. Say's *virginica*, which he called *multistriata*.' Say's species was *M. multilineata*, and Tryon makes the correction on p. 295 of his monograph."

Paludina multilineata Meek and Hayden, Fort Union Tertiary, Fort Clarke, North Dakota, was described in 1856 (Proc. Acad. Nat. Sci., Phila., VIII, p. 120), and renamed by the same authors *Viviparus nebrascensis* (Proc. Acad. Nat. Sci., Phila., XII, 1860, p. 430), because they said *multilineata* was preoccupied in *Paludina* by Say, 1829. Later, after the Meek and

Hayden species had been removed to *Campeloma*, Meek restored the first name, calling it *Campeloma multilineata*, in accordance with his custom, a practice forbidden by modern rules of nomenclature. Since then, everyone has followed Meek. A difficult question as to what constitutes a description is involved, but I believe the second specific name should be used and that the name should be written *Campeloma nebrascensis* (Meek and Hayden). Say's *Paludina multilineata*, now placed in *Viviparus*, was described after a fashion by indicating the species to which he referred. He says: "I described it nearly four years since under the name *multilineata* [evidently in unpublished manuscript]; but recently, being about to publish it, on a more attentive examination and comparison with a specimen of the *elongata* from Calcutta, I have concluded that it varies from that specimen only in having the umbilicus a little smaller." Tryon, after quoting this, says: "I have compared the original specimen with shells from Calcutta, and find that it differs as little from them, as they do from each other. It is smaller than the foreign specimens, but I think a larger native shell was mislaid, or placed accidentally among the foreign ones, in the same collection; so that, rather than commit an error, I have chosen the reputed American example for my illustration. If this is not the *bengelensis* of Lamarck, it must have the name given to it by Say; that of Swainson [*elongata*] having been previously given to a fossil species." It is plain then, that the name *multilineata* was definitely applied to the Florida species by both Say and Tryon, provided it proved distinct from the Asiatic species, which it probably is, and the designation was accompanied by a figure of the Florida species and a brief description by comparison with the Asiatic species. All this appears to me to preclude the use of the name *multilineata* for Meek and Hayden's species.

Helix occidentalis Meek and Hayden, Judith River, Cretaceous, Montana, is another instance of the same kind. The name was changed by Meek to *nebrascensis*, because *occidentalis* was preoccupied in *Helix* by Recluz. Then Meek, in removing the Cretaceous species to *Hyalina*, restored the original name, in accordance with his custom, but contrary to present usage. From

the figures it is impossible to definitely ascertain to what genus either this species or *H. evansi* M. & H., from the same locality and formation, belong, but whatever the genus, the name *occidentalis* should not be used. As to *H. evansi*, which is based upon poor and probably immature material, we agree with Dr. Pilsbry, who writes: "It is better to leave uncertain shells of this kind in '*Helix*,' as uncertain generic reference may lead some one to baseless deductions. Paleontology is full of the most reckless generic references." He also calls attention to the fact that *H. occidentalis* Recluz, is now considered a *Hygromia*, ranking as a variety, but that does not restore Meek and Hayden's first name for their species.

Planorbis vetulus Meek and Hayden, was described from the Tertiary of South Dakota in 1860 (Proc. Acad. Nat. Sci., Phila., XII, pp. 175, 431). In 1864 (Smithsonian Check-list of Invertebrate Fossils of North America—Miocene, p. 13) Meek called it *P. vetustus*, since which time the latter name has been almost universally used, though no reason was given for the change. The change was likely inadvertent, though possibly deliberate, as authors in those days did not always hesitate about changing names to suit their own notions. Unless *vetulus* is preoccupied, of which I have found no evidence, it must stand as the name for this species.

A somewhat similar case is that of *Campeloma vetula* Meek and Hayden, which was first described as *Paludina vetula*, and afterwards cited by the same authors as *P. vetusta* and changed to *Vivipara vetusta*, but fortunately in that case the original name has been used by most subsequent authors, though White (U. S. Geol. Surv., Bull. 128, p. 77) made the curious mistake of supposing that *V. vetusta* and *C. vetula* are distinct species.

Limnæa tenuicosta Meek and Hayden, Eocene, near Fort Union, N. D., was described in 1856 (Proc. Acad. Nat. Sci., Phila., VIII, p. 119). In 1860 the same authors (Proc. Acad. Nat. Sci., Phila., XII, p. 431) cited the original description but spelled the name *tenuicostata*, without offering any reason, and the majority of subsequent writers have used the latter name, instead of the former.

NOTES ON THE MOLLUSCA OF FORRESTER ISLAND, ALASKA.

BY GEORGE WILLET.

During the past four months (1914 to 1917 inclusive), which were spent by the writer on Forrester Island, Alaska, some attention was given to the study of the mollusca of the locality. The shore line was rather thoroughly traversed and some dredging was done in various depths down to seventy-five fathoms.

Forrester Island lies well out to sea, a few miles north of the Canadian boundary line. It is about fifteen miles west of Dall Island, and seventy-five miles out from the mainland shore. The island is small, being approximately five miles in length and from a half mile to a mile and a half in width. It is very rocky along shore but is well timbered from the high-water line to the summits of the hills. There are a number of small islets and groups of rocks lying off the main island and practically all of these were visited one or more times.

As Forrester Island is well within the sweep of the Japan current, the water is much warmer than in the inside channels around Dall and Prince of Wales islands. The effect of this difference in temperature is shown in the fact that several species of shells that occur in 10-15 fathoms in inside waters were not found in less than 40-50 fathoms at Forrester Island. Also a number of species that were rather common on Dall and Prince of Wales islands were not noted on Forrester Island at all. As there are neither sand beaches nor mud flats on the island, many forms requiring such situations were conspicuously absent. The tidal currents in the vicinity are very strong at times, and it is quite possible that some species of which fragments or dead shells were found do not properly belong to the island fauna but were carried to the locality by the strong currents. One of the most interesting features of this region from a conchological standpoint is the fact that in many instances it seems to be a meeting point between boreal species and those from the southern fauna.

A number of species taken have since been described as new. In such cases I have mentioned the paper in which the descrip-

tion was given. The chitons obtained were made the subject of a paper by Dr. S. S. Berry in the Proceedings of the California Academy of Sciences (Fourth Series, Vol. VII, No. 10, September 1, 1917, pp. 229-248). All species of which I was doubtful as to identity were submitted to Dr. Wm. H. Dall and named by him. For this kind assistance I wish to express here my very great appreciation.

The following is a list of species of bivalves taken with brief notes on same:

Terebratulina caput-serpentis Linn. Several young specimens dredged in 50-60 fathoms.

Terebratalia transversa Sby. Common 5-30 fathoms.

Laqueus jeffreysi Dall. Abundant in 65-75 fathoms.

Nucula tenuis Mont. Rare. One or two dead valves and one living young specimen dredged.

Nucula (Acila) castrensis Hds. Common 40-50 fathoms. At Waterfall, Prince of Wales Island, plentiful in 10 fathoms.

Leda minuta Fabr. Fairly common 20-40 fathoms.

Leda penderi Dall. One dead valve dredged. Rather common at Waterfall in 10 fathoms.

Leda fossa Baird. A few dead valves dredged in 75 fathoms.

Glycymeris septentrionalis Midd. Rather uncommon.

Glycymeris corteziana Dall. Abundant 20-40 fathoms.

Glycymeris migueliana Dall. Fairly common 20-40 fathoms.

Philobrya setosa Cpr. Fairly common.

Pecten (Chlamys) hericeus Gld. Found occasionally.

Pecten (Chlamys) hindsi Cpr. Abundant from low-tide line to 60 fathoms.

Pecten (Chlamys) islandicus Mull. A few specimens taken in dredge with last species.

Pecten (Chlamys) caurinus Gld. Single dead valve dredged.

Pecten (Pseudamusium) randolphi Dall. Two young specimens dredged in 50 fathoms.

Pecten (Propeamusium) alaskense Dall. Fairly common in 50-60 fathoms.

Hinnites giganteus Gray. Rather common. More abundant in inside channels.

Lima (Limatula) subauriculata Mont. Dead valves common 25–50 fathoms. Living specimens rarely taken.

Monia macroschisma Desh. Rather common.

Mytilus californianus Conr. Abundant. Some specimens attaining a length of nine or ten inches.

Modiolus modiolus Linn. Occasional. Abundant in inside waters.

Musculus niger Gray. *Musculus seminudus* Dall. A few specimens of each of these species were taken in about 30 fathoms.

Musculus laevigatus Gray. One or two dead valves dredged.

Musculus vernicosus Midd. Common at times in sea weed at extreme low tide mark.

Thracia curta. One dead valve dredged. Rather common at Waterfall in 12 fathoms.

Thracia challisiana Dall. A few dead specimens taken in 30–40 fathoms. Living specimens were probably all too deep in gravel to be secured by the dredge.

Pandora (Kennerlyia) forresterensis Willett. (NAUTILUS, xxxi, 1918, p. 134.) Abundant in 60–70 fathoms; less plentiful in more shallow water.

Pandora (Kennerlyia) bilirata Conr. Common 25–50 fathoms.

Lyonsia (Entodesma) saxicola Baird. Dredged rarely. Rather plentiful in inside waters.

Lyonsia (Entodesma) inflata Conr. One living specimen dredged in 50 fathoms.

Lyonsia striata Mont. Occasional 30–60 fathoms.

Mytilimeria nuttalli Conr. Fairly common.

Cuspidaria planetica Dall. Not rare 50–60 fathoms.

Astarte compacta Cpr. Abundant 25–60 fathoms.

Astarte willetti Dall. (NAUTILUS, xxxi, July, 1917, p. 10.) Abundant with the last species. Adults mostly found in the deeper water.

Astarte alaskensis Dall. Abundant in company with the last two. *A. esquimaulti* Baird, was found to occur plentifully in 10 fathoms at Waterfall, but was not noted at Forrester Island.

Venericardia crebricostata Krause. Rather common 20–50 fathoms.

Venericardia (Miodontiscus) prolongata Cpr. Rather common with the last.

Thyasira trisinuata polygona Jeff. A few valves dredged in 50-60 fathoms. Also taken at north end of Dall Island.

Diplodonta orbella Gld. Rather common. Much less globose than California specimens.

Phacoides (Lucinoma) annulatus Rve. A few specimens dredged in 40-60 fathoms.

Phacoides (Parvilucina) tenuisculptus Cpr. Fairly common 25-50 fathoms.

Kellia laperousii Desh. Abundant in dead shells of *Marcia kennerlyi*.

Rochefortia tunida Cpr. A few valves dredged.

Cardium (Cerastoderma) californiense Desh. Abundant 10-40 fathoms.

Protocardia centifilosa richardsoni Whiteaves. Common 50-60 fathoms.

Saxidomus giganteus Desh. Dead valves found occasionally. Abundant in inside waters.

Marcia kennerlyi (Cpr.) Rve. Abundant 20-40 fathoms.

Marcia subdiaphana Cpr. Rather common 50-60 fathoms.

Paphia (Protothaca) staminea Conr. Occasional in gravel between boulders. Very abundant in inside waters.

Psephidea ovalis Dall. Common 15-40 fathoms.

Tellina (Oudardia) buttoni Dall. Rather common in 50 fathoms.

Tellina (Angulus) carpenteri Dall. Fairly common with last.

Tellina (Moerella) salmonea Cpr. One pair of dead valves dredged in 40 fathoms.

Macoma calcarea Gmel. A few immature specimens dredged in 50-60 fathoms.

Semele rubropicta Dall. Occasional 25-40 fathoms.

Psammobia (Gobraeus) californica Conr. Rather common.

Siliqua patula Dixon. One dead young specimen dredged. Common in inside waters.

Spisula (Hemimactra) polynyma alaskana Dall. Dead valves found occasionally. Common in mud flats on inside waters.

Mya truncata Linn. Fairly common.

Panope generosa Gld. Single valves dredged occasionally.

Panomya arctica Lam. A few specimens taken in 50-60 fathoms.

Panomya ampla Dall. Several dredged in 25–50 fathoms.

Saxicava arctica Linn. Common. Many living specimens found in dead shells of *Marcia kennerlyi*.

Saxicava pholadis Linn. Less plentiful than the last.

PUBLICATIONS RECEIVED.

A CHECK-LIST OF THE MARINE FAUNA OF NEW SOUTH WALES, PART I, MOLLUSCA. By Charles Hedley. (Suppl. Jour. Royal Soc. N. S. W., Vol. 51, 120 pp., 1917. Issued June, 1918.) A very useful and interesting paper. The list by T. Whitelegge, of Port Jackson invertebrata, published in 1889, contained 802 marine mollusca. The present catalogue contains over 1200 species. The list has been purified notably by eliminating a block of Atlantic species included by mistake in the Challenger series of 410 fathoms off Sydney. The author estimates that future research will recognize 2000 species from the waters of this State. The nomenclature is up to date and one notes many changes, and in the position of certain families some surprises. The following new genera are proposed: *Attenuata*, *Austrodrilla*, *Epideira*, *Etrema*, *Exomilus*, *Guraleus*, *Inquisitor*, *Hemidaphne*, *Macteola*, *Nepotilla*, *Provexillum* and *Scabrella*.—C. W. J.

MOLLUSCA. By Charles Hedley. (Reprint from the Proc. Royal Geog. Soc. Australasia. S. Australian Branch, Session 1916–17, 21 pp., 1 pl., 1918.) A report on some mollusca collected in Western Australia by Dr. H. Basedow, adding about sixty species to the fauna of that State. The new species described and figured are: *Tellina piratica*, *Encithara basedowi*, and an interesting fresh-water shell *Bulimus sisurnius*.

REPORT ON THE CEPHALOPODA OBTAINED BY THE F. I. S. "ENDEAVOUR" IN THE GREAT AUSTRALIAN BIGHT AND OTHER SOUTHERN AUSTRALIAN LOCALITIES. By S. Stillman Berry. (Biol. Results of the Fishing Experiments carried on by the F. I. S. "Endeavour," 1909–14. Commonwealth of Australia, Dept. of Trade and Customs, Fisheries, Vol. IV, pt. 5, pp.

203-298, pls. 59-88, 1918.) A valuable contribution to our knowledge of the Cephalopods of that region. The material studied consisted of 104 specimens, representing 9 genera and 13 species. On the whole the material was in good condition, but the author can find little to commend the use of formalin in preserving Cephalopods, unless it be for some of the more delicate and transparent pelagic forms. Nine new species are described and figured and two new subgeneric names are proposed—*Austrossia*, a subgenus of *Rossia*, type *R. australis*, and *Teuthidiscus*, a subgenus of *Opisthoteuthis*, type *O. pluto*. The illustrations based on the preserved specimens themselves, which are apparently much contracted and distorted, often fail to convey as clear an idea of the animal in life as a good drawing.—C. W. J.

FRESH-WATER BIOLOGY. By Henry Baldwin Ward, Ph. D., and George Chandler Whipple, with the collaboration of a staff of specialists. Pp. viii + 1111. New York: John Wiley and Sons Inc., 1918. This work treats of all groups of fresh-water plants and animals. In each group (except the Bacteria and fishes) there is a comprehensive outline of the system arranged in the form of a key, so that any form in hand may be run down to its genus or subgenus with the least labor. Typical species in each genus are described and in most cases figured. The figures, of which there are 1547, appear to be admirably selected, and as a rule are well engraved. The chapter on mollusks, by Dr. Bryant Walker (pp. 957-1020, 144 figs.), forms an excellent introduction to this group, as the clear definitions and abundant figures carry the classification to subgenera. As most of the figures represent the more common forms, a large number of the species most likely to be encountered can be determined. The well-illustrated synopsis of Unionid groups will be especially useful. There is no other publication giving an up-to-date and complete classification of our fresh-water mollusks, the data being scattered in many books and periodicals.

The chapter on Conditions of Existence, by Prof. Victor E. Shelford, will be of value to collectors of fresh-water shells for

its clear though condensed exposition of modern methods of observation and study.

The typography of the volume is particularly agreeable. The work deserves and will doubtless have a wide circulation.—H. A. P.

NOTES.

COLORADO MOLLUSK NOTES.—The latest find in Colorado is a fine specimen of *Limax maximus* L., found out-of-doors by D. M. Andrews, the well-known botanist, in one of his nurseries at Boulder, under a board. As he has imported some plants from France, it is possible that it came from there.

Several years ago a few *Lymnæa auricularia* (L.) were reported from Colorado Springs. Lately G. B. Warner sent me about 200 dead shells of that species found by him on the shore of Dotson Reservoir near Fowler, which is in the same drainage basin as Colorado Springs.

Lymnæa hendersoni Baker, therefore known only from the type locality west of Fort Collins, has been found by Dr. M. M. Ellis in a small pool west of Louisville. Like the one at the type locality, the pool contains water during only a few months each year.—JUNIUS HENDERSON.

VIVIPARUS CONTECTOIDES LIMI, new name for *V. c. compactus* Pils., NAUTILUS, Vol. 30, p. 42. Dr. Walker has kindly called my attention to the prior use of *compactus* in *Viviparus* (Kobelt, Syst. Conch. Cab., *Vivipara*, p. 113, 1906), and the name is accordingly changed.—H. A. PILSBRY.

COMMANDANT PAUL DUPUIS, of the Belgian Army, and well known to malacologists for his useful papers upon the shells of the Belgian Congo, having been severely wounded, has been transferred to the garrison of Paris, where he is employing leisure time in zoological studies, particularly upon the chitons.

GONAVE ISLAND SHELLS.—The following species of land shells were collected by Dr. W. L. Abbott at La Mahotiere on the S. W. coast of Gonave Island, off the west coast of Hayti: *Pleurodonte semiaperta* v. Mart. (this is the same as *Helix gaskoini gonavensis* Crosse), *Cepolis loxodon* Pfr., *Urocoptis guigouana* Petit, *Gastrocopta pellucida* Pfr., *Chondropoma browniana* Weinld., *Alcacia gonavensis* Weinld., and *Trochatella brownia* Weinld.—E. G. VANATTA.

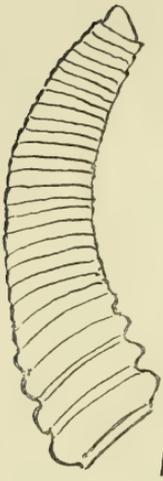
HENRY SUTER.

The well-known conchologist, Mr. Henry Suter, died at Christchurch, New Zealand, on July 30, 1918, at the advanced age of 77 years. He will be remembered best for his important work, the "Manual of New Zealand Mollusca," published in 1913.

Mr. Suter was a native of Zurich, Switzerland, and from his boyhood was an enthusiastic naturalist. He was educated as an analytical chemist and was engaged for several years in various commercial pursuits without much success. At last, to improve his prospects he emigrated with his family to New Zealand in 1887.

He commenced his colonial career by taking a farm in a rough bush district. When a middle-aged foreigner, accustomed to a town life, turns back-woodsman it is only in a novel that he ever succeeds. But when this last venture came to the inevitable end, Mr. Suter had fortunately attracted the attention of Capt. Hutton, who obtained scientific employment for him. Thereafter the remainder of his life was spent in the congenial work of zoology. He held no regular post, but was engaged in turn by various institutions to arrange collections, to make reports or as relieving officer.

So long did he continue in harness that he used finally to claim to be the oldest man in New Zealand earning, not drawing, government pay. His last occupation was the preparation of palaeontological bulletins for the geological survey.—CHARLES HEDLEY.



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No. 3

NEW FORMS OF CAECUM IN NEW ENGLAND.

BY EDWARD S. MORSE.

A few years ago I collected from several scoops of sand from Easton's Beach, Newport, R. I., over two hundred specimens of Caecum. From the variety of forms discovered, not including the three New England species¹ which were more or less abundant, one might imagine that the Marquis de Folin had been wrecked off the coast of New England at this place and his collection of Caecidae had been washed ashore. In de Folin's monograph of the group he says that the species vary greatly among themselves. The same species may vary from a smooth to a ribbed surface, not only that but the three sub-genera established by Carpenter² under the names of *Elephantulum*, *Anellum* and *Fartulum* are not based on permanent characters.

A reference to Carpenter's monograph of Caecidae shows that he gave little value to his groupings, for he says "The groups described under Caecum can scarcely be regarded even as sub-genera, so very gradually do they pass one into the other; but they are found convenient, to avoid the frequent repetition of characters, and to aid in the identification of species." He does not give a single illustration, which greatly diminishes the value of the monograph.

Bearing in mind this dictum of de Folin, one might believe that here is a distinct group of mollusks in which permanent

¹ *C. pulchellum*, Stimpson. *C. cooperii*, Smith. *C. johnsoni* Winkley.

² Proc. Zool. Soc. of London, 1858.

specific characters had not been established—nascent species, in fact. Marquis de Folin published a monograph of the family but I have never been able to refer to his memoir. So far as I can learn it is not to be found in any scientific library in the United States. Tryon in preparing his Manual of Conchology has been equally unfortunate. He was unable to obtain the memoir. Agents of the Philadelphia Academy of Sciences in Europe were specially instructed to obtain the work but without success.¹

Tryon in his Manual presents two plates of figures of *Caecum* depicting thirty-nine species. I have compared my forms with these figures and under the names given have presented a few drawings of these forms which more or less resemble the figures as given by Tryon.

The family *Caecidae* consists for the most part of minute tubular shells from one to two millimeters in length. These shells are slightly curved backward. The earliest stage shows a closely coiled shell discoid in form; after a few symmetrical whorls it abruptly straightens out into a tubular shape and as the shell grows the coiled nucleus is discarded, leaving a tubular shell which in many species is also discarded after the permanent shell begins to form. The end exposed after this separation is closed by a plug, or septum having a form which may be unguulate, mucronate or mammillate. The tubular shell may be smooth, longitudinally ribbed or transversely marked by encircling ribs, these annulations being more or less prominent and crowded. They vary in color from a light brown to a chalky white resembling a dead shell, though often preserving the operculum. When smooth the shell is often hyaline.

If one desires specimens of this interesting group he may usually find them in the sand which drops out of sponges kept in a druggists' box or drawer.

It must be understood that the following designations do not imply that I regard the forms as representing the species assigned to them. Doubtless some of them are different; but re-

¹ De Folin's work, "Les Fonds de la Mer," is now contained in the library of the Academy.

calling what de Folin and Carpenter say in regard to the extreme variability of what are supposed to be species, I judge it better not to encumber the synonymy by creating new names.

Caecum annulatum Brown. Pl. V, Fig. 1.

A single specimen in the collection resembles the figure given by Tryon. At first sight it suggests *pulchellum* but enlarges more rapidly towards the aperture. It differs also in having three or four large costae next to the margin or lip.

Caecum cooperii Smith. Pl. V, Fig. 2.

This species was discovered by Sanderson Smith in Gardiner's Bay at the end of Long Island in five fathoms. This is a very distinct form. From one specimen which was white and chalky and resembled a dead shell I obtained the operculum which was orbicular, thick, brown in color, concave with six sharp revolving ribs, sinistral in direction, indicating that the shell was dextral. In various references to the operculum of Caecidae no mention is made of the direction of the revolving striae.

Stimpson in his "Shells of New England" figures accurately the operculum of *Caecum pulchellum*, showing the sinistral spiral of the lines of growth, yet makes no reference to its significance. Even Carpenter in his monograph while describing a number of opercula of different species makes no mention of the direction of the striae. He describes the shape of the operculum, whether flat, convex or concave, whether thick or thin, the color, etc., but not a word is given as to whether the spiral lines are dextral or sinistral. In his examination he used a $\frac{1}{4}$ in. obj. and the direction of the lines must have been very plain. With the lowest power of Zeiss the direction of the spiral was easily detected.

Caecum johnsoni Winkley. Pl. V, Fig. 3.

This was first discovered at Woods Hole. The drawing is made from a co-type in the collection of the Boston Society of Natural History. I am indebted to Mr. C. W. Johnson for the loan of it and for other kindnesses. The septum is sub-ungulate and has transverse lines of growth. It resembles the figure in Tryon of *C. achirona* of de Folin.

Caecum auriculatum de Folin. Pl. V, Fig. 4.

A number of specimens in the collection resemble the figure of this species as given by Tryon. The shell is thin, white, hyaline, very narrow for its length, faintly enlarging toward the aperture. Near the aperture faint lines of growth are seen. The septum is distinctly hemispherical or mammillate.

Caecum clarkii Carpenter. Pl. V, Fig. 5.

A number of these glassy tubes were found identical in shape to *C. auriculatum* but only half the size. It cannot be an early deciduous stage because the diameter of the tube is much smaller. *C. clarkii* as figured by Tryon bears some resemblance to this form. It has the same hemispherical septum. The operculum is light corneous in color, flat with a central smooth area with a distinct knob in the centre; this area surrounded by minute lines of growth. The form approaches *C. cornubovis* of Carpenter.

Caecum nitidum Stimpson. Pl. V, Fig. 6.

This form of which a number of specimens were found is without question Stimpson's species described as a Florida shell.

Meioceras sp., Carpenter. Pl. V, Fig. 7.

Two specimens in the collection are identical with the figure given by Tryon. Its distribution is given from Florida to Rio de la Plata.

Stimpson described under the name of *pulchellum* the first *Caecum* discovered on the New England coast and gives an excellent figure of it in his "Shells of New England." The species was dredged in ten fathoms of water in New Bedford harbor. The other two species of New England *Caecum* were also found south of Cape Cod. By far the larger number of *Caecum* collected at Easton's Beach consisted of *C. pulchellum*. Miss M. W. Brooks also collected a number of *Caecum* at Narragansett Pier and most of these were *C. pulchellum*. The shell is light horn color and easily distinguished. The second deciduous stage of *pulchellum* was very common in the collection. The shell enlarges quite rapidly towards the aperture and is more

sharply curved than in the adult. A few of the forms figured by Tryon suggest the second deciduous stage of other species.

In the foregoing attributions I am indebted to the two plates of Caecidae given in Tryon's Manual of Conchology, Vol. 8. I may remark that all the species referred to are Atlantic coast forms, the west coast of Europe, the east coast of the United States south of Cape Cod, Teneriffe, Florida, West Indies and Brazil.

EXPLANATION OF PLATE V.

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| 1. <i>Caecum annulatum</i> , Brown. | 5. <i>Caecum clarkii</i> , Carpenter. |
| 2. <i>Caecum cooperii</i> , Smith. | 6. <i>Caecum nitidum</i> , Stimpson. |
| 3. <i>Caecum johnsoni</i> , Winkley. | 7. <i>Meioceras</i> sp., Carpenter. |
| 4. <i>Caecum auriculatum</i> , de Folin. | |

A EUROPEAN MOLLUSK, *HELCION PELLUCIDUM*, NEVER BEFORE RECORDED IN AMERICA.

BY EDWARD S. MORSE.

In looking over the sand from Easton's Beach, Newport, containing *Caecum*, I discovered a minute specimen of the beautiful limpet *Helcion pellucidum* of Great Britain. It was not over a millimeter in length. I first detected it by the opalescent markings like iridescent glass. These markings appeared as four irregular-shaped areas near the anterior margin. In my paper on An Early Stage of *Acmaea* (Proc. B. S. N. H., Vol. 34, pp. 313-323), I became familiar with the protoconchs of *Acmaea testudinalis* and *A. alveus* and they do not even remotely resemble the young *pellucidum*. The shell is corneous, narrowing slightly behind. Without the metallic markings it would have suggested *Helcion pellucidum*, but with these iridescent spots it was unmistakable. So far as I know this species has never been found on this side of the Atlantic. Miss M. W. Brooks discovered another European species, *Homalogyra atomus* at Newport and Narragansett Pier.

In the American Journal of Science, Vol. 20, 1880, Verrill in a brief note records finding in the docks at Newport a European species never before recorded as American, *Truncatella truncatula*.

With the tremendous traffic going on for nearly two years in the conveyance of troops and provisions we may confidently look for other introductions of European species.

PRATICOLELLA CAMPI, SP. NOV. (PLATE VI, FIGS. 1 TO 4.)

BY GEO. H. CLAPP AND JAS. H. FERRISS.

Shell narrowly umbilicated, globose, shining, opaque white with translucent corneous bands, usually one just above the periphery, one just below and numerous bands down to the umbilicus, or the shell may be all opaque or all translucent below the periphery. Whorls 4 with well impressed suture, body whorl rounded, periphery high some shells showing a slight angularity at the periphery. Aperture lunate-rounded, slightly oblique, somewhat dilated above, lip thickened within and widely dilated at the columellar insertion; there is a distinct, though thin, callous deposit connecting the ends of the lip.

Diameter 6, altitude 4 mm. There is a slight variation in size but above is about the average. Animal not observed.

Type locality, Fort Brown, Brownsville, Texas. "In sandy soil from 1 to 6 inches below the surface, at the foot of the brick piers" (J. H. F.). It was also found in the "axils of banana plants" and in the soil on the eastern side of the parade ground, in both instances with a number of other snails. Collected by Jas. H. Ferriss and R. D. Camp in midwinter, 1913-1914. Camp reports, Nov., 1918, that "the old building where we found it has been removed and the parade ground torn up by changes for the war."

We take pleasure in naming this species after Mr. R. D. Camp who, for several years, has been collecting in the Brownsville region.

Mr. Ferriss noticed this form when first collected and insisted that it was not the young of either *P. berlandieriana* or *griseola* which were found with it; there was too much evidence of maturity and its subsequent detection in drift from the Rio Grande confirms this opinion.

It differs from the young of the other species in being more

solid and less translucent, and by the *constantly thickened and dilated lip and the presence of the callous deposit*. The umbilicus is also wider, being nearly double the diameter of that of the young shells. The aperture is wider and more rounded, that of the young of the above-named species being distinctly sub-angular at the base. As a rule the spire of the young shells is more prominent and the suture deeper, the young shells are also *distinctly angular at the periphery*.

Figs. 1, 2, 3, 4, *Praticolella campi* Clapp and Ferriss.

Figs. 5, 6, 7, *Praticolella griseola* (Pfr.) juv.

STYLOBATES, A WARNING.

BY WILLIAM HEALEY DALL.

Some fifteen years ago a colleague interested in crustacea and whose habit it was to bring me the empty shells from which he had extracted hermit crabs, left on my desk a jar of alcohol containing half a dozen horny objects having the aspect of a large gastropod shell, flexible, yet keeping shape fairly well while moist. The specimens were of a brownish color with beautiful coppery or bronze reflections. Some were torn, but several retained their shape in a nearly perfect manner. Of the most perfect one, the drawings were made which illustrate this note (Plate VI, figs. 8, 9, 10). The specimens recall the large horny *Velutina* so common in Bering Sea, but of course being nearly three inches in greatest diameter are immensely larger. They were obtained in water between 220 and 436 fathoms deep between Oahu and Molokai islands of the Hawaiian group, by the U. S. Fish Commission steamer Albatross, in 1903.

The "shells" when collected contained each a hermit crab of large size and served as a pedestal for from one to three large Actinias.

After due consideration, and the exhibition to my colleagues in the Museum of these singular specimens, I described them as a new genus in the NAUTILUS.¹ Had there been any marked

¹ *Stylobates aeneus*, NAUTILUS. Vol. XVII, No. 6, pp. 61-2, October, 1903.

irregularity in the different specimens I should have been more cautious, but this was not the case in this instance. However, a year or two later another batch was received, and this time the "shells" were no two alike, and most of them with comparatively little resemblance to a normal shell.

The blunder was clear. These specimens were secretions from the bases of the Actinias, but how the first lot attained the regularity shown by the figures is still a mystery. The readers of this article must assess my culpability.

ENIA COOKI N. SP. (PLATE VII, FIGS. 11, 12, 13.)

BY H. A. PILSBRY.

The shell is thin, obesely fusiform, the diameter contained about $2\frac{1}{2}$ times in the length, composed of six whorls, the first $1\frac{1}{2}$ strongly convex. The first four whorls form a rapidly enlarging cone; the next whorl is much inflated; and the last whorl is large, somewhat flattened peripherally in its first half, then rapidly contracting, concave a short distance below the suture; the neck rounded and shortly descending, free in front. Surface mat, of a chamois tint, but darker on the antepenult, paler on the last whorl; covered with a very thin cuticle. The apex is entire, obtuse. First whorl smooth, the next having delicate striae; on the third whorl low, coarse wrinkles appear, and the following whorls have coarse sculpture of irregular, retractive wrinkles. On the neck they become sharper, more crowded, and less oblique to the growth lines. The aperture is but slightly longer than wide, rounded, ivory-yellow within. Peristome broadly expanded, faintly flesh-tinted within, with a narrowly reflexed white edge. The superior lamella is high, sinuous, continuous with the spiral lamella. The inferior lamella is strongly developed. Subcolumellar lamella is deeply immersed. The principal plica is lateral, running in to the middle of the dorsal side, where its inner end is closely contiguous to the upper end of the lunella. The lunella is crescentic, deeply curved, and wholly visible in the aperture (seen foreshortened in fig. 11).

Length 27.8 mm., diam. 11.5 mm.; aperture, length 9.7 mm., width 8.6 mm.

The clausilium is widest in the middle, tapering towards both ends. It is a little thickened at the distal end, and the main curvature is near the filament.

Type, Cat. No. 215084 U. S. Nat. Mus., from the Peruvian Andes, in the vicinity of San Miguel (6,000 ft.), Urubamba Valley, Province of Caxamarca, Peru, collected by Dr. O. F. Cook, and referred to the writer by Dr. Wm. H. Dall.

This species is strongly differentiated from all known *Nenia* by its very obese figure and small number of whorls, none being deciduous. The sculpture allies it to such forms as *N. taczanowskii* (Lub.), which also agrees in the armature of the throat. The inflation of the penult and contraction of the last whorl give the shell an appearance of deformity. Dr. Paul Ehrmann has remarked of the genus *Nenia*¹ that Ecuador and northern Peru are its distribution center; the group here reaches its acme of differentiation, and is most numerous in species. The present species, of a shape hardly to be matched in the whole family Clausiliidæ, is a further illustration of the diversity of forms found in this focal region for *Nenia*.

MY JOURNEY TO THE BLUE AND WHITE MOUNTAINS, ARIZONA.

BY JAS. H. FERRISS.

At the close of a summer in the Catalina mountains, Frank Cole, the guide for tourists and bug hunters to the wilds, led me into the seventh heaven. Something over 200 miles north-east of Tucson, Mt. Thomas, also known as Sierra Blanca and Old Baldy, in this region of perfect delight, stands 13,496 feet above sea level, the highest in Arizona, and at that time unknown to conchology. Here was the chance at that mythical *Oreohelix* "big as a tea saucer."

¹The late Dr. C. Boettger (1909) and most other recent authors on this group consider *Nenia* generically distinct from *Clausilia*. Its nearest affinity in the old world appears to be the Indo-Chinese genus *Garnieria*.

We left Tucson early in September, 1913, and the second night out camped at the Shaw goat ranch in the southern foothills of the Rincon group. Those hills seemed too naked and dry for our purpose and were left undisturbed. However, with more knowledge of the ways of the snail, passing that way again late in the winter of 1918, we dug into the Shaw ranch and filled two cans with *Sonorellas* (*S. hesterna*).

On the eastern side of the San Pedro river, John Lyon's mountain and the southern end of the Bonito range gave up only a couple of *Thysanophora hornii*. Snails have been reported in the Little Dragoons, only four miles from our trail, but were passed by. The White mountains were ahead and high. Physas and Succineas were abundant at the watering places for cattle, and box tortoises and rattlers plentiful in the desert.

The Graham mountains on the south bank of the Gila river, so high that there is yellow pine and quaking asp, plentiful enough for saw-mills, has *Sonorella* and *Oreohelix*. Camp was made in Stockton pass for a day, and a collection gathered at Mud Springs on the summit. However, between climbing and the descent made by moonlight, only a couple of hours could be given to the real work, and the collection was small. The *Sonorella* reminds one of the odorous species of the Santa Catalinas, and has been described as a new species, *S. grahamensis*. The deep forest on the north side of this range is promising. Safford, on the railway not over ten miles from the peak, with an easy ascent, would be a convenient base for an explorer.

From Solomonville to Coronado (on other branches of both river and railway) a toll road is graded more or less, between low hills of the Peloncillo range. Rock slides were plentiful, but at that time also seemed to be too naked and dry. Only one slide, six miles from Coronado, was disturbed, and this one had *Sonorella* (*S. delicata*) and one of the rare Price's rattlers. The snake was hustled into a Velvet Joe tobacco can with the snails, and all drowned in the Gila. Here I had another walk by moonlight in a strange country, but Cole had a hot supper ready. This Peloncillo range needs further investigation. It is about 130 miles in length, from Clifton to a point on the

Mexican border, and has been worked less than half a day. Daniels and I discovered *Sonorella hachitana peloncillensis* near Rodeo, New Mexico, in 1907, and F. H. Fowler found the same species in Doubtful Canyon, S.-W. New Mexico. Otherwise the shells of the range are unknown.

The wagon was stored at Clifton, a \$30 saddle horse purchased, of course including saddle and bridle, and two pack mules hired. Here is a beautiful and prosperous city of about ten thousand people, out on the side of the world. The dwellings seem to hang on brackets from the cliffs. The smelters and business houses are huddled together in pockets along the San Francisco river wherever the castellated cliffs will permit.

There were some attractions for weary travelers and it was late in the day when our train got under headway. Before the packs were lashed the new mules had sung out symptoms of homesickness, and to hold them true to the trail the pack animals were tied together in a string, Cole leading, and leading fast. At a sharp turn in the trail the swing mule was swung upside down into a creek. A few groceries were dampened this time and a mule repacked. Then the mules were turned loose. Going up a steep hill a packhorse heavily loaded, carrying two guns on top of its pack, tipped over backwards, unhorsed Cole and came down the hill like a wheel on its spokes. A fat, shiny, blue-black stage driver, so joyful he was not attending to his business, ran his four-in-hand into our belongings, adding considerably to both annoyance and oratory.

A new and wide trail from Clifton to Metcalf, high up on the cliffs, ended in the blacksmith shop of the trail builders, forcing us down the hill upon the old trail along a railroad track with many tunnels. By that time it was dark in the open country, and not a time-table or a lantern in the outfit.

At Metcalf one of the new mules dashed through a group of celebrating miners and hid under an outside stairway. That intellectual animal would have missed a glorious trip had it not been for the assistance of those helpful miners.

With the mule tied in line again we ate a cold snack in the saddle and pushed on and on in search of a country level enough to tie up mules and spread blankets. At a late hour we

compromised and camped anyhow. Beds were made in the trail. Before saying good-night a couple of heavily armed men came riding rapidly up the trail in search of a horse thief. We were questioned closely and our steeds inspected by flashlight. They did not find a chestnut horse, and we escaped.

Next a ranchman, we had heard helping the Metcalf Mexicans celebrate their independence day, came riding, roaring, questioning and horse inspecting. Easily satisfied or something, and without declaring intentions, he dropped his bridle reins on the ground and plumped into bed with Cole, hat, boots and pistol.

These adventures of an afternoon were all we had. In the morning light Cole recognized in the roaring midnight rider an old and generous acquaintance, and gave a monster breakfast in his honor. Every day after is a delightful memory—in snails, venison, bear meat, mountain trout, interesting people, magnificent forests, beautiful parks and newness botanically. Here was a paradise in gentian time, fringed and unfringed, with mountain asters and pentstemons.

From Clifton to the Double Circle ranch on Eagle creek it is a rough country, mostly forested and with sufficient rock slides for cover; but the snails do not like it. The trail here ran northwesterly for about 35 miles. Then directly north on Eagle creek to the south rim of the Blue mountains, 16 miles, except a short diversion eastward to get an easier climb.

Pupas and Vallonias were found near the Honeymoon U. S. ranger station, and a mile or two farther came in the *Oreohelix*, fifty miles from Clifton and fourteen days from Tucson. Here Cole found the bear. A party of Tucson friends in camp had been looking for it, so we split fifty-fifty, the rug going with the snail collection.

The rim of the Blue has a wall of broken granite. We found *Ashmunella mogollonensis* and a greyish form of *Oreohelix cooperi*. The latter is also found in the quaking asp and cork-bark fir groves of the vicinity, and upon the slopes of the White mountains. Our route lay northwesterly again across the K. P. *ciénaga*, down Corduroy and Fish creeks and across Black river to Reservation creek, the eastern boundary of the Apache nation, perhaps 20 miles. This is in Apache county.

Here were the mountain trout, the Colorado river Cut Throat (*Salmo mykiss pleuriticus*, Cope), a pound each; wild turkeys in flocks of one and two hundred, blue grouse, beaver, Abert's squirrel with its tufted ears, and a deep forest untouched by axe, fire or wind; and please do not complain if the shell collection is not as large as it ought to be. Upon this high plateau it was a continuous forest of the largest yellow pine, blue spruce, Douglas spruce, thickets of quaking asp 150 feet high, alder and cork-bark fir—(*Abies arizonica*, Merriam). There are wild peas and black gama grass, and cattle fatter than the average corn-fed herds.

The Black river, known as the Salt river farther down, is one of the beautiful streams of America. No dirty water or naked banks here, but a robust forest and a sodded turf. It takes a good part of an hour to climb to the plateau above. Well swept lawns with enough of the large pines for landscape beauty, and wide enough for the snail-hunter's camp and his horse feed, either on one or both sides of the stream, and *Oreohelix* from white to black, from high to low, in every rock pile.

Physas and *Pisidiums* were plentiful in Reservation creek and a few *Oreohelix* were in the rocks. The next twelve or fifteen miles north the country was higher, with prairie parks and a few lakes. Besides the few *Oreohelix cooperi* on the south slope of Mt. Thomas there was an abundance of the *Vertigos*, *Pupillas* and other small species. The trees were so close together here that the horses were left at the camp and we climbed the easy slope on foot. The dome-like summit of Thomas, with its stunted spruces, bogs and moss, had a few shells, and none were found alive.

The scenic effect was concealed by flurries of snow. At camp in the morning the snow was ankle-deep and still falling. It was cold. Our packing ropes were like rods of iron, and we moved. In an hour we rode into pleasant weather and the days after were perfect. On the return trip the Raspberry trail from the rim of the Blue mountain to the Blue river was taken, landing us at Cosper's ranch.

Down the Blue and San Francisco rivers *Ashmunellas* (*A. pilsbryana*), two new *Sonorellas* and *Oreohelix* were found in

the slides investigated, but it was again a hurried journey. The next year with the assistance of L. E. Daniels the work was thorough.

Oct. 17th, a month and a half from Tucson, the collector, snails, snakes and ferns were on the train homeward bound, and Cole wending his way over the toll road Tucson-ward. Theodore, that splendid thirty-dollar horse, and also one of Cole's, ate too much of a dry, short, delicate, mischievous grass, and died at the end of the trip.

A NEW OPISTHOSIPHON FROM CUBA.

BY WILLIAM F. CLAPP.

Opisthosiphon berryi sp. nov. Plate VII, fig. 14.

Shell longitudinally, finely plicate, ochraceous buff, encircled with a broad chocolate-brown band on the periphery of the last whorl and on the lower half of the earlier whorls; slightly shining; decollated; suture deep, crenate; four or five spiral ridges appearing in the umbilical region; whorls (remaining) four, very convex; aperture vertical, circularly oval, peristome white, double; the inner, a brief continuation of the whorl; the outer, on the right side, smooth, slightly expanded, at the suture broadly expanded and excavated over the breathing tube, adnate to the penultimate whorl; columellar margin expanded horizontally above in a broad flange adnate to the penultimate whorl, a large lobe curving over and nearly covering the umbilical region, interrupted below by a broad sinus where the lip is abruptly reflexed and attached to the whorl, a smaller lobe expanded horizontally below. A minute breathing hole within the aperture near the posterior angle, connects with a tube, somewhat concealed in the expanded and excavated lip, which curving back to the suture, descends and ends in the narrow space between the ultimate and penultimate whorls. Numerous strong raised lamellae mostly originating on the inner lip but occasionally extending along the parietal lip, cover that portion of the tube visible within the lip. Operculum as in *Opisthosiphon pupoides*.

Length (type) 13.5 mm. *g.d.* 9 mm. *l.d.* 7.3 mm. *g.d. aperture* 4.7 mm. *l.d.* 4 mm.

Length (paratype) 14.5 mm. *g.d.* 9.7 mm. *l.d.* 7.5 mm. *g.d. aperture* 5.5 mm. *l.d.* 4.3 mm.

Collected by Dr. S. S. Berry, March 1, 1814, at Cariji, Cerro de Tuabaquey, Prov. Camaguey, Cuba.

Type M. C. Z. No. 42005; Paratype, collection of Dr. S. S. Berry.

The chocolate-colored band is the most striking character of *Opisthosiphon berryi*. Compared with *O. pupoides* Mor. it has more convex whorls, more numerous and finer plicae, the outer lip is smooth, much less broadly expanded below and over the breathing tube is bent forward rather than being reflected back, as in *O. pupoides*. The columellar lip does not completely cover the umbilicus, as in *pupoides*, and its two lobes are much more widely separated. The operculum is very similar to *O. pupoides*, differing only in being slightly more oval. In the larger specimen very faint traces of fine chestnut-colored widely interrupted spiral bands may be seen on the upper half of each whorl, very similar in arrangement and color to those seen in *O. pupoides*. A young specimen shows the embryonic shell to consist of about $1\frac{1}{2}$ smooth whorls, the brown band and longitudinal plicae beginning at about the second whorl, the plicae becoming gradually more numerous and the intervening spaces less wide.

I am indebted to Mr. Berry for the opportunity to examine this species. It is closely related to *Opisthosiphon pupoides* Morelet from the Isle of Pines. The similarity of the shell fauna of Camaguey, Santa Clara, and the Isle of Pines, has been noted by Mr. John B. Henderson (NAUT., Vol. 27, p. 137; NAUT., Vol. 29, p. 18). Mr. Henderson also calls attention to the confusion in the genera of the Cyclostomatidae.

The species described above belong to *Opisthosiphon*, Dall (Proc. Mal. Soc. Lond., 1905, p. 209). Shells which possess the operculum of a *Rhytidopoma* and in addition are provided with a tubular projection behind the outer lip belong here. Undoubtedly when all of the characters of the species placed in this group are known, it will be found to be a natural one, and

yet it is true that the value for showing relationships, of accessory breathing apparatus among the land operculates, is to be questioned. The necessity for obtaining air when the aperture is tightly sealed with the operculum has apparently caused many genera not at all closely related to develop ingenious and occasionally somewhat similar breathing contrivances. Species of *Pterocyclos*, *Spiraculum*, *Rhiostoma* and *Tomocyclos*, while not closely related to our American land operculates have developed breathing apparatus similar to that of some of the American species. The American shells belonging to the *Ericiidae*, the genera of which are founded to a great extent on the characters of the operculum, show great variation in the apparatus through which air is introduced into the lumen of the whorl when the aperture is closed by the operculum. At least three types of accessory breathing apparatus may be seen.

First. With perforation connecting with visible external tube.

a. Operculum of *Rhytidopoma*.

1. Tube greatly prolonged, entering umbilicus.

Opisthosiphon rugulosum Pfr. Matanzas.

Opisthosiphon denegatum Poey. Isle of Pines.

2. Tube short, external opening towards and close to preceding whorl.

Opisthosiphon bahamense Sh. Bahamas.

3. Tube short, disappearing in the suture between the ultimate and penultimate whorl.

Opisthosiphon pupoides Mor. Isle of Pines.

4. Tube short, straight, not recurved.

Opisthosiphon sculptum Gundl. Cabo Cruz.

b. Operculum of *Choanopoma*.

1. Tube as in *Opisthosiphon pupoides* Mor.

Choanopoma uncinatum Arango. Sta. Clara, Cuba.

Second. With perforation opening directly into umbilical region or exterior of shell.

a. Operculum of *Choanopoma*.

Choanopoma blaini Gundl. Galalon, Cuba.

b. With operculum of *Cistula*.

Cistula limbifera Mke. Matanzas.

c. With operculum of *Chondropoma*.

Chondropoma egregium Gundl. Pinar del Rio, Cuba.

d. With operculum unknown.

Licina percrassa Wright. Pinar del Rio.

Third. With perforation not penetrating to exterior of whorl but connecting with an internal air space which is situated in the upper angle of the whorl and extends back from the aperture for a considerable distance. In some specimens it may be traced for over two whorls.

Rhytidopoma bilabiatum Orb. Pinar del Rio.

The first group has a restricted geographical distribution extending from the Bahamas through central Cuba to the Isle of Pines. *Choanopoma uncinatum* Arango while possessing the typical Opisthosiphon breathing tube has the very different operculum of a *Choanopoma*. It therefore cannot be included in *Opisthosiphon*, and until a careful study of the animal shows its true relationships may be retained as an aberrant *Choanopoma*.

The second group is confined to western Cuba and while containing species with very different opercula, and therefore a group of apparently no systematic value, is nevertheless interesting, in that it is confined almost entirely to Pinar del Rio, and entirely to western Cuba.

The third group, of which I have seen but one species, is of interest because of the fact that in this case the perforation and internal tube appear to be of no practical value; for, though one might be led to expect that at certain stages of growth, communication to the exterior might exist through the external sutural flanges, I have been unable to find any structural evidence of such connection.

It would appear from the above that if the breathing tube is to be considered of value as a generic character together with the operculum, as in the case of *Opisthosiphon*, *Choanopoma uncinatum* Arango would have to be placed in a new genus, the operculum being very different from that of *Opisthosiphon*; while the breathing tube, having been considered of sufficient

importance to separate *Opisthosiphon* from *Rhytidopoma*, would also have the same consideration in separating *C. uncinatum* from *Choanopoma*.

It would also seem that if the breathing tube restricted for *Opisthosiphon* is of generic importance that the modified perforation seen in so many of the *Ericiidae* from western Cuba should also be considered of value generically. This would mean, providing that the operculum was still considered of generic value, the removal of species of *Choanopoma*, of *Cistula* and of a large number of *Chondropoma* to new genera.

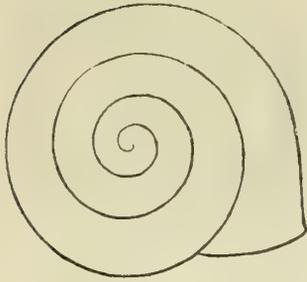
This would merely be substituting chaos for confusion and, until the anatomy of many of the species has been carefully examined, it would seem better to merely call attention to the peculiarly restricted distribution of those species of the *Ericiidae*, which have made structural changes in the shell, probably, as Dr. Dall suggests (*Proc. Mal. Soc. Lond.*, 1905, p. 309) to enable them to obtain air when the aperture is closed by the operculum.

SOME MARINE MOLLUSCA ABOUT NEW YORK CITY.

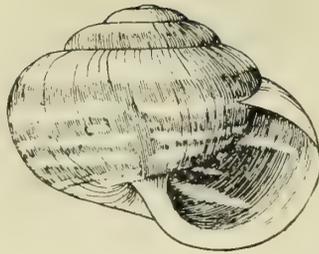
BY ARTHUR JACOT.

To aid any New-Yorkers interested in the shells of their vicinity, I am taking this opportunity of giving them the results of a few studies which were made during the past year in that region.

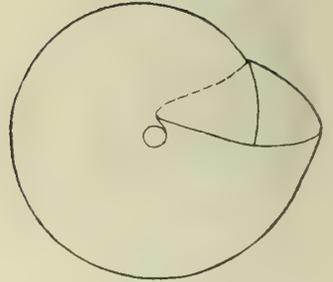
The coast of Staten Island from Fort Wadsworth to Great Kills was carefully gone over at low tide several times. Along this strip are three definite stations. The first (1) is an expanse of red sand flats (exposed only at low tide) at the mouth of the stream which drains the marshland between South and Midland Beaches. This is the only place where I found *Periploma leanum*, *Pandora gouldiana* and *Lyonsia hyalina*. Another station (2) opposite the Oakwood Heights station on the steam railroad to Tottenville, is a "sod-bank" formation, beautifully showing the encroachment of the sea on



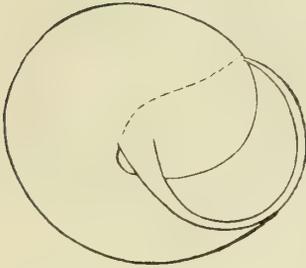
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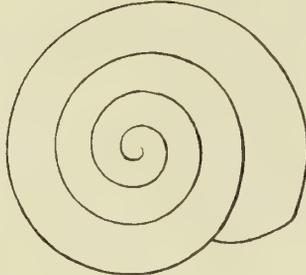
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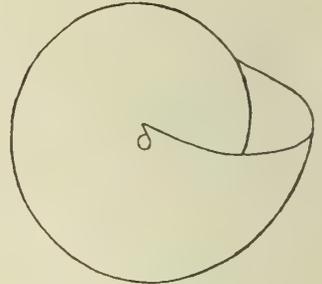
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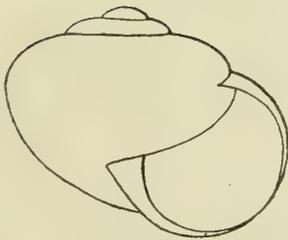
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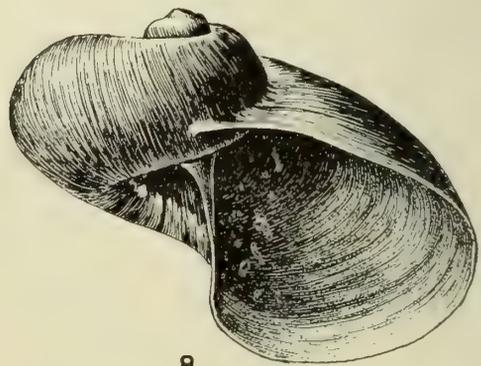
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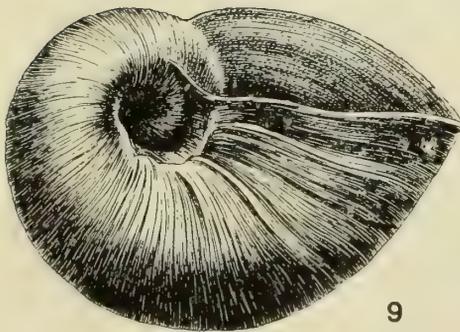
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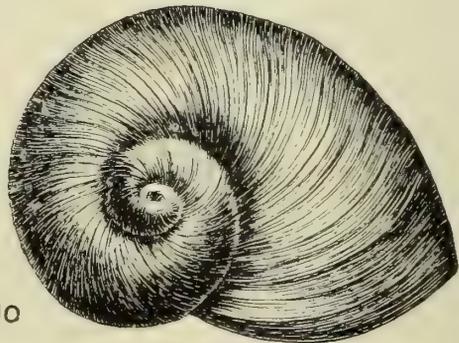
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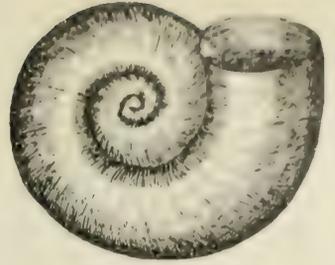
1-4. PRATICOLELLA CAMPI CLAPP & FERRISS, X5.
5-7. " GRISEOLA PFR., YOUNG. X5.
8-10. STYLOBATES ÆNEUS DALL, SLIGHTLY OVER 1/2 NAT. SIZE.



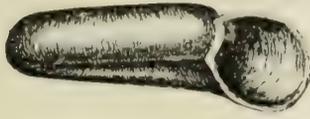
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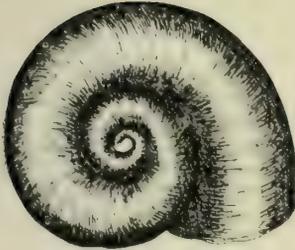
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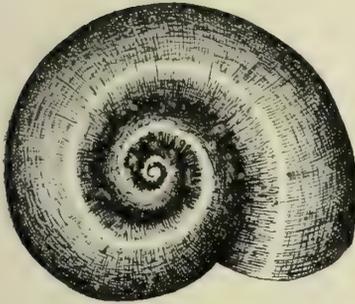
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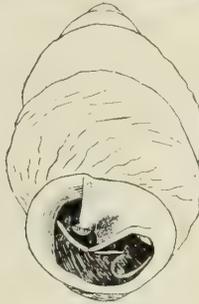
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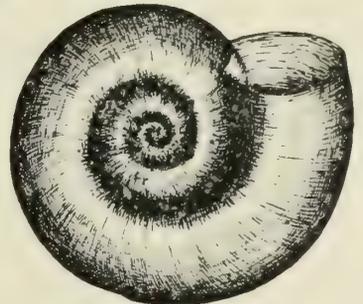
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11



10



12



13



14

1-10. BAKER: ON PLANORBIS.
11-13. NENIA COOKI PILSBRY.
14. OPISTHOSIPHON BERRYI W. F. CLAPP.

the land. The "banks" wherever submerged, are covered with *Modiolus plicatulus* among which and over which crawl *Littorina littorea* and *L. rudis*. The third station (3) is inside the isthmus which encloses the bay near the second station. Here there is an eel-grass bed which is exposed at low water.

The only species of note at Rockaway Beach (4) is *Astarte castanea* which can be picked up in front of or a little beyond the hospital to the west of the pleasure beach. Far Rockaway Beach (5) yielded the greatest number of species. This is especially due to the rift of fine shell material left by the receding tide at the angles of the bar which begins to the west of the "bathing beach."

The numbers in the following list correspond to the stations as designated above.

Pelecypoda.

Nucula proxima truncula Dall. A valve at 5.

Yoldia sp? Fragment at 5.

Arca campechiensis pexata Say. Generally distributed.

Arca transversa Say. Less common than preceding.

Ostrea virginica Gmelin. Generally distributed.

Pecten gibbus borealis Say. Most common at 4 and 5.

Anomia simplex d'Orbigny. Generally distributed.

Mytilus edulis Linnaeus. Generally distributed.

Mytilus edulis pellucidus Pennant. Not as common as on Conn. coast.

Modiolus demissus plicatulus (Lam.). Local. Abundant where found.

Periploma leanum (Conrad). Rare and only at 1.

Pandora gouldiana Dall. One valve at 1.

Lyonsia hyalina (Conrad). Only at 1.

Astarte castanea (Say). At 4, very small specimens at 5.

Venericardia borealis (Conrad). Only at 5.

Divaricella quadrisulcata (d'Orbigny). Occasional at 4 and 5.

Rocheportia planulata (Stimpson). Occasional at 5.

Aligena elevata (Stimpson). Not as common as preceding.

Cardium pinnulatum Conrad. One valve at 5.

- Callocardia morrhuana* (Linsley). At 1 and 5.
Venus mercenaria Linnaeus. Becoming less common.
Venus mercenaria notata Say. True form very rare.
Gemma gemma (Totten). Generally distributed.
Gemma gemma purpurea (H. C. Lea). Different habitat than preceding.
- Petricola pholadiformis* Lamarck. Generally distributed.
Tellina tenera Say. Fine specimens at 1.
Tellina tenella (Verrill). One valve at 1.
Tellina versicolor De Kay. Fine specimens at 5.
Macoma balthica (Linnaeus). Commonest at 2.
Tagelus gibbus (Spengler). At 5.
Ensis directus (Conrad). Generally distributed.
Siliqua costata (Say). Found only at 5.
Spisula solidissima (Dillwyn). Very abundant at 4.
Spisula solidissima similis (Say). Occasional.
Mulinia lateralis (Say). Generally distributed.
Mya arenaria Linnaeus. Generally distributed.
Corbula contracta Say. Found only at 5.
Barnea truncata (Say). At 1, 3 & 5, but especially common at 3.
Zirfaea cripata (Linnaeus). One valve at 5.
Teredo navalis Linnaeus. At 5.

Gasteropoda.

- Dentalium* sp? Fragment at 5.
Pyramidella fusca (C. B. Adams). Several specimens at 5.
Pyramidella winkleyi Bartsch? Two or three specimens which seem to be this species.
Turbonilla nivea (Stimpson). Only at 5, where it is the commonest *Turbonilla*.
Turbonilla aequalis (Say). I have referred 7 of my specimens to this species.
Turbonilla vinea Bartsch. Two specimens from 5.
Turbonilla areolata Verrill. One specimen, but with six rather than five spiral rows of pits, from 5.
Turbonilla interrupta (Totten). This is the typical form, not as described by Bartsch, but as described by Bush. The

color band is well marked in all my specimens (six). Found only at 5.

Odostomia (Chrysallida) sp? Two specimens at 5.

Odostomia impressa (Say). Several specimens at 5.

Odostomia trifida (Totten). Abundant at 5, found also at 3.

Odostomia bisuturalis Say. At 3 and 5.

Epitoneum multistriatum (Say). Three specimens at 5.

Polinices duplicata (Say). Generally distributed, fine specimens at 4.

Polinices heros (Say). Generally distributed, fine specimens at 4.

Polinices triseriata (Say). Occasional.

Crepidula fornicata (Linnaeus). Generally distributed.

Crepidula glauca Say. Found only at 2.

Crepidula glauca convexa Say. Generally but thinly distributed.

Crepidula plana Say. Generally distributed.

Paludestrina minuta (Totten). Occasional at 5.

Paludestrina laevis (De Kay). Common at 5, a few at 3.

Adeorbis supranitidus lirata (Verrill). Several specimens at 5, all being of this subspecies.

Litorina littorea (Linnaeus). At 2, 3 and 4.

Litorina obtusata palliata (Say). Only found at 5.

Litorina rudis (Donovan). Abundant at 2.

Lacuna vincta (fusca) Gould. Found at 2, 3 & 5.

Triphoris perversa nigrocincta (C. B. Adams). Several specimens at 5.

Certhiopsis greenii (C. B. Adams). Several specimens at 5.

Bittium alternatum (Say). Fine specimens at 5.

Eupleura caudata (Say). Generally distributed.

Urosalpinx cinerea (Say). Generally distributed.

Columbella avara similis Ravenel. A specimen at 2.

Columbella lunata (Say). Generally distributed.

Alectrion obsoleta (Say). Generally distributed.

Alectrion trivittata (Say). Generally distributed.

Busycon canaliculata (Linnaeus). Generally distributed.

Actaeon punctostriatus (C. B. Adams). Several specimens at 5.

Tornatina canaliculata (Say). Fairly common at 5.

Cylichna oryza (Totten). Several specimens at 5.

Melampus lineatus Say. Most common at 2.

Alexia myosotis (Drap.) Fairly common at 3.

On a tramp up and down the western end of Long Beach point, Long Island, I picked up the following interesting forms, besides forty-eight of the commoner species:

Yoldia limatula (Say). 1 valve.

Arca ponderosa Say. 3 valves.

Astarte castanea (Say). Common.

Tellina tenella (Verrill). 1 valve.

Tellina versicolor De Kay. 2 valves.

Barnea costata (Linné). 1 valve (fragment).

Cavolina telemus (Linné). 1 specimen.

DESCRIPTION OF A NEW SPECIES AND VARIETY OF PLANORBIS
FROM POST-GLACIAL DEPOSITS.*

BY FRANK C. BAKER.

Planorbis parvus urbanensis n. var. Pl. VII, figs. 4-6.

Shell differing from *parvus* by having a round aperture, the last third of the body whorl being depressed below the general level of the spire, deeper sutures, channelled in most individuals, and a deeper umbilical region. The body whorl has not quite as great transverse diameter as in typical *parvus*. In *parvus* (pl. 1, figs. 1-3), the whorls are typically in the same plane, the aperture is oblong or long ovate and the sutures are impressed but not channelled. The umbilical region is also less impressed and has a "reamed out" appearance.

Height at aperture, 1.00; greatest diameter, 3.00 mm.
Holotype.

Height at aperture, 1.00; greatest diameter, 3.00 mm.

* Contribution from the Museum of Natural History, University of Illinois, No. 1.

Height at aperture, .80; greatest diameter, 2.75 mm. Cotype.

Height at aperture, .80; greatest diameter, 2.50 mm. Cotype.

Holotype, number Z 10772 and paratypes number Z 10773, Museum of Natural History, University of Illinois. Cotypes of *urbanensis* and *altissimus* have been placed in A. N. S. Phila.

About 40 specimens of this form of *parvus* occur in the marl collections taken from the University of Illinois campus. The characteristics mentioned above appear to be very constant and the race or variety of *parvus* seems distinguishable enough for a distinct name. There were none of the *parvus* form in the material. This may be a Pleistocene species that has become extinct. Nothing similar has been seen in other marl collections available for study, but it would seem that it should be looked for in marl deposits, especially the older marl beds overlying the earlier drift sheets, or in deposits between these sheets—interglacial.

Planorbis altissimus n. sp. Pl. VII, figs. 7-10.

Shell depressed, with flatly rounded periphery which is placed below the center of the whorl; lines of growth fine, crowded, but surface without spiral ornamentation; whorls 4, regularly increasing in diameter, sloping flatly to the rounded periphery; spire whorls sunken below the general level of the surface, the whorls forming a rather sharp v-shaped suture, causing the shell to resemble a miniature *Planorbis antrosus* and producing a subacute carina on the upper surface of the whorls; base of shell deeply concave, forming a wide, saucer-shaped depression and umbilicus; the earlier whorls are carinate on the under side but the last whorl is rounded; the last half of the last whorl is markedly deflected, forming a contact with but half of the preceding whorl; aperture roundly ovate, shouldered above, the dorsal margin much produced over the ventral margin, the parietal callus joining the margins and causing the aperture to be continuous.

Height at aperture, 2.00; greatest diameter, 4.50 mm. Holotype.

Height at aperture, 1.75; greatest diameter, 4.25 mm.
Cotype.

Height at aperture, 2.00; greatest diameter, 4.00 mm.
Cotype.

Height at aperture, .90; greatest diameter, 2.00 mm.
(young, 3 whorls).

Holotype; number Z 10775 and cotypes number Z 10776,
Museum of Natural History, University of Illinois.

This small *Planorbis* is related to *deflectus*, but differs markedly in the form of the upper whorls which are more sharply carinated, and in the spire which is more sunken below the general level of the whorls. The umbilical region is deeper and the aperture is higher than wide. The lower part of the body whorl is more exposed below the first half of this whorl than in *deflectus*. Young specimens very strongly resemble *Planorbis campanulatus* in form.

Specimens of *deflectus* from marl deposits in Milwaukee (30th Street) Wisconsin, have occasional individuals that somewhat resemble *altissimus* in the greatly deflected last whorl but these are otherwise quite different. The new species may be looked for in marl deposits associated with *Galba obrussa decampi* and the *Pisidia* peculiar to the northern marl beds. Only 5 adult and 9 immature specimens occurred in the Urbana marl deposit and the new species was not, seemingly, a common inhabitant of the pond or lake.

The new forms described above occurred in a lot of post-glacial fossils found in a deposit on the campus of the University of Illinois, in a ditch and in excavations for the basement of the new greenhouses. The shells were about four feet below the surface, in a deposit of marl underlying two feet of black, clayey soil. The fauna contains several species which now have a more northern range, as *Pisidium costatum*, *P. tenuissimum calcareum*, *Valvata sincera*, and *Galba obrussa decampi*, and there is reason to believe that the pond in which these fossils lived occupied a kettle hole on the inner face of the Champaign moraine when the ice of the late Wisconsin glaciation was at or near Chicago. If this is so, then the

deposit is interglacial between the early and late Wisconsin invasions. A paper covering this point is in preparation.

EXPLANATION OF FIGURES, PLATE VII.

- 1-3. *Planorbis parvus* Say. Owaseo Lake, N. Y. X9
 4-6. *Planorbis parvus urbanensis* Baker, new variety. X9
 7. *Planorbis altissimus* Baker, young. X9.
 8-10. *Planorbis altissimus* Baker, new species. X7.

MOLLUSKS INFESTED WITH PARASITIC WORMS.

BY FRANK C. BAKER.

While carrying on biological work for the New York State College of Forestry at Oneida Lake in the fall of 1917, many animals were examined to ascertain the degree of parasitization by worms. The hosts studied included fish, birds, batrachians, reptiles, and mollusks. Among the latter many interesting cases occurred, both of infestation and absence of infestation, the degree of infestation varied from none to fifty per cent. Of the twelve species examined, five were without trace of parasites and seven were infested in varying degrees. It is noteworthy that none of the Amnicolidae or Valvatidae were parasitized, and that no worms were found in the small *Planorbis* (*parvus* and *hirsutus*). Of those infested, five are fresh water pulmonates. The examinations were carried on under the direction of Dr. H. S. Pratt, of Haverford College. The table below indicates the species infested and the degree of infestation. All are trematode worms the species of which have not yet been determined.

Bythinia tentaculata 17 examined; no worms.

Amnicola limosa 20 examined; no worms.

Valvata tricarinata 20 examined; no worms.

Planorbis parvus 3 examined; no worms.

Planorbis hirsutus 7 examined; no worms.

Planorbis antrosus 2 examined; 1 with cercariae, 1 without.

Planorbis campanulatus 15 examined; 3 with cercariae, 12 without.

Galba catascopium 10 examined; 6 with sporocysts and cercariae, 4 without.

Galba emarginata 5 examined; 3 with cercariae, 2 without.

Campeloma integrum 3 examined; 2 with cercariae, 1 without.

Physa warreniana 9 examined; 3 with cercariae, 6 without. Small leech in mantle cavity of 3 specimens.

Goniobasis livescens 2 examined; 1 with cercariae, 1 without.

University of Illinois,
Museum of Natural History.

TYPES OF GENERIC NAMES PROPOSED FOR ACHATINAE.

BY H. A. PILSBRY.

When working on Congo Valley mollusks I noticed that while the generic names applied to the Achatinae were discussed in Manual of Conchology, vol. xvi, genotypes were not selected for some names there considered absolute synonyms. This lack is supplied in the following list. Where a type had already been selected the authority and date of selection are added in parentheses.

Achatina Lam., 1799, type *Bulla achatina* L. (Lam., 1799).

Ampulla Bolten, 1798, type *A. priamus* Bolt. (Pilsbry, 1908).

Chersina [Humphrey], 1797, type *Bulla achatina*.¹

Achatium Link, 1807, type *A. elegans* Link = *A. achatina* (L.).

Achatinus Montfort, 1810, type *A. zebra* (Montfort, 1810).²

¹ The Museum Calonianum has been rejected as a source of nomenclature by the International Commission.

² De Montfort appears to have confused *A. zebra* and *A. panthera* under the former name, but as he stated that *Achatinus zebra* is the type, the name belongs rather to *Cochlitoma* than to *Achatina*. Since he says that Lamarck founded the genus, it is evident that he intended *Achatinus* merely as an emendation of *Achatina* Lam., and not as a new name. It cannot therefore displace *Cochlitoma*, but will be regarded merely as a variation in orthography.

Cochlitoma Fér. 1817, type *Bulimus zebra* Brug. (Pilsbry, 1904).

Archachatina Albers, 1850, type *A. bicarinata* Brug. (Pilsbry, 1904).³

Geodes Gistel, 1848, type *Bulla achatina*.⁴

Oncaea Gistel, 1848, type *Oncaea perdix*,⁵ = *A. perdix* Lam., = *A. achatina* (L.).

Parachatina Bourguignat, 1889, type *A. dohrniana* Pfr. (Pilsbry, 1904).

Serpæa Bourguignat, 1889, type *A. hortensiae* Morel. (Pilsbry, 1904).

Pintoa Bourguignat, 1889, *A. pfeiffer* Dkr. (Pilsbry, 1904).

Urceus (Klein) Jousseume, 1884, type *Achatina achatina* (L.).⁶

LORENZO E. DANIELS.

L. E. Daniels was born at Mazon, Grundy Co., Illinois, March 4th, 1852. The son of a farmer, his early life was spent on the farm, and so far as known his education was in the local schools.

While a farmer in Illinois, though a Democrat in politics, he was called from the plow in that strong Republican community to take the office of sheriff. Though modest to a fault and with none of the politician or office-holder in thought or manner, the administration was nevertheless a success. The term of office was enlivened by puzzling criminal cases, including murder, and there were also serious strikes in the coal fields;

³ *A. bicarinata*, the type of *Archachatina*, is a decidedly aberrant species. For the dextral continental species, which have the surface smoothish and even, I propose the subgenus *Calachatina*, *A. marginata* (Swains.), Man. Conch., XVI, 109, being the type.

⁴ Gistel, *Naturgeschichte des Thierreichs für höhere Schulen*, 1848, p. viii. *Geodes* is a substitute for *Achatina* Lam., no species mentioned.

⁵ Gistel, *tom. cit.*, p. 168. *Oncaea* is a substitute for *Achatina* Auct.; several species are briefly described.

⁶ Jousseume merely mentioned "le genre *Urceus* Klein (*Achatina* Lam.)" without any species. It therefore takes the same type as Lamarck's genus.

but this quiet farmer had courage, a known reputation for fair play, and was trusted by both workmen and employer. There were no complaints of violence in labor disputes during the Daniels regime.

The sheriff's rooms in the Grundy county court house at that time contained one of the best collections of Mazon creek fossils; for back in boyhood days the sheriff had become interested in those famous Upper Carboniferous beds near his home. In types, especially of insects, the collection contained many of the rarest species. They were worked up in a memoir by Dr. Handlirsch of Vienna, published by the National Museum. Mr. Daniels still owned this collection, together with the accumulations of many years of research in conchology, and the old Illinois homestead at the time of his death.

Mr. Daniels became interested in mollusks while a young man, and for many years collected assiduously, particularly in Indiana. For some years he was Assistant State Geologist of Indiana. Some of the results of his investigations during this period were published, in collaboration with Dr. W. S. Blatchley, the State Geologist, under the title "On some Mollusca known to occur in Indiana," and by Daniels alone, "A Checklist of Indiana Mollusca." Both appeared in 1903. At this time herpetology was added to his other interests, and in later trips the collection of snakes, horned toads and especially turtles claimed part of his attention.

Subsequently with Dr. Pilsbry, Junius Henderson and the writer, he was associated in field work many seasons in the wild places of North Carolina, Tennessee, Arizona, New Mexico, Utah and Idaho. In 1910 he joined Dr. Pilsbry and the writer in a collecting trip of several months in southern New Mexico and Arizona, and in 1914, in company with the writer, explored the Blue River region in Arizona and the Mogollon Mts., New Mexico. Many new species of *Sonorella*, *Ashmunella*, *Oreohelix* and *Holospira* were found on these excursions. In 1915 and 1916 Mr. Daniels joined forces with Prof. Junius Henderson in hunting *Oreohelices* in Utah and Idaho. Their results were set forth in two admirable papers, published jointly, the first exact and critical records for this fauna.

As a collector Daniels was untiring. His bag was always among the largest. He seemed to have the knack of finding unusual or abnormal shells. Some of these were illustrated by him in a special article.

Species of the molluscan genera *Sonorella*, *Ashmunella*, *Holospira*, *Hemphillia*, *Pisidium*, *Lymnæa*, of *Gerarus* and *Asemoblatta* (Upper Carboniferous insects), and probably other groups, have been named in his honor. His collections of land and fresh water shells, and of Mazon creek fossils are among the best.

Mr. Daniels was unmarried. Of late years he made his home with a sister, Mrs. James Foster, at La Porte and later at Rolling Prairie, Indiana. While on the farm he became interested in Masonry, often driving across the unbroken prairie a dozen miles on winter nights to attend lodge sessions at the county seat. He continued up to the thirty-third degree and the final services at La Porte were conducted by the Masonic fraternity.

In person Daniels was of the tall, strongly but loosely built Illinois type, of which Lincoln was an example. He was rather serious, but by no means lacking in humor, a good camp-fire companion. In character enterprising, interested, upright.

Seemingly in good health, nevertheless for some years he had need of a surgeon, and in October submitted to an operation at a Chicago hospital. Unforeseen complications developed and he died October 23, 1918. By his death conchology has lost one of its best explorers, and his associates a loyal and loving friend.—J. H. FERRISS.

JOSEPH WILLCOX.

Mr. Joseph Willcox, a member of the Board of Trustees of the Wagner Free Institute of Science for forty years, died in Philadelphia, October 1, 1918. Mr. Willcox was born at Ivy Mills, Delaware Co., Pa., August 11, 1829. After graduating from St. Mary's College, Baltimore, he became engaged in paper making with his father. This business was founded in 1729 by Thomas Willcox, who made paper for the continental

currency, the firm continuing to make paper for the government up to 1875. Mr. Willcox was in the Pennsylvania militia during the Civil War, and attained the rank of colonel.

On retiring from business Mr. Willcox took up the study of mineralogy and geology, and during his frequent visits to Florida became greatly interested in the geology of that State. In the spring of 1886, under the auspices of the Wagner Free Institute of Science, he organized with Prof. Angelo Heilprin of the Academy of Natural Sciences, an expedition to explore the gulf coast of Florida. Leaving Cedar Keys and proceeding south, they examined the silex beds of Tampa Bay, and in ascending the Caloosahatchie to enter Lake Okeechobee, discovered the Caloosahatchie Pliocene. An account of this expedition appeared in Transactions Wagner Free Institute, Vol. I. In company with Dr. Wm. H. Dall, he again visited these beds in the spring of 1887, and with the writer in 1888 made another trip to this and adjacent streams, making large collections to aid Dr. Dall in his great work on the Tertiary Fauna of Florida, also published in the Transactions of the Wagner Free Institute (Vol. III, six parts, 1654 pages, 60 plates, 1890-1903). In the work of obtaining additional material in other southern states and in many ways assisting Dr. Dall and others, he took great pleasure. On the various collecting trips he always obtained many undescribed species, of which some sixteen have been named in his honor. He made a large collection of Miocene and Pliocene shells and specialized on the genus *Busycon* (*Fulgur*) both recent and fossil. This collection he presented to the Academy of Natural Sciences.

For many years Mr. Willcox was Honorary Curator of the Isaac Lea collection of Eocene fossils at the Academy of Natural Sciences of Philadelphia. He was Chairman of the Committee on Museum of the Wagner Free Institute, and always took the greatest interest in the development of both institutions. A warm friend of Dr. Isaac Lea and Dr. Joseph Leidy, he lived to see the scientific work and progress of practically two generations. He is survived by a son, Mr. C. Percy Willcox, of Philadelphia.—C. W. JOHNSON.

NOTES.

NOTE ON THYASIRA BISECTA CONRAD.—In 1889 I gave an account of the microscopic anatomy of a species of *Thyasira* (under the name of *Cryptodon*) in my report on the Blake dredgings, p. 438. This was I believe the first general account of the unique features of this genus, the data on *Cryptodon* furnished by Pelseneer in the Challenger report relating to *Lyonsiella* or a similar genus rather than to *Thyasira*. Pelseneer himself referred them to "*Cryptodon*" with doubt. The specimen described in the Blake report was 17 mm. high, and regarded as exceptionally large. The species referred to *Thyasira*, under the name of *bisecta* Conrad, was so placed by me because of its agreement conchologically with that genus, although it had been referred to several different genera and a new genus had been proposed for it by Gabb.

I had long been anxious to examine the anatomy of this mollusk, which reaches a height of 75 mm., to see whether it conformed to the primitive features of the small typical forms of the genus, and by the kindness of Mrs. Oldroyd and Dr. Frye of the Friday Harbor Biological Station, Puget Sound, this wish has been granted. The specimen was found in about four fathoms, muddy bottom among the San Juan Islands.

Rather to my surprise I find that the description written of the small species nearly thirty years ago applies almost word for word to this giant of the genus. The only difference seems to be the greater proportional length of attachment of the W-shaped gills, and the only addition is the presence of a glandular area within the basal edges of the mantle extending nearly the whole length of the free edges. Something of this sort might have occurred in the earlier specimen but have been overlooked on account of its minuteness. The arborescent hepaticogenital organs occupy the greater part of the mantle cavity, while the absence of papillae on the mantle edge and around the efferent aperture in the mantle, and of oral palpi, the worm-like foot, etc., are essentially the same as in the smaller forms.

Geologically, *T. bisecta* recedes to the Miocene.—W. H. DALL.

CUBAN MOLLUSKS COLONIZED IN FLORIDA.—Last April Mr. C. T. Simpson sent me 10 fine *Pleurodonte auricoma* (Fér.) and 2 *P. marginella* (Gmel.), one adult and one immature, which he had collected in his "hammock" at Lemon City, Fla. The largest *auricoma* measures 40 x 29 and the smallest 30 x 20 mm. The adult *marginella* is 27 x 16 mm., while the young shell would probably have grown larger.

As these species appear to be permanently established I wrote for further information, and below give his response.— "Little River, Fla., April 20, 1918. I have *Pleurodonte auricoma* living on the place but cannot give locality from whence taken. It has become completely established and every year I find hundreds of living and dead examples scattered throughout my cultivated pine land, but never in the hammock. I find most of the living specimens when hoeing, buried just under the surface of the sandy soil, sometimes in dry weather with a sort of epiphragm. The other day I found a perfect var. *provisoria* in fine condition. I do not remember whence it came.

"Two varieties of *Liguus fasciatus*, which were derived from the general Camaguay to Holguin (Cuba) region, seem to be established here. The ground color of one is a warm slate and the other has some yellowish on it. I have found two specimens lately in fairly fresh condition and as it has been about four years since any were brought in I am sure they have grown here, especially as one was not fully grown.

"*Polymita muscarum*, white var. with dark dots, is occasionally seen and the dead shells are rarely found. J. B. Henderson sent the parents of these and they are from some part of Eastern Cuba. Our specimens are large, solid and fine.

"*Pleurodonte marginella* seems to be pretty well established in my hammock, probably from Cayo del Rey, and there are several variations. Most are bluntly keeled and rather dark colored. They keep strictly in the hammock and tho not yet numerous they seem to be spreading and slowly increasing. They remain under trash and the fallen leaves of palms during most of the dry season, but have just begun to appear since we had a heavy shower yesterday. They climb palms and live

oaks, sometimes to a height of seven feet and seem to be given greatly to breeding.

“ I have introduced a number of other snails from Cuba and Bimini including some of the land operculates, but have never found living or dead specimens since. That does not prove that they may not be living, as it seems to take a long time for a species to become established. Until a short time ago I supposed that no Cuban *Liguus* were living in my hammock. I have none of the original stock of these that I can be sure of; I simply introduced the things for ‘company’ and not for any ‘scientific results.’ ”

I think the above is well worth putting on record.—GEO. H. CLAPP.

SOME RARE SHELLS COLLECTED IN PUGET SOUND, WASHINGTON, DURING JULY, 1918.—Thinking it would be of interest to the readers of the NAUTILUS, I send you a short list of some of the very rare species we collected this summer at the Biological Station of the University of Washington at Friday Harbor, San Juan Island.

Thyasira bisecta Conrad.

This rare shell we dredged in mud in between 3 and 4 fms. Three live specimens and a few dead ones were obtained.

Macoma nasuta kelseyi Dall.

This species we found with the above; the specimens were larger than those from California.

Thracia curta Conrad.

One specimen of this species was obtained in 25 fms. between San Juan Is. and O’Neal Island.

Thracia trapezoides Conrad.

This species is the pride of the collection. So far as we have been able to find out, this has never been reported living. One living and two dead specimens were obtained in about 20 fms. off O’Neal Island. This with the first two are found in the Pliocene at San Pedro, Cal.

A fine species in the Naticidae may prove to be a new genus.

Velutina laevigata Linn.

The specimens we obtained were the largest and finest I have ever seen. The largest one is 8.2 mm. in length.

Panomya ampla Dall.

Of this odd and rare species we were fortunate to obtain several specimens.

A report will be published about April, 1919, and will have a full description of each species; and we hope to have figures of most of them.—IDA S. OLDROYD, Stanford University, California.

PUBLICATIONS RECEIVED.

FOREIGN LAND SNAILS IN MICHIGAN. Occ. Pap. Mus. Zool. Univ. of Mich., no. 58. By Bryant Walker. The following are recorded:

Arion ater (L.), garden in Detroit, one specimen.

Arion circumscriptus Johns. "Cat Hole," near Ann Arbor.

Subulina octona (Brug.) and *Opeas clavulinum kyotense* Pils., conservatory in Lansing.

Vitrea lucida (Dr.), conservatory, Bell Isle Park.

PLEUROBEMA CLAVA (Lam.) AND PLANORBIS DILATATUS BUCHANENSIS LEA IN MICHIGAN. Occ. Pap., etc., no. 51. By Mina L. Winslow. *P. clava* was taken by the author in Hillsdale Co., the *Planorbis* near Harbert, Berrien Co. Excellent figures of *P. dilatatus* and *P. d. buchanensis* are given, with a bibliography of the species and notes on distribution.—H. A. P.

MOLLUSCAN FAUNA FROM SAN FRANCISCO BAY. By E. L. Packard (Univ. of Cal. Publications, vol. 14, no. 2, pp. 199-452, pls. 14-60, 1918). This valuable publication is the results of the work of U. S. Steamer "Albatross," commissioned in Oct., 1911, by the Bureau of Fisheries to make a biological

survey of San Francisco Bay. A thorough study of the fauna of a given area presents many interesting facts pertaining to distribution, and a basis for making further observations. The number described are 173 species and 13 varieties collected by the survey or previously recorded from the San Francisco Bay, San Francisco Co., or the Farallon Islands. The number obtained by the survey within the limits of San Francisco Bay comprises 81 species and varieties. The illustrations are excellent, and charts show the local distribution of 18 of the more common species. A map of San Francisco Bay showing the dredging stations is also given.—C. W. J.

THE PRODUCTIVITY OF INVERTEBRATE FISH FOOD ON THE BOTTOM OF ONEIDA LAKE WITH SPECIAL REFERENCE TO MOLLUSKS. By Frank C. Baker (N. Y. State College of Forestry, Tech. Pub., no. 9, vol. 18, no. 2, 1918, pp. 1-264. A most interesting publication that brings to our attention a great factor little considered by most conchologists, *i. e.*, the importance of the smaller fresh-water mollusks as fish food. Animal life was found to be most abundant at the 6-foot contour and a sandy bottom the richest in animal life.—C. W. J.

A NEW MARINE MOLLUSK OF THE GENUS CERITHIOPSIS FROM FLORIDA. By Paul Bartsch (Proc. Biol. Soc., Wash., vol. 31, p. 135, 1918). *Cerithiopsis vanhyningi*, Tampa Bay.

FOUR NEW MOLLUSKS FROM THE PHILIPPINE ISLANDS. By Paul Bartsch (Proc. Biol. Soc., Wash., vol. 31, p. 153, 1918).

CHANGES AND ADDITIONS TO MOLLUSCAN NOMENCLATURE. By W. H. Dall (Proc. Biol. Soc., Wash., vol. 31, p. 137, 1918). The following new generic and section names are proposed: *Tromina*, *Algaroda*, *Littorivaga*, *Algamorda*, *Boetica*, *Iselica*, *Elachisina*, *Kurtziella*, *Progabbia*, *Crawfordia*, *Boreomelon*, *Phenacptygma* and *Atrimitra*.

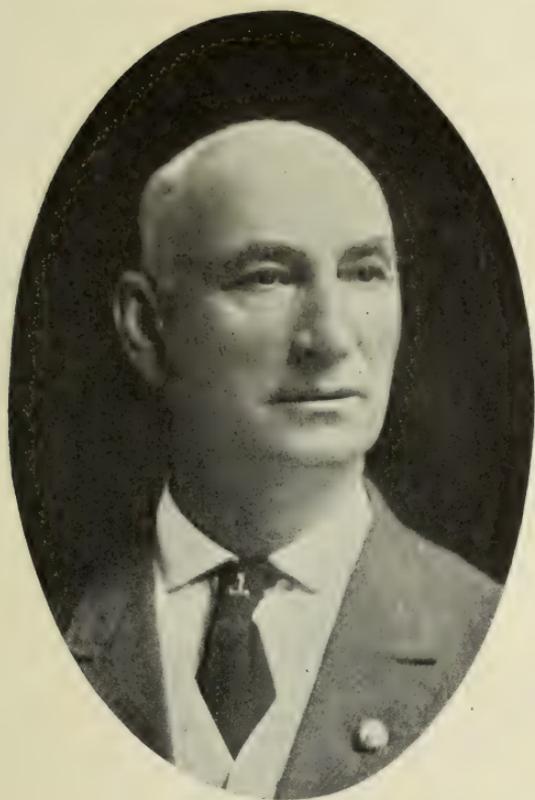
THE HOMING HABITS OF THE PULMONATE MOLLUSK ONCHIDIUM. By L. B. Arey and W. J. Crozier (Proc. Nat. Acad. Sci., vol. 4, pp. 319-321, 1918).

GROWTH AND DURATION OF LIFE OF CHITON TUBERCULATUS AND GROWTH OF CHITON TUBERCULATUS IN DIFFERENT ENVIRONMENTS [2 papers]. By W. J. Crozier (Proc. Nat. Acad. Sci., vol. 4, pp. 322-328, 1918).

THE NAYADES (FRESH WATER MUSSELS) OF THE UPPER TENNESSEE DRAINAGE, WITH NOTES ON SYNONYMY AND DISTRIBUTION. By A. E. Ortmann (Proc. Amer. Phil. Soc., vol. 57, pp. 521-626, 1918). Exhaustive studies of this character of the molluscan fauna of our rivers constitutes one of the most important works in biology. The constantly increasing pollution of our streams will locally exterminate many species. The author says: "The region in question is known as one of the chief centers of nayad development, and may be called the most prolific section of the world in this particular group." The species often assume different shapes in the larger rivers than in the smaller streams and headwaters. Some 88 species and varieties are recorded from this drainage.—C. W. J.

LOS MOLUSCOS DE LA REPUBLICA DE PANAMA por James Zetek (Revista Nueva, Jul.-Aug., 1918). This catalogue of the mollusks is prefaced by a discussion of the distribution, peculiarities of the fauna, etc., and followed by a list of synonyms and a bibliography. Besides having many species additional to those of C. B. Adams's well-known catalogue, it has the advantage of modern nomenclature.

CEPHALOPODA, AUSTRALIAN ANTARCTIC EXPEDITION. By S. S. Berry. A new species of *Stauroteuthis* and four of *Moschites* are described and well figured in this interesting report.



L. E. DANIELS



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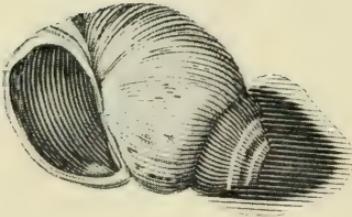
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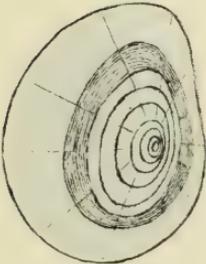
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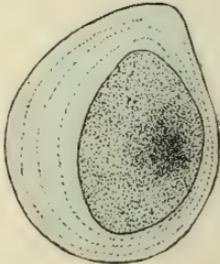
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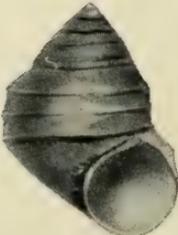
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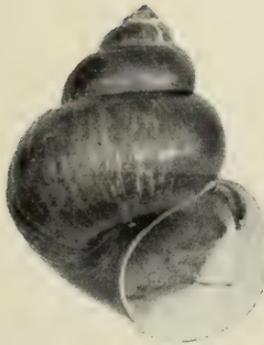
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THE NAUTILUS.

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No. 4

NOTES ON CERTAIN PHILIPPINE SPECIES OF VIVIPARUS.

BY BRYANT WALKER.

Several months ago Mr. Walter F. Webb, of Rochester, N. Y., placed in my hands for identification a small collection of Philippine *Vivipari*. The very considerable search of the literature that was found necessary to determine the proper names to be used for certain species has brought about some interesting results in the matter of nomenclature.

I.

PALUDINA (VIVIPARA) CARINATA Auct.

No less than four distinct species have been described by as many different authors as *Paludina carinata* or *Vivipara carinata*, viz:

- 1820-3. *Paludina carinata* Swainson. Ganges.
- 1827. *Paludina carinata* Valenciennes. Mexico.
- 1863. *Paludina carinata* Reeve. Philippine Is.
- 1867. *Vivipara carinata* Bartsch. Philippine Is.

It will be more convenient to treat these species separately.

II.

PALUDINA CARINATA Sw. Pl. VIII, fig. 1.

Paludina carinata Swainson. Zool. Ills., Series I, 1820-3, pl. 93, center figure.

Swainson's original figure is reproduced as above and his brief description is as follows:

"*P. testa parva, olivacea; spira apertura longiore, apice obtuso, rufo; anfractu basili medio leviter carinato; umbilico obsoleto.*

"Shell small, olive; spire longer than the aperture; the tip obtuse, rufous; basal whorl slightly carinated in the middle; umbilicus obsolete.

"A distinct species which is never found larger than the figure. I once saw near 100 which had been picked up on the banks of the Ganges; the spire is rather lengthened, always obtuse, and the umbilicus even less than the last" (*P. unicolor*).

No measurements are given, but the figure (there is only one) measures: alt. 21, diam. 16 mm.

This species seems to have entirely dropped out of sight in recent years. It has been referred to *V. dissimilis* (Müll.) by Mörch (Cat. Yoldi, 1852, p. 52), Troschel (ubi?) and von Martens (Mal. Blätt., 1865, p. 148). Frauenfeld (Verzeichniss, Paludina, 1864, p. 584) referred it to *V. remossii* (Phil.). Hanley and Theobald (Con. Ind., 1876; p. xvii, n. 7) simply give the above opinions. The species is not referred to by Kuester (Con. Cab., Paludina, 1852) nor by Reeve in the Conchologia Iconica (1863) except as hereinafter stated, nor by Kobelt in his recent (1906-9) monograph in the Conchylien Cabinet, nor by Bartsch (Pr. U. S. Nat. Mus., XXXII, 1907, pp. 135-150), nor by Preston in "The Fauna of British India" (1915).

But it is clear that Swainson's species was an Indian one and, whatever may be its standing at the present time in the Indian fauna, it is entirely different from any Philippine species and by its priority prevents the use of the name by any subsequent author either in *Paludina*, *Vivipara* or *Viviparus*.

III.

PALUDINA CARINATA Valenciennes.

See No. X.

IV.

PALUDINA CARINATA Reeve.

Paludina carinata Reeve. Con. Icon., Paludina, 1863, Sp. 53, pl. IX, fig. 53.

Reeve in his text gives no authority for the specific name and

the species is usually credited to him, but in the index the species is credited to Swainson. It is possible that he thought that the shell that he described and figured was the same as Swainson's species. Frauenfeld (*Verzeichniss*, Paludina, 1864, p. 584) expresses the opinion that Reeve's species is really the same, but the figure, description, such as it is, and the locality, if correct, renders it quite improbable.

I do not think either that the shell figured by Bartsch as this species is really the same.

Reeve as usual gives no dimensions, but his figure measures: alt. 25, diam. 20; aperture, alt. 13.5, diam. 12 mm.

The type, said by Reeve to be in the Cuming Collection, seems to have been lost or mislaid as Mr. H. C. Fulton, who made a search for it at my request, was unable to find it at the British Museum.

I have before me four shells that I believe represent this species and which are figured on pl. IX, figs. 1-4. Two (figs. 1 and 2) are from the Andrews collection and were sent to Mrs. Andrews by Dr. Wesley Newcomb as *V. amplior* Rve., and as from the Philippine Islands. They are clearly not Reeve's *amplior*, which Frauenfeld (*Verzeichniss*, p. 569) considers the same as Mousson's *V. lineolatus amplus* and Kobelt (*Con. Cab.*, Viviparidae, 1908, p. 260) calls a variety of *V. javanicus*.

The third specimen (fig. 3) is No. 3252 of the collection of the Museum of Zoology, University of Michigan, and formed a part of the collection of Joseph Monds, of Salem, Mass., purchased by the University in 1855. It was originally unnamed and is labeled "Manilla."

The fourth (fig. 4), (Coll. Walker, No. 31774) was part of the Quadras collection and has his original label "*Pal. carinata* Rve., Rio Pasig, Manila." With it was a larger shell of apparently a different species.

As Reeve's type has disappeared, I propose to call the species represented by these specimens *Viviparus pseudocarinatus*, fig. 1 being the type and the others paratypes. If Reeve's type should be found and prove to be identical, his specific name will be superseded by *pseudocarinatus*.

Viviparus pseudocarinatus may be described as follows: Shell

globose-conic, apex obtuse, narrowly but deeply, umbilicate; whorls five; apical whorls dark purple, which after the third whorl becomes lighter and gradually fades into a yellowish-green on the body-whorl; the dark color of the upper whorls is lighter towards the sutures; on the last half of the body-whorl of Nos. 1 and 3 are several darker, longitudinal strigations representing, probably, rest periods. The lips of Nos. 1 and 2 are sharp and uncolored, having been taken apparently between rest periods; No. 3 has the remains of a dark brown or blackish margin on the lip, and on No. 4 the lip is thickened and deep black. All four shells are quite acutely carinated on the periphery of the upper whorls and in the three larger ones the body-whorl drops slightly below the carina of the preceding whorl and exposes it above the suture, but the carina rapidly diminishes in prominence and is practically obsolete before reaching the lip, which is regularly rounded. The lines of growth are regular but very light, and the entire surface is covered with exceedingly fine, spiral striæ, scarcely discernible on the upper whorls, but becoming stronger on the base of the body-whorl; these lines especially on the upper whorls are more or less interrupted by the growth lines giving the appearance of very minute punctations.

The four shells measure as follows:

No. 1, alt. 22.5, diam, 17.5; aperture, alt. 12.8, width, 11.4 mm.

No. 2, alt. 20.00, diam. 14.5; aperture, alt. 11.2, width, 8.9 mm.

No. 3, alt. 22.1, diam. 17.1; aperture, alt. 13.0, width, 10.0 mm.

No. 4, alt. 16.9, diam. 12.8; aperture, alt. 9.6, width, 8.4 mm.

Unfortunately No. 4 is the only one with its operculum. This (Pl. 8, fig. 7) is like that of *V. costatus* (Q. and G.) in having the inner surface divided into three distinct areas with the central and outer portions smooth and polished, but it differs from that species in having the intermediate area without granulation, it being finely and concentrically striate.

V.

VIVIPARA CARINATA Bartsch. Pl. IX, fig. 5.

Vivipara carinata Bartsch. Pr. U. S. Nat. Mus., XXXII, 1907, p. 141, pl. XI, fig. 14.

As already stated I do not think that the shell figured by Bartsch as *carinata* Rve. is really that species. Bartsch's specimen apparently belongs to a larger, more elongated species and, if mature, lacks the black peritreme that seems characteristic of *carinata* Rve. The color is also different.

The specimen that I have figured for comparison with what I believe to be the genuine *carinata* Rve. and which seems to agree very exactly with that figured by Bartsch, was sent by Dr. Wesley Newcomb to the late Mrs. George Andrews with another, which was correctly named as *V. cumingii* Rve. It is No. 47035 Coll. Walker and measures: alt. 28.5, diam. 21.7; aperture, alt. 16.2, width 13.1 mm.

As "carinata" can not be used for either Reeve's or Bartsch's species and the two are evidently different, the better course would seem to be to rename the form figured and described by Bartsch and to leave Reeve's *carinata* to stand for further consideration. I would propose that the species figured and described by Bartsch be called *V. bartschi*, the type being No. 103666, U. S. Nat. Museum.

VI.

PALUDINA CUMINGII Reeve. Pl. IX, fig. 7.

Paludina cumingii Reeve. Con. Icon., Paludina, 1862, Sp. 11, pl. III, fig. 11.

This species will also have to be renamed, as "*Paludina cumingii*" was used by d'Orbigny in 1835 for the South American species now known as *Littoridina cumingii* (d'Orb.). Reeve himself says that the name had been used by d'Orbigny, but attempts to avoid the duplication by stating that d'Orbigny's species is a *Paludestrina*. This, of course, is impossible under the international code.

To make the change as inconspicuous as possible, I would propose that the species hereafter be known as *Viviparus cumingianus*.

Cumingianus is a large, well-marked species and was excellently figured by Reeve. It was the first of the more-widely umbilicated Philippine species to be described and is not likely to be confounded with any of its contemporaneous species.

The characteristic specimen figured is from the MacAndrew collection (Coll. Walker, No. 46916) and measures: alt. 39.7, diam. 30.5 mm. Another with it measures: alt. 36.5, diam. 29 mm. This specimen has its operculum, which is of the characteristic *javanicus* type.

The specimen figured by Bartsch (Pr. U. S. N. M., XXXII, 1907, pl. X, fig. 7) is apparently immature as it measures only alt. 17.1, diam. 14.8 mm.

Autoptically unknown to Frauenfeld, von Martens and Kobelt, the first two express no opinion in regard to it, but the latter (Con. Cab., Viviparidae, 1908, p. 273) thinks that it is probably a thick-shelled variety of *V. costatus* (Q. and G.); but that view is not tenable.

VII.

VIVIPARUS ANGULARIS (Müller). Pl. VIII, figs. 4-5.

Nerita angularis Müller. Hist. Verm., II, 1774, p. 187.

Helix angularis Chemnitz. Con. Cab., IX, 1786, p. 160, pl. 134, figs. 1222-1223.

Müller's description of his *Nerita angularis* is as follows:

"*Nerita testa imperforata, virescente, anfractibus spiraliter angulatis, fauce alba.*

"*Cochlea virginiana e flavo viridescens non fasciata.*"

"List. Syn. t. 127, f. 27.

"Dan. Kant-neriten

long. 12 lin. lat. 6 lin.

"*Testa opaca, conica, glabra virescens striis transversis subtilissimis, spiralibus tribus in singulo anfractu elevatis, acutis. Anfractus quinque prope perpendiculares.*

"*Apertura retundata, ad anfractum vicinum in angulum producta. Foramen vel umbilicus nullus. Faux calcarea. Striæ spirales in quibusdam evanescent.*

"*Figura Listeri nostris major, caeterum refert. In flumine Chinensi emporium Canton alluente.*"

His reference to Lister was an unfortunate one as the two species have nothing in common. Chemnitz in 1786 expressed his surprise at the approximation. Lister's species was undoubtedly that subsequently described by Say (1817) as *Limnæa decisa* and now known as *Campeloma decisum*. As the facsimile of Lister's figure given by Binney (L. and F.-W. Shells, III, 1865, p. 43, fig. 86) is not a satisfactory reproduction of the original figure, I give a photographic copy on pl. VIII, fig. 6.

As to whether Müller's species was the Chinese species commonly known as *V. quadratus* (Bens.) or the Philippine species often referred to *V. costatus* (Q. and G.), there has been a very radical and long-continued difference of opinion among conchologists.

Mousson in 1849 (Moll. Jav., p. 62) according to von Martens (Moll. Weber, 1897, p. 21) recognized that the shell figured by Chemnitz as *Helix angularis* was different from that figured by Philippi as *Paludina angularis*, but overlooked the fact that it was the *P. quadrata* of Benson.

Philippi (Abbildungen, I, 1845, pl. I, fig. 10) identified it with the species described by Quoy and Gaimard in 1832 as *P. costata*.

Kuester (Con. Cab., Paludina, 1862, p. 26) followed Philippi.

Reeve (Con. Icon., Paludina, 1862) referred the Philippine species to *angularis*, which he considered distinct from *costata*, though he remarks that the two species are very closely allied.

Frauenfeld in 1864 (Verzeichniss, Paludina, p. 571) also referred the Philippine species to *angularis*.

Von Martens in 1869 (Mal. Blätt., p. 145) seems to have been the first to refer Müller's species to the well-known Chinese form commonly called *quadrata* Bens.

Morelet in 1869 (J. de Con., XVII, p. 403) argued the question at considerable length and refused to follow von Martens. But he makes no reference to Chemnitz either in his synonymy or in his discussion.

Issel in 1874 (Moll. Born., p. 90) followed von Martens.

The Sarasins (Suessw. Moll. Celebes, 1898, p. 59), while they make no reference either to *angularis* Müll. or to *quadrata* Bens., refer the Celebes species to *costata* Q. and G. and therefore impliedly endorse von Martens' position.

In 1897 von Martens (Moll. Weber, p. 20) reaffirmed his position of 1865.

Bartsch in his monographic paper on "The Philippine Pond Snails of the Genus *Vivipara*" (Pr. U. S. Nat. Mus., XXXII, 1907, pp. 135-150) followed Philippi and referred the Philippine species to *angularis* Müll.

Kobelt in his recent monograph of the Viviparidæ (Con. Cab., 1908, p. 230) adopts von Martens' position and calls the Philippine species *costata* Q. and G. But while he states (l. c. p. 122) that in his opinion the smaller, spirally-sculptured Chinese species should be divided into groups represented by *angularis* Müll. and *quadrata* Bens., he retains Benson's name for practically the whole Chinese series and neither figures nor describes, except in a very general way, the particular Chinese form that he would consider to be the real *angularis*.

None of the above-mentioned authors with the exception of Philippi, Kuster and von Martens, refer in any way to the figures and remarks of Chemnitz in the original Conchylien Cabinet. If they were acquainted with that work they omitted to make any reference to it, and if they were not it is difficult to understand how they came to refer *costata* Q. and G. to Müller's species.

I am indebted to Dr. Pilsbry for the reference to Chemnitz, the photographs of his figures reproduced on pl. VIII, the translation of his remarks and for permission to use the illuminating note that follows.

The translation is as follows:

"Tab. 134. Fig. 1222. 1223.

"Ex Museo Spongleriano.

"The greenish river-snail with three-fold keels on each whorl.

"*Helix angularis, testa conica, viridescente, in quovis anfractu tricarinata, apertura rotunda subangulari.*"

Müller, Histor. Verm. no. 373, p. 187.

Then follows Müller's diagnosis.

"This river snail is covered with a dark green coat. It has a quite conic formation, and a mainly circular, but still somewhat angular, aperture. It will be most conspicuously and

recognizably distinguished from other snails by the three white angles or perceptibly raised, parallel, transverse striæ, which are seen upon the whorls. Because it is seen to be thus somewhat angular in its formation and aperture, our renowned Müller has called it *Cochleam angularem*. It lives in the Chinese rivers, has a length of only sixteen lines and is certainly unknown at present to most lovers of shells; hence it is rare and uncommon. I do not comprehend how Müller could find it like the figure of Lister, tab. 127, no. 27, which he refers to in his *Hist. Verm.*”

Dr. Pilsbry adds: “Müller’s *angularis* does not depend upon Lister, he notes a discrepancy in size. I have therefore had Chemnitz’s figures copied. Nearly all of Müller’s exotic shells were from the Spengler collection, and there is every reason to believe that Chemnitz figured one of the type lot from the same collection.”

It is only necessary, in addition, to compare Chemnitz’s figures with a typical specimen of *quadrata* Bens. from China (Coll. Walker, No. 46135) figured on pl. IX, fig. 10, and Quoy and Gaimard’s figures of the Celebes type of their *costata* (pl. VIII, figs. 9–10) to come to the conclusion reached by von Martens.

Morelet’s remark (l. c. p. 407) that *Paludina quadrata* is distinguished by its more elongated form, less shouldered spire and a proportionately smaller aperture is a very apt statement of the difference between Chemnitz’s and Quoy and Gaimard’s figures and practically convicts him out of his own mouth.

To which of the many described forms of the protean Chinese species, *angularis* should be referred is “another story” and outside the purview of this paper. But there can be no doubt but that Müller’s specific name should be associated with the Chinese rather than with the Philippine species.

VIII.

VIVIPARUS COSTATUS (Quoy and Gaimard . Pl. VIII, figs. 9–13.
Pl. IX, fig. 6.

Paludina costata Quoy and Gaimard. Voy. Astrolabe, III, 1832, p. 170, pl. 58, figs. 1–5.

Type locality: Lac de Tondano, N. Celebes.

It is not entirely certain that Quoy and Gaimard's name can be retained for this species.

Frauenfeld (Verzeichniss, Paludina, 1864, p. 571) has considered it to be the same as Lesson's *P. tricostata* from New Guinea described in 1830 (Voy. Coquille, Zool., II, p. 349).

Von Martens (Moll. Weber, 1897, p. 21) has also made the same suggestion. If so, Lesson's name would have priority.

Lesson did not figure his species, but his description may be translated as follows:

"Shell conic, inflated, of a uniform yellowish-green color, ornamented with vertical striæ, very fine and very close together. Spire moderate, conic, acute, with convex whorls separated by a linear and excavated suture. The fifth whorl is the largest, inflated and dilated, three prominent keels mark its contour, beginning on the preceding whorl. These three light lineations form a ribbon-like, flat carina. The aperture is as high, as wide, rounded, with a thin, sharp lip and smooth on the columellar border, thickened a little at its base by a small lamella, which covers in part the narrow umbilicus.

"Several individuals in all respects alike were 7 lines in height and 6 in diameter. This Paludina inhabits the sweet, fresh waters of the brooks of New Guinea."

While in some respects this description would apply to *V. costatus*, the dimensions given, alt. 17, diam. 15 mm., if from mature specimens, would indicate a much smaller and more globose species and his statement that the three lirations form a flat, ribbon-like (*rubanée et aplatic*) carina would seem to indicate that they were close together and, probably, at the periphery of the shell.

Moreover, Tapparone-Canefri (Fauna Moll. N. Guinea, Pt. I, 1883, p. 23) states that Beccari and d'Albertis found nothing like it in their collections. On the other hand, Pilsbry in commenting on another of Lesson's lost species, *Partula lineata* (Man. Con., XX, 1909, p. 312), remarks on "the general reliability of the locality records in the Zoology of the Coquille."

Thinking that possibly Lesson's type had been preserved in the Paris Museum, I requested Dr. Louis Germain to ascertain

whether they were in the Museum. But he replied that much of their collection and nearly all of their types had been stored in the cellars for safety and that consequently the desired information could not be obtained at present. Now that the war is over, the Museum collections will, no doubt, be returned in due time to their normal condition and then, if the original types have been preserved, a critical examination can be made.

In view of the uncertainty as to just what Lesson's species is, it does not seem to be desirable to change the well-known and unquestioned name for the species until more definite information can be had in regard to the earlier one.

Viviparus costatus (Q. and G.) came from Lake Tondano, North Celebes and is described as being "very ventricose, fragile and thin, spire obtuse, whorls rounded, carinated by a considerable number of acute lirations, of which two or three are more prominent, and very finely longitudinally striate. Aperture almost circular, slightly angled above, umbilicus narrow and deep. Length 27.66, diam. 22.56 mm."

As shown by the original figures copied on pl. IX, figs. 9-10 and fig. 6 on pl. X from a specimen from Sukur, Celebes, labeled "*angularis* Müll." by Brot, the shell has two principal carinas, one at the periphery and the other forming the edge of the prominent, wide shoulder; between these are a number of lesser lirations, of which two are usually somewhat stronger than the others. The penultimate whorl is much smaller than the body-whorl owing to the width of the shoulder, and the spire is short and obtusely conical.

I have not seen any typical *V. costata* from the Philippine Islands.

Kobelt (Con. Cab., Viviparidæ, 1908, p. 230) has called attention to the fact that the shell figured by Bartsch (Pr. U. S. Nat. Mus., XXXII, 1907, pl. X, fig. I) from Luzon as typical "*angularis*" (*costatus*) does not represent the type from North Celebes. It was very properly united with *V. burroughianus* by Bartsch and will probably, when large series are obtained, be found to intergrade with it quite completely, but at present, at least, it seems entitled to varietal rank.

IX.

VIVIPARUS BURROUGHIANUS (Lea).

Paludina burroughiana Lea. Trans. Am. Phil. Soc., V, 1834, p. 113, pl. XIX, fig. 80; Obs., I, 1834, p. 225, pl. XIX, fig. 80.

Paludina angularis Reeve. Con. Icon., Paludina, 1862, Sp. 14, pl. III, fig. 14.

Vivipara angularis burroughiana Bartsch. Pr. U. S. Nat. Mus., 1907, p. 136, pl. X, fig. 1.

Vivipara costata burroughiana Kobelt. Con. Cab., Viviparidæ, 1908, p. 232, pl. 46, figs. 7-8.

This is a characteristic species of the Philippine Islands. It differs from the *V. costatus* from Celebes by its larger size, more sloping shoulder, more elevated spire and stronger carination. As the oldest available name Lea's becomes the specific designation.

X.

VIVIPARUS BURROUGHIANUS TRINOMINIS n. n.

Paludina carinata Valenciennes. Rec. d'Observ. de Zool., 1833, p. 252, pl. LVI, figs. 2a-b; Haldeman, Mon., 1841, p. 27, pl. VIII; Kuster, Con. Cab. Paludina, 1852, p. 28, pl. VI, figs. 6-7; *non* Swainson, 1820-3.

Paludina multicarinata Haldeman. Mon., 1842, Pt. 4, p. 4 of cover; W. G. Binney, L. and F.-W. Shells, Pt. III, 1865, p. 22, fig. 40; *non* Cailliaud, 1826.

Vivipara angularis Bartsch. Pr. U. S. Nat. Mus., XXXII, 1907, p. 135, pl. X, fig. 1; *non* Müller, 1774.

Valenciennes states that his species came from Mexico, but W. G. Binney (J. de Con., XV, 1867, p. 430) and Morelet (*Ibid.*, XVII, 1869, p. 405) from an examination of the types have confirmed the opinions of Frauenfeld (Verzeichniss, Paludina, 1864, p. 583) and von Martens (Mal. Blätt., 1865, p. 149) that it is undoubtedly the Philippine species commonly known as *V. costatus* (Q. and G.). The author himself states that his specimens were given to Humboldt by a member of the Royal Council of Manilla. Valenciennes' figure copied by

Haldeman is almost exactly the same as that given by Bartsch (l. c.) as the typical form of *V. angularis* (Müll.).

Haldeman's name was proposed on account of the priority of *Paludina carinata* Sw., but *multicarinata* has already been used by Cailliaud (Voy. Meroe, 1826, pl. IX, fig. 6) for another species, so that it is not available at the present time even in a varietal sense.

None of the earlier names proposed for this form being available and, as in the light of our present knowledge, the race seems worthy of varietal recognition, a new one is given as above.

Frauenfeld (Verzeichniss, Paludina, 1864, p. 571) considers this form as the same as *tricarinata* Ant., but if the figures given of that species by Philippi and Kuester correctly represent it, it is quite different.

XI.

VIVIPARUS TRICARINATUS (Anton).

Paludina tricarinata Anton. Verzeichniss, 1839, p. 52.

Anton did not figure his species and I have not been able to consult his original description. Kuester (Con. Cab., Paludina, 1852, p. 27) considered it to be a variety of *angularis* Müll. (*costatus* Q. and G.) "differing only in the sharper carinæ, two on the upper whorls and three on the last," and remarks that every gradation between the two forms is to be found.

Tricarinata is not mentioned by Reeve in the Conchologia Iconica nor by Kobelt in his recent monograph in the Conchylien Cabinet.

I have not seen any Philippine specimens that are referable to this species, but Bartsch's *zamboangensis* evidently groups with it, if we are justified in assuming that Kuester's figure (pl. 6, fig. 5), which he gives as a "mittelform" in the series between the typical form and the variety, fairly represents the species.

I have two specimens in the James Lewis collection (Coll. Walker, No. 12553) from Celebes (pl. IX, fig. 11), which agree fairly well with Kuester's figure above mentioned. They differ from typical *costatus* by their more elevated form, the sloping

shoulder of the whorls and in the accentuation of the three principal carinas.

Philippi's figures of *tricarinatus* copied on pl. VIII, figs. 2-3, are not quite so much elevated and look not unlike *V. javanicus luzonicus* as figured by Kobelt (pl. 46, fig. 9) and herein. Philippi notes several minor differences between his specimens and Anton's description, but "has no doubt" but that his shells are correctly identified.

In the absence of specimens with their opercula, the standing of Anton's species and its relations to both *costatus* and *javanicus* must remain uncertain.

XII.

VIVIPARUS JAVANICUS LUZONICUS Kobelt. Pl. IX, fig. 8.

Vivipara javanica luzonica Kobelt. Con. Cab., Viviparidæ, 1909, p. 378, pl. 46, figs. 5, 9 and 10.

The Sarasins (Suessw. Moll. Celebes, 1898, p. 59) were the first to call attention to the radical difference in the opercula of the two species, *V. costatus* Q. and G. and *V. javanicus* v. d. Busch, which in their shell characters are often quite indistinguishable.

In *javanicus* and its allies the central part of the inner side of the operculum is occupied by a granulated area, which is surrounded by a smooth, polished border.

In *costatus*, on the other hand, the central portion is smooth and polished, but is surrounded by a narrow, distinctly granulated area and outside of this the remainder of the surface is smooth and polished like the centre.

Kobelt (l. c.) has described a race from Daraga, Luzon, which has the typical *javanicus* operculum, but in other respects closely resembles *costatus*. I have similar specimens with their opercula, figured above, which were collected in the Philippines by Steere, but no exact locality is given.

Among the shells received from Mr. Webb was a single specimen from Panique, Tarlac Prov., Luzon, which agrees in its shell characters with the Steere specimens, but unfortunately has no operculum.

If Anton's *tricarinata* should prove to be identical with this form, his name would have priority.

XIII.

VIVIPARA ZAMBOANGENSIS Bartsch. Pl. VIII, fig. 8.

Vivipara zamboangensis Bartsch. Pr. U. S. Nat. Mus., XXXII, 1907, p. 137, pl. XI, fig. 19.

This species was also collected by Steere many years ago at Zamboanga. The operculum (fig. 8) shows that it belongs to the *javanicus* group. I have also received it from the Geneva (Switzerland) Museum, but without exact locality, labeled "*angularis* Müll." by Brot.

A single specimen (pl. IX, fig. 9) from Bugasong, Antique, Panay, was received from Mr. Webb, which resembles the typical form in shape, but differs in the details of the carination. The peripheral and shoulder keels are as in the type, but the central one has disappeared and the space between the two that remain is divided by four lesser keels, of which the two in the middle are a little more prominent; the whole surface is very finely, spirally lirate as in the type but rather stronger. The lip is black-edged and bluish-white within. The apical whorls are dark purple, which passes into a yellowish-green on the intermediate whorls and become a darker green on the body-whorl. The umbilicus is as in the typical form.

This form may be called *V. zamboangensis duplocinctus*.

The type (No. 45204 Coll. Walker) has $5\frac{1}{2}$ whorls and measures: alt. 25.2, diam. 17.2 mm.

I am indebted to Dr. Pilsbry for photographic copies of Lister's description and figure and also of *P. carinata* Sw. and *N. angularis* Müll. And to Miss Mina L. Winslow of the Museum of Zoology, University of Michigan, for the reproduction of Philippi's figures of *P. tricarinata* Ant.

SUPPLEMENTAL NOTE.

Since the foregoing paper was written I find that Bavay found the original and unique type of *Paludina tricostata* Lesson in the Museum of Paris and figured it in his paper on the "Land and Fresh-Water Shells of New Guinea" (Nova Guinea, 1908, p. 270, pl. XIV, fig. 1). Unfortunately he added nothing to the meagre description of Lesson, but contented himself with giving an apparently excellent, life-size figure. Although

he followed von Martens in considering it identical with *P. costata* Q. and G., I do not think that the figure in any way supports his conclusion. As shown by his figure, *tricostata* is a small, globose form with two visible carinas, the upper one scarcely more than a strong angle, the peripheral one is well developed, the third (and intermediate?) one, if it exists, is not shown in the figure.

Bavay associates with this as varieties two forms, one much larger and the other about of the same size, both of which are much more strongly carinated and have a funicular umbilicus surrounded with a strong carina. *Tricostata* has no indication of an umbilicus of this form and no umbilical carina. Bavay's varieties are certainly clearly distinct from *costata* and apparently so from *tricostata*.

Lesson's type came from Lac Sentani at Ase.

So far as can be determined from Bavay's figure *tricostata* is apparently specifically distinct from *costata* and Quoy and Gaimard's name should be used for the species described by them.

A HAWAIIAN FORM OF TAPES PHILIPPINARUM.

BY WM. ALANSON BRYAN.

From a reliable native fisherman I learn that this species of clam was plentiful at a certain locality in the mud-flats at Ewa, on Oahu, more than thirty years ago, but that it apparently completely disappeared from that locality. The native name "Okupi" was commonly used for the species then though more recently the name "Mahamoi" is sometimes used to distinguish it from the more common edible "Olepi" (*Tellina rugosa* Born).

The story given in accounting for the unusual nature name "okupi," which means leg-weary, tired or exhausted, is that "a long time ago a native chief with his family and attendants, while spending a day at the seashore, accidentally discovered this clam as they were wading in the soft ooze black mud, deposited in the estuary of the stream. None of them knew a name for the clam; no one had ever seen it before; it was a new

comer and a stranger to the oldest inhabitants. After wading about in the sticky mud for a time and having gathered a quantity of the shells, the company, exhausted from their labor, sat down on the shore to rest. It was decided that the chief must name the *malihini* (stranger). Being a stout man and not accustomed to such strenuous labor as he had just been engaged in, he declared that the name of the new clam should be "okupi."

A few hours spent collecting specimens was sufficient to convince me that the name was most appropriately bestowed.

The species seems to be entirely restricted to brackish water mud-flats and is easily killed by either fresh or sea water. My native informant states that after the okupi had been abundant for several years during his youth, there came a period of very heavy rain which flooded the lowlands about his home in Ewa. After the flood went down there was not one of this species of clam alive in that locality. Although he is a professional fisherman he had not seen the clam either in Ewa or at Kalihi (where he had resided since 1886) until a few months ago, when the natives began to secure them in quantity from the Kalihi and Moanalua mud-flats, not a mile distant from his home.

In a large series of 456 specimens 68 have deep purple interiors; 374 bluish-white and 14 are from yellow to salmon colored, the proportions remaining the same in full grown and immature shells. When this clam is cooked the varied dark greenish-brown or purple-brown markings¹ change to a rich chestnut (or between russet and cinnamon-brown of Ridgeway) but the interior of the shell is not affected. The majority of the colored figures of this genus that we have examined are apparently made from sun-bleached shells or those that have been opened in hot water and accordingly do not show the color as in life.

While these shells agree in the main with the figure and description of *Tapes philippinarum*, and with Japanese specimens they differ by the somewhat larger size and bolder markings. It may be as well to have a varietal name, *Tapes philippinarum okupi*, for the Hawaiian form.

¹ Bone-brown to clove-brown in the dry shells.

A NEW EPIPHRAGMOPHORA FROM THE COAST RANGE OF CALIFORNIA.¹

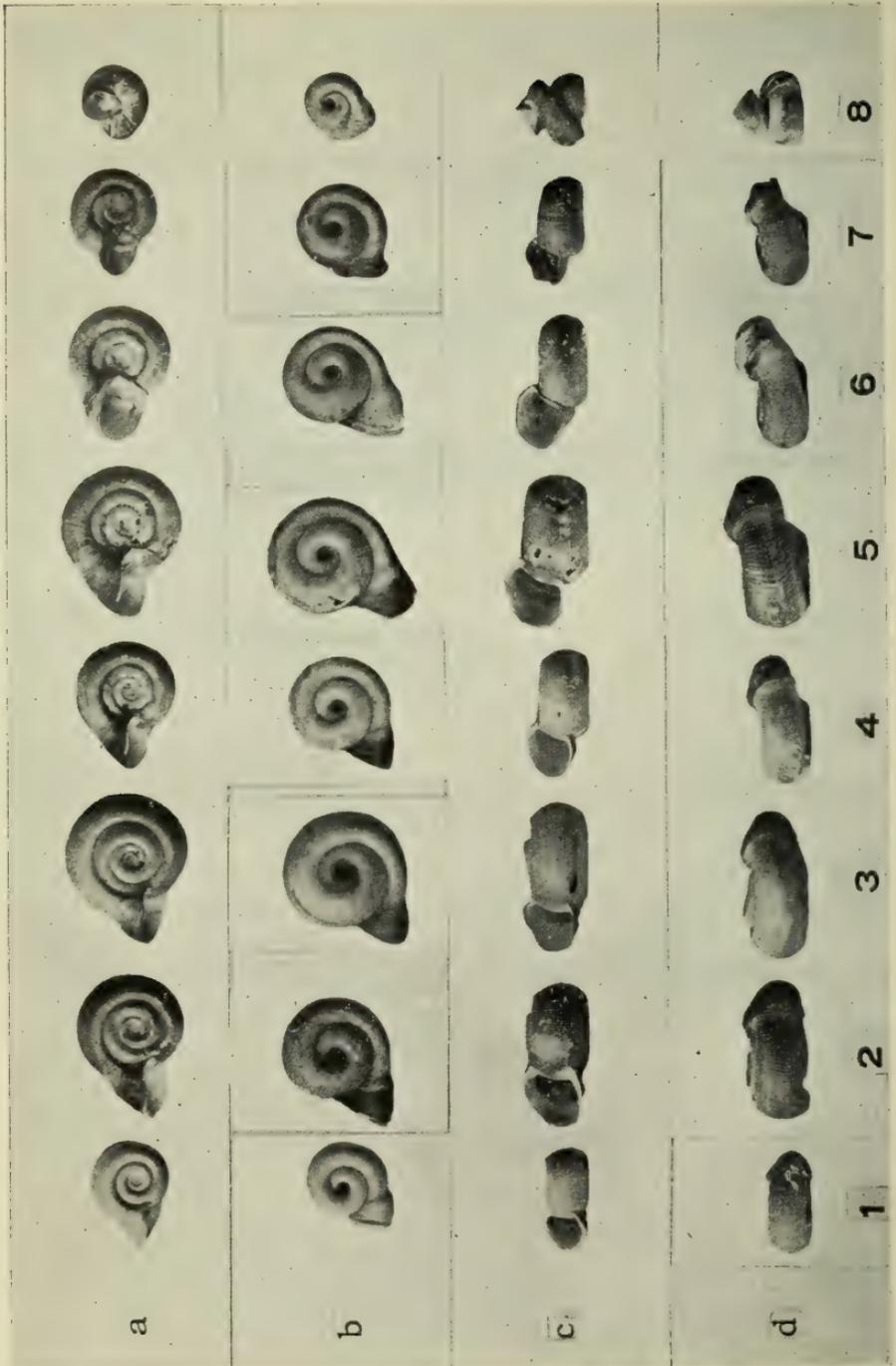
BY PAUL BARTSCH.

Epiphragmophora tudiculata colusaensis, new subspecies.

Shell depressed helicoid, pale brown with an olive tinge above and olive with a brownish tinge below, provided with a narrow chestnut-brown supraperipheral spiral band which is fringed on each side by a narrow zone a little lighter than the ground color; inside of the aperture and the slightly reflected lip, pale purplish, the spiral brown band and its bordering lighter zones well marked. Nuclear whorls one and three-fourths, well rounded, minutely granulated; the succeeding turns marked by more or less regular obliquely retractorily curved riblets, which are about half as wide as the spaces that separate them. The last turn shows a few irregularly distributed malleations on the upper surface. Base narrowly umbilicated, the umbilicus about half covered by the reflected columella. The under surface of the whorls are well rounded and marked by the continuations of the axial riblets which extend feebly into the umbilical area, becoming crowded in this region. The peripheral half of the base shows numerous malleations while the umbilical half is almost devoid of them. Immediately behind the reflected peristome there is a concentration of fine pustules which are densely scattered over about one-twentyfifth of the last whorl; within the umbilicus they extend back a little farther covering probably a tenth of a turn. Aperture large, very broadly oval; peristome slightly reflected, inner lip decidedly reflected, parietal wall covered by a thin callus.

The type, Cat. No. 334721, U. S. N. M., and two additional specimens were collected by Mr. G. Willett "in an old rock slide on the north slope near the summit of a hill about a mile southeast of Sites, Colusa County, California, January 29, 1919," that is, on the east slope of the coast range north of San Francisco Bay. The type has $5\frac{1}{4}$ turns and measures: altitude 15 mm., greater diameter 24.4 mm., lesser diameter 19.6 mm.

¹ Published by permission of the Secretary of the Smithsonian Institution.



WHITTAKER: VARIATION IN PLANORBIS CAMPANULATUS

The largest of the three specimens, a dead individual, measures: altitude, 16 mm.; greater diameter 27.1 mm.; lesser diameter 21.2 mm.

No race of *Epiphragmophora tudiculata* appears to have been described from that general region. The general form and the weak malleations of the surface distinguish this race from the other members of the *tudiculata* group and strongly suggest *Epiphragmophora traski*, but the nuclear characters as well as the other sculptural features all ally it with the *tudiculata* complex.

NOTES ON VARIATION IN *PLANORBIS CAMPANULATUS* SAY, FROM
BLUE SEA LAKE, QUEBEC.¹

BY E. J. WHITTAKER.

Variability in *Planorbis campanulatus* is much less common than it is in a related species, *P. trivolvis*, in which variation with reference to size and aperture of the shell has resulted in many varieties being established by conchologists. The shell in *P. campanulatus* may vary in size in certain localities, due to differences in bottom environment and food supply, but in the same area the form is apt to be constant. While at Blue Sea Lake, Wright County, Quebec, about eighty miles north of Ottawa, in the summer of 1918, the writer secured a large series of *P. campanulatus*, in which several well-marked deviations from the normal type were observed.

PREVIOUS OBSERVATIONS.

Various observations have been made on variation in this species among which are the following:

Tryon² remarks: "The plan of the spiral in this genus (*i. e.* *Planorbis*) is such as to yield readily to pressure, hence monstrosities are rather frequent. This consists of a tilting-up of the whorls on one side, or even a conical elevation of the spire. The smaller forms appear to be most liable to this distortion."

¹Published by permission of the Director of the Geological Survey of Canada.

²Tryon, Geo., Jr., *Manual of Conchology*, vol. 3, p. 106.

Dall¹ remarks of *P. campanulatus rudentis*: "Very similar specimens were obtained from Anticosti, and from Marl Lake, Michigan, in which the coil is even more irregularly wound, a condition I take to be pathological."

Bryant Walker² remarks of *P. multivolvis*: "When it (*i. e.* the abnormality) occurs, it bears the appearance of an abnormal extension of the last whorl being more or less irregular in form and usually deflected from the plane of the rest of the whorls;" and adds that occasionally *P. campanulatus* has a similar abnormality. This would appear to be the closest approach to No. 8 in the plate accompanying this paper.

Dr. Frank C. Baker³ describes *P. campanulatus smithii*. This species would seem to be very similar, with regard to the deflection of the last whorl, to the ones discussed here, but the whorls of that variety are "strongly carinated above and below, the last whorl being particularly so marked." This serves to distinguish the forms. Mr. Baker observes, however, as in the specimens from Blue Sea Lake, the presence of the typical form of *P. campanulatus* which shows marked variation toward the *smithii* type.

Robertson⁴ states: "Often distorted so that the tops of the whorls are inclined at various angles. Varies considerably in the length of campanulate expansion and thickness of shell." This is of interest because the area, which his report covers, lies within the Archaean region of Georgian Bay, where similar conditions to those at Blue Sea prevail.

Tryon⁵ describes and illustrates an abnormal specimen of *Planorbis bicarinatus*, which has developed in exactly the same

¹Dall, W. H., Land and Fresh-Water Mollusca, Harriman Alaska Expedition, vol. XVIII, p. 90.

²Walker, B., Mollusca of Michigan, NAUTILUS, vol. 6, p. 136.

³Baker, F. C., A New Planorbis from Michigan, NAUTILUS, vol. 25, p. 119.

⁴Robertson, A. D., Mollusca of Georgian Bay, Contributions to Canadian Biology, Supp. 47th Annual Report, Dept. of Marine and Fisheries, Fisheries Branch, Pt. 2, p. 101.

⁵Tryon, Geo., Jr., An Abnormal Specimen of *Planorbis bicarinatus*. Journ. of Conchology, vol. 2, p. 3.

manner as has the specimen No. 8 of this plate. From the illustration it would be taken for an ordinary dextral shell.

DESCRIPTION.

In the following description only the characters of interest in this discussion are noted: "Shell sinistral, discoidal, more or less rounded; surface shiny, lines of growth oblique; whorls four, rounded above and below, rather subcarinated; gently and regularly expanding; spire flat or on a level with the general plane of the whorls; periphery rounded, aperture lunate, mouth of the aperture dilated to a great extent forming a bell-shaped expansion; last whorl contracts slightly just before the dilation commences; heavy ridge inside aperture beneath constriction forms narrow throat."

The last whorl in many cases shows a tendency to turn slightly upwards, the effect of which is accentuated by the rapidly flaring aperture. In the normal type this is so inconsiderable as to be omitted in most descriptions of the species. Gould¹ and Haldeman,² however, mention this feature. The former says: "The whorls enclose each other in a very regular spiral to the last fifth of the outer one, where there is a sudden enlargement and distortion toward the left" (*i. e.* upward). The latter says: "Remarkable for the deflection and dilatation of the last whorl." The figures accompanying the above show the deflection of the lower edge of the aperture to be not more in any case than one-quarter the height of the body whorl. Binney's figure 184, reprinted by Call³ and others, shows a similar slight deflection. Dr. Baker's⁴ plates show no such deflection, and the writer has many specimens in the collections here in which that feature is very inconsiderable. It appears from the fact that so many descriptions are silent on this point,

¹Gould, *Invertebrata of Massachusetts*, ed. Binney, p. 493.

²Haldeman. *Monograph of the Fresh-water Univalve Mollusca of the United States*, part 7, p. 9.

³Call, R. E., *A Descriptive Illustrated Catalogue of the Mollusca of Indiana*, p. 410, pl. 8, fig. 12.

⁴Baker, F. C., *Mollusca of the Chicago Area*, Bull. 3, pt. 2, *Natural History Survey*, Chicago Academy of Sciences.

that this distortion upwards is not readily observed on normal specimens, and any large degree of upturn of the aperture would seem to be a variation worthy of note.

VARIATION (PLATE X).

In the form from Blue Sea Lake this tendency of the extremity of the last whorl has been greatly accentuated, as a study of Series c in the accompanying plate will show. Fig. cl, a form from Mackay Lake, near Ottawa, shows no deflection at all. The others are all from Blue Sea. In this series there is a gradual elevation of the extremity throughout. In c7 the lower edge of the aperture is more than half-way up the preceding whorl. In c8 the last whorl has been removed completely from the plane of the others, and the aperture is directed upwards at a high angle. The gradation throughout is such that all must be considered as variations within the species, though the end members are quite different. Such variation, however, if followed by the disappearance of intermediate forms would result in new species.

The last shell of the series, No. 8, represents the extreme development of the tendency to deflection from the plane of the shell of the outer whorl. Viewed by itself, it would appear to be merely a rather odd dextral form. On closer inspection it proves to have four and a-half whorls to the point, where there is a small campanulate expansion and where the distortion commences. Therefore, so far, it is normal. The contraction forming the throat of the shell is much less than usual. The last whorl turns upward rapidly and, in a horizontal plane, almost at a right angle to the one preceding as shown in Figs. c8 and b8 respectively. In contrast to the latter, which is sub-carinated above and below, the last whorl is broadly rounded above, and irregularly sub-carinated below. The lines of growth on the body whorl, though inconspicuous, are spaced normally, and those on the small campanulate portion are much finer. However on passing this enlargement, the striae become coarse again, though more oblique and irregular than on the preceding whorl. A short distance from the aperture the shell thickens slightly but there is no pronounced expansion at the extremity of this additional whorl.

In addition to the variation noted above, which is observable throughout the series, certain individuals show others. Normally the spire is on a level with, or slightly below, the plane of the whorls. Shells 1 and 4 conform to this feature fairly well. But in 2 and 3 the second to the last whorl is higher than either those preceding or the body whorl, and in 3 its plane is quite oblique. Shell *g* shows this in a less degree. Series *c* and *d* show this variation well.

Normally the whorls increase slowly and gradually to the beginning of the campanulate expansion. From this nearly all the specimens show various diversions, as shown in series *a*. Shells 4 and 5 approach the type most closely. In 3 and 6 the second to the last whorl is proportionately much the largest. In 3, 4 and 5, the whorls are rounded above except for the last revolution, which is sub-carinate. In 2 and 7 the tops of the whorls are quite carinate. From the umbilical aspect as shown in series *b*, these differences are not apparent, the whorls being rounded to sub-carinate below.

The lines of growth are coarser, though not to a large degree, in some specimens than others. Shell 5 is unique in having a series of revolving lines as well. These fade away as they approach the aperture, and are most numerous about the middle of the whorl. Several individuals have also rib-like striae on the campanulate portion of the body whorl, but not elsewhere. Revolving lines on the shell were seen only on this one specimen of those from Blue Sea Lake.

The aperture itself is subject to considerable variation. There is a considerable difference in the degree of flare, and as one would expect from the varying amounts of upturn of the last whorl in the obliquity of the aperture also. Shell 6 and of course 8 are extreme in this regard. In 1 the degree of obliquity from the vertical of the plane of the aperture is 15° ; in 6 it is 40° .

One feature, seldom seen in *Planorbis campanulatus*, but which is comparatively common in these specimens, is a rudimentary color banding. Unfortunately, this feature has not shown well in the plate. These colored areas are generally confined to the lower half of the whorl and consist usually of two brown re-

volving lines whose upper and lower boundaries are well defined. Occasionally the two are merged into one broad band. The majority of the specimens in this collection show traces of this ornamentation and in many the lines are quite clearly marked.

FACTORS AFFECTING VARIATION.

As seen from the above paragraph, considerable variation occurs in *Planorbis campanulatus* in the area under discussion. Although, in the literature, references to deviations from type are not common, this form would seem to be a somewhat plastic species reacting to some unusual external condition. In this case the writer attributes these modifications mainly to bottom environment. The habitat of *P. campanulatus* is usually given as *ponds or streams with a muddy bottom, or weedy areas with a muddy or sandy bottom, presumably in well-protected places.* At Blue Sea we have an entirely different set of conditions. This lake is wholly within the Archaean granite and limestone area; its shores, especially toward the north, are precipitous and rocky; and its floor, with the exception of some small muddy bays is composed of bed rock. No streams of any size enter the lake and consequently little sediment is being deposited. The larger of these bays are at the south end, and none of the specimens here discussed were collected there. The shells are often found in from one to three feet of water attached to the rock. Upon these rocks, absolutely devoid of sediment, the waves during a storm beat with great force. Yet, while waves of considerable strength were beating upon the shore, causing small pebbles, which were placed as markers, to be tossed violently to and fro, this gastropod would remain firmly attached by its foot to the rock. This habitat differs vastly from the muddy bottom of rivers or ponds. The animal holds its shell erect. Any increase in obliquity of the aperture causes the shell to be carried more horizontally, and consequently better adapted to resist wave action. In all probability this environment has developed the high degree of obliquity of the specimens from Blue Sea. *Planorbis deflectus* is an example of a form which has a somewhat oblique aperture so that it can lie almost flat, and is found occasionally on exposed rocky shores.

The problem of food may have some influence in the production of these forms. The discrepancies in size of the whorls may be connected with periods of scarcity and abundance of food. With the exception of the small muddy bays above mentioned, the bottom is very free from weeds and algae, the usual food of this gastropod. It is indeed remarkable that the lake can support so large a molluscan fauna as it does. Of plankton there is none. The gastropods are not abundant, but certain of the Unionidae in the bays occur in thousands.

The temperature of the water and range in depth of the gastropods are not sufficiently distinctive to be an important factor in this connection. The average water temperature is not much colder than it would be in the Ottawa valley.

SUMMARY.

To summarize the results of this study it would appear that the specimens of *P. campanulatus* from Blue Sea Lake show considerable variation as follows:

a. Progressively in an increasing deflection upwards of the extremity of the last whorl and aperture from the general plane of the whorls.

b. In degree of elevation and obliquity of the spire.

c. In size and shape of the whorls, which vary from rounded to sharply carinate.

d. In presence in one specimen of well-marked revolving lines.

e. In the flare and obliquity of the aperture.

f. In presence or absence of color-banding.

Of these the first only is regularly progressive, and the latter deviations bear no relation either to it or to each other. To the writer, bottom environment, wave action, and food conditions appear to be the main factors in producing such a series of forms as have been above described. Such conditions are favorable for the development of new varieties and species.

Note.—The writer wishes to gratefully acknowledge the assistance and helpful criticism received from Dr. E. M. Kindle of the Geological Survey of Canada, and from Mr. Frank C. Baker.

EXPLANATION OF PLATE X.

Variation in Planorbis campanulatus Say.

Series *a.* Apical aspect.

1. From fossil marl beds Mackay Lake, Ottawa.

2-8. From Blue Sea Lake, Quebec.

Series *b.* Umbilical aspect of the above.

Series *c.* Profile view, showing aperture of the above.

Series *d.* Profile view, from side opposite aperture, of the above.

The four views of each specimen are shown in vertical rows, *e. g.*, the four figures at left of plate represent a single shell. All figures natural size.

ON THE LAND SHELLS OF MONROE, CONNECTICUT.

BY ARTHUR JACOT.

Twelve miles north of Bridgeport, Conn. is situated Monroe Center. That part of the town of Monroe lying between the Center and the Housatonic River was searched at several localities for terrestrial mollusca by my wife and me. This region presents five well-marked biological associations in which land shells are common. Of these, the upland swamp (1) was found to be richest in number of species and individuals. A tract which has not been burned over for a great number of years lying west of my father's house and barns (1) we considered to be the best example of the upland swamp association. Water can here be found throughout the year, though much less in summer than at other times. The trees are mainly elm and soft maple with clumps of black ash rising here and there from the water. On each side of the wet area, among the maples and elms are yellow birches, white ashes, and various swamp or wet-land oaks. Lichens and mosses are very numerous, among the latter being sphagnum. The cinnamon fern grows waist-high. The dry wooded hill slopes to the south and southwest of this tract represents the second (2) association, characterized by *Polygyra fraterna* and *Succinea retusa*. The lowland swamp as-

sociation (3) was chiefly studied as typified by the swamp at the head of Cargyles Pond to the east of the above-mentioned localities and at the foot of the hill. This association seems to be characterized by *Succinea ovalis (totteniana)*. A limestone cave association (4) was merely outlined by the fauna found in a limestone fissure known as Devil's Den, situated on the north side of the Boy's Half-way River (the brook flowing from the above-mentioned artificial pond) a mile below the pond. The limestone is partly leached out, with three entrances, and partially blasted out, making a fissure cavern. Here the larger shells were quite common while the small ones were not noticed. The fifth or fluvio-terrestrial association (5) borders the Housatonic River and is characterized by *Succinea avara*. Although many other localities were examined, all the species found are represented in at least one of the above associations as outlined in the following list.

The method of collecting the smaller species was to gather leaf mould, moss and rubbish (always keeping each collection separate), dry the material in the oven, pass it through a graded series of sieves and carefully sort over each sifting. The method used for finding the larger shells, as well as the smaller, was to carefully scrutinize old wood and stones, especially the under or moist side, bases of stumps and trees, especially the "saw-dust" in their cavities, the underside of bark, etc. My wife rendered me the greatest assistance in all of this tedious work.

Notice is called to the absence of *Cochlicopa lubrica* which I have found near Bridgewater, fifteen miles further north. The *Omphalinas* also were not found. No distinctly Canadian fauna species were noticed.

Carychium exiguum (Say). Common at 1, less so at 3.

Polygyra tridentata (Say). Found at 4.

Polygyra albolabris (Say). Occasionally at 1, 3 and 5, common at 2 and 4.

Polygyra thyroides (Say). Found at 4.

Polygyra hirsuta (Say). Found at 2 and 4.

Polygyra fraterna (Say). Found at 2 and 4.

Circinaria concava (Say). Found only at 4.

Vitrea binneyana (Morse). Rare, and only found at 1.

Vitrea indentata (Say). Occasionally at 1, 2, 3 and 4.

Vitrea rhoadsi (Pilsbry). Uncommon, found at 1.

Striatura ferrea (Morse). Rare, and only found at 1.

Striatura milium (Morse). Common at 1, occasionally at 2, 3 and 5.

Euconulus fulvus (Müller). Not satisfactorily distinguished from the next species.

Euconulus chersinus (Say). Common at 1, fairly common at 3 and 5.

Zonitoides hammonis (Ström). Common at 1, 2, 3 and 5.

Zonitoides arborea (Say). Abundant everywhere.

Zonitoides minuscula (Binney). Rarest of the *Zonitidae*, found only at 1.

Zonitoides exigua (Stimpson). Common at 1, fairly common at 3.

Philomyces carolinianus (Bose). Occasional at 2 and 3.

Pallifera dorsalis (Binney). Occasional at 2 and 3.

Pyramidula alternata (Say). Occasional at 2, common at 4.

Pyramidula cronkhitei anthonyi (Pilsbry). Occasional and generally distributed.

Helicodiscus parallelus (Say). Common and generally distributed.

Punctum pygmaeum minutissimum (Lea). Occasional at 1.

Succinea retusa (Lea). Fairly common at 2.

Succinea ovalis (Say). Uncommon at 2 and 3.

Succinea ovalis totteniana (Lea). Common at 3.

Succinea avara (Say). Common at 5.

Strobilops labyrinthica (Say). Common in one spot (about a decaying tree-top) at 1.

Bifidaria contracta (Say). Found at 1.

Bifidaria pentodon (Say). Common at 1 and 3, the commonest Pupillid.

Bifidaria tappaniana (C. B. Adams). Found at 1 and 3.

Vertigo gouldii (Binney). A few specimens from 1 were considered to be this species.

Vertigo bollesiana (Morse). Occasional at 1.

Vertigo ventricosa (Morse). Fairly common at 1.

Vertigo ovata (Say). Fairly common at 1.

Vallonia pulchella (Müller). Rare, at 1 only.

SOME FURTHER COMMENTS UPON THE WORK OF LORENZO EUGENE DANIELS.

BY JUNIUS HENDERSON.

My good friend Ferriss, in the interesting account of the life, character and scientific work of Mr. Daniels, has briefly mentioned the principal items of his work, but there is opportunity for enlargement upon some of the items. Daniels' work is a good text for a sermonette upon the great value of the non-professional and semi-professional in science. His vocation was agriculture, which furnished the means for carrying on his avocation, the collection and study of natural history material. Perhaps there is no branch of natural science that has profited more from the labors of such men than has conchology. There are few strictly professional conchologists or malacologists—that is, men whose living is derived from such work. Therefore, the progress of the science is dependent upon those to whom the work is an avocation, done for the pure love of it, with no thought of financial remuneration. After all, is not that the best reward?

Many of us may not realize the extent and value of Daniels' work so fully as we would had his modesty not kept him so much in the background. His mind was a fountain of information concerning the habits and habitats of snails and methods of caring for material, which information was freely at the disposal of his friends. He was usually content to allow others to do the publishing, or to appear only as joint author. I only recall seven papers bearing his name as the sole author. Probably there are others. In the former account his Minnesota and Montana work was not mentioned. His Minnesota paper covered a field where work was much needed, for the literature of that state was scant compared with that of many states. His Montana work, published by Vanatta, was in a vast territory that has only been scratched in a few places by students of Mollusca. His two seasons in Indiana, prior to 1903, forming the basis for his Catalogue, added 91 to the 184 species and varieties listed for that state by Call, and he has since added

others. It is impossible to estimate, without a great deal of time spent in searching the literature, the forms new to science discovered by him individually or jointly with others, or the extent to which his discoveries have added to the known range of species. Only a small proportion of the species he discovered bear his name. In view of the large amount of work he did in collecting snails of the genus *Oreohelix* in six states, sometimes by himself, sometimes with others, and the number of new forms of *Oreohelix* discovered on those expeditions, it is a shock to realize that no member of that genus is dedicated to him by name.

Another thought has been in my mind for some time. In estimating the work of such an enthusiastic and indefatigable collector, do we place a high enough value upon the benefit to science of the wide distribution of the material, accompanied by reliable data, to other collections and particularly to museums? Material obtained by Mr. Daniels in out-of-the-way places has reached many institutions where it will be studied by hundreds of students for perhaps a century to come, and doubtless will result or assist in adding many facts to our knowledge of natural history, especially of the distribution and variation of species, and straightening out problems of nomenclature and classification, in the years to come.

Mr. Daniels' collections in eleven states have resulted in published reports. I believe he also made one or two trips to Florida, but do not know whether those trips resulted in any publications. Wright, in his description of *Unio danielsi*, from Georgia, stated that Mr. Daniels partly financed some work in that state too.

In addition to the loss to science, those of us who have endured hardships with him in a difficult country, and enjoyed his quiet companionship, looking forward to other trips, feel a deep personal loss in his removal from our midst.

REMARKS UPON THE IDENTITY OF "UNIO FASCIATA," RAFINESQUE.

BY L. S. FRIERSON.

Lampsilis fasciata, Rafinesque.
 Unio fasciata, Rafinesque, 1820.
 Unio siliquoideus, Barnes, 1823.
 Unio inflatus, Barnes, 1823.
 Unio distans, Anthony, 1865.
 Unio luteolus, Auct. as of Lamarck.

The above wide-spread, common, and well-known Naiad, is seldom given the name which we adopt ("fasciata, Rafinesque") but is all but universally known as "luteolus" as of Lamarck.

The use of the latter as the specific name of the shell is merely the unquestioning acceptance of the dictum of Dr. Lea, who on returning from Europe in 1833, wrote that the "specimen cited by Lamarck" seen by him in the "Garden of Plants" was a "true siliquoideus" of Barnes. Against this application of Lamarck's name for the species, the following reasons seem just.

(1) Lamarck's description does not describe the species in question, but does fairly well describe the *Unio cariosus*, Say, as evidenced by the unanimous opinion of all writers previous to Lea's pronouncement of 1833 (as well as by some of the more courageous spirits since that event).

(2) Lamarck gives as habitats (he must have seen more than one?) the "Susquehanna and Mohawk Rivers."

The *cariosus* abounds in these streams, but from neither of them did Lamarck obtain specimens of the species *luteolus*, Auct. (The shell does not live in the Susquehanna; but according to Marshall the species is now an immigrant in the Mohawk through the Erie canal, and this is confirmed as to the Genesee by Ortman.)

(3) Lea claimed that the specimen seen by him, "cited by Lamarck," was a "true siliquoideus, Barnes;" but his identification was disputed by Férussac, who stated that according to Lamarck's "example" the shell was "*cariosus*, Say."

The use of "luteolus" as the specific name of the species in question is therefore unwarranted by the description; is absolutely contradicted by the habitats assigned, and rests solely upon the identification of a specimen made by one student, which was at once contradicted by another of equal ability, for it must not be overlooked that in 1832 Lea was by no means the "authority" that he afterwards became.

(In 1829 Lea considered the "Unio cornutus" to be a "protean species" whose "varieties run into the aesopus," and embraced those species which Lea afterwards knew as "Unio perplexus" and "foliatus." It was still later before he appreciated the specific differences existing between "Unio verrucosus" and "pustulosus;" or between the "Unio plicatus and multiplicatus.")

Notwithstanding that Lea in 1832 conversed with Férussac over the cabinet of the latter, concerning their "favorites, the Unios," the latter student (who had specimens of the present species in his cabinet) stuck to his opinion that the "luteolus of Lamarck" was the "cariosus, Say."

In view of the above the continued use of Lamarck's name for the present species is clearly unwarranted, except by the rather flimsy claim of usage.

Turning now to the name we adopt (*fasciata*, Rafinesque) we find from its description that Rafinesque had before him an extremely wide-spread species, found practically all over the Ohio drainage, occurring, he writes, "in the rivers Ohio, Alleghany, Muskingum, Kentucky, Green, Salt, etc."

Aside from other characters he states that his species (which though ordinarily small, attains a length of three inches) is inequilateral, elliptical, ventricose and rather thick.

Its epidermis is olive, with brownish rays; a variety has dark rays; another is greenish with blackish rays, alternately wider and narrower; others are copper-colored, with olive rays.

The nacre is bluish, except that in the last variety it is coppery-white. The cardinal tooth is "divaricate."

A handsome species approaching the "ochraceus, Say."

The above characters can be ascribed to no known Naiad from the Ohio drainage except to the species in question.

(A conclusion made doubly certain when we know that even Dr. Lea thought that the "*Lampsilis fasciola*, Rafinesque" might be the species which he (Lea) had afterwards named "*Unio multiradiatus*.")

It is true that the name "*Unio fasciata*, Rafinesque," was given by Conrad to a rayed specimen of "*ligamentinus*, Lamarck" (Monography, Plate I, 1836), an error which may yet quite often be found duplicated in cabinets.

But this patent error of Conrad's scarcely militates against the conclusions drawn, since we find in the same work (Monography) figured as one species, specimens of the very diverse shells, *Unio fisherianus*, Lea, and *Unio nasutus*, Say (Plate 18).

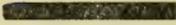
We find, too, that Conrad figured under the name of "*Unio glans*, Lea," a specimen of the very different *Unio perpurpureus*, Lea (Monography, Plate 9), etc.

As bearing upon Conrad's figure referred to, Dr. Lea cogently remarks: "Mr. Conrad thinks the '*crassus*, Say,' is the '*fasciata*' of Rafinesque. An examination of his description ought to satisfy any one that the '*crassus*, Say' could not have been under the eye of the author when he made his description of '*fasciata*.'"

As bearing upon the identification of "*fasciata*" with the "*pseudo-luteolus*"—the "*Unio siliquoideus*, Barnes," it is a matter of history that Rafinesque often sent to Ferussac specimens of shells from the West, bearing names given by the donor.

Dr. Lea records the fact that specimens of the "*siliquoideus*, Barnes" were seen by him in the cabinet of Ferussac in 1832, labeled "*Unio fasciata*, Rafinesque."

All of the available evidence therefore goes to show that the name "*fasciata*, Rafinesque" must supplant as the specific name of the species, the "*luteolus*, Lamarck," the latter being a synonym of the early "*Unio cariosus*, Say."


ELIZABETH LETSON BRYAN, sc. D.

Elizabeth Letson Bryan died on February 28th at her home in Honolulu, of an organic heart affection after an illness of nearly eight months.

Mrs. Bryan was born April 9, 1874, at Griffin's Mills, Erie Co., New York, the only child of Augustus F. and Nellie Webb Letson. She was a direct descendant from Governor Bradford, first governor of Massachusetts, and was a member of the Mayflower Society of New York. She early became interested in natural history, especially conchology. In 1892 she entered upon her long service in the Buffalo Society of Natural Sciences, of which she became Director in 1899, finally retiring, after a connection of seventeen years, upon her marriage to Professor William Alanson Bryan in 1909. This long period was interrupted by several years given to study in the Academy of Natural Sciences of Philadelphia and the United States National Museum.

In 1899 the Conchological Society of Buffalo was organized by her, and a new period of local enthusiasm for the study of mollusks began. In 1906 Alfred University conferred the honorary degree of Doctor of Science. She was a member of the American Association for the Advancement of Science, the Conchological Society of Great Britain and Ireland, and various other scientific bodies.

Dr. Letson's publications relate chiefly to the mollusks of New York, the more extensive being a Check List of the Mollusca of New York, Bull. 341, N. Y. State Education Department, 1905; Post-Pliocene Fossils of the Niagara River Gravels, published in a Bulletin of the State Museum, 1901; a partial list of the shells found in Erie and Niagara counties and the Niagara frontier, Bull. Buffalo Soc. Nat. Sci., IX, 1909. At the time of her marriage to Professor Bryan, of the College of Hawaii, and her removal to Honolulu, she was working on a monograph of the New York Mollusca.

In Honolulu Mrs. Bryan engaged ardently in the collection

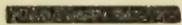
of marine shells. Professor Bryan, who had before been chiefly known for his work on birds, added the mollusks to his other interests, and together, on many an island collecting trip, they amassed the largest collection of Hawaiian marine shells yet brought together.

For several years she had served as librarian of the College of Hawaii, a congenial task bringing many young people under her influence.

In 1917-18 Professor and Mrs. Bryan traveled in California and the East, spending several months at the Academy of Natural Sciences in studying Hawaiian shells. For the same purpose the museums of Cambridge and Washington were also visited.

Mrs. Bryan's gracious personality and sunny outlook, no less than the genuine love of nature which determined the course of her life, made her many warm friends who mourn her untimely death.

H. A. P.



Dr. Herbert Huntington Smith, Curator at the Museum of the University of Alabama, was killed by a train on March 22. A notice of his life and work will appear later.



NOTES.

THE INTRODUCTION OF *ACANTHINULA HARPA* (SAY) AND *CIRCI-NARIA VANCOUVERENSIS* (LEA) INTO ST. PAUL ISLAND, ALASKA. —In order that there may be a definite record of the introduction of these two species by man into St. Paul Island, I wish to state that I placed about ten specimens of each of these species behind the laboratories on St. Paul Island, of the Pribiloff Group, in June, 1916. It may also be well to note that I was unable to find any trace of these in 1918. This, of course, does not mean that they may not still be in existence there.—G. DALLAS HANNA.

HENDERSON COLLECTION OF ANTILLEAN LAND MOLLUSKS.—The National Museum has recently received as a gift from Mr. John B. Henderson, one of the Regents of the Smithsonian Institution and a prominent malacologist, his entire collection of Antillean land mollusks, comprising approximately 400,000 specimens. The bulk of the collection is the result of expeditions to the Antilles made by Mr. Henderson and his assistants for the sole purpose of visiting unexplored or little known regions, or for collecting specimens in the identical localities from which the original types were obtained.

Dr. H. A. PILSBRY has recently been elected a Corresponding Member of the Zoological Society of London.

PUBLICATIONS RECEIVED.

THE PLIOCENE MOLLUSCA OF GREAT BRITAIN. By F. W. Harmer (Palaeontographical Society, Vol. I, parts 3 and 4, pp. 303–483, plates 33–44, 1918 and 1919). This completes Vol. I. Part 1 was published in 1914 and part 2 in 1915, the whole being supplementary to S. V. Wood's Monograph of the Crag Mollusca. It brings the subject up to date and adds much to our knowledge of the distribution of some of the American species in Pliocene times. Aside from some of the species which are circumpolar in distribution, *Sipho pygmaea*, *Bela bicarinata*, a var. of *Eupleura caudata*, *Turritella erosa* and *Nassa trivittata* are also recorded from the pliocene and pleistocene of Great Britain. Part IV contains the title page and index to the volume.—C. W. J.

POST-GLACIAL MOLLUSCA FROM THE MARLS OF CENTRAL ILLINOIS. By Frank C. Baker (Jour. of Geol., Vol. 26, pp. 659–671, 1918).

ON SOME TERTIARY FOSSILS FROM PRIBILOF ISLANDS. By W. H. Dall (Jour. Washington Acad. Sci., Vol. 9, 1919). The collection of some 47 species made by Mr. G. Dallas Hanna, is of interest as linking up the age of the strata with the beach deposits at Nome which are referred to the late Pliocene.

14.05
A
Zool. N.H.L.

THE
NAUTILUS

A QUARTERLY JOURNAL
DEVOTED TO THE INTERESTS
OF CONCHOLOGISTS

VOL. XXXIII
JULY, 1919, to APRIL, 1920

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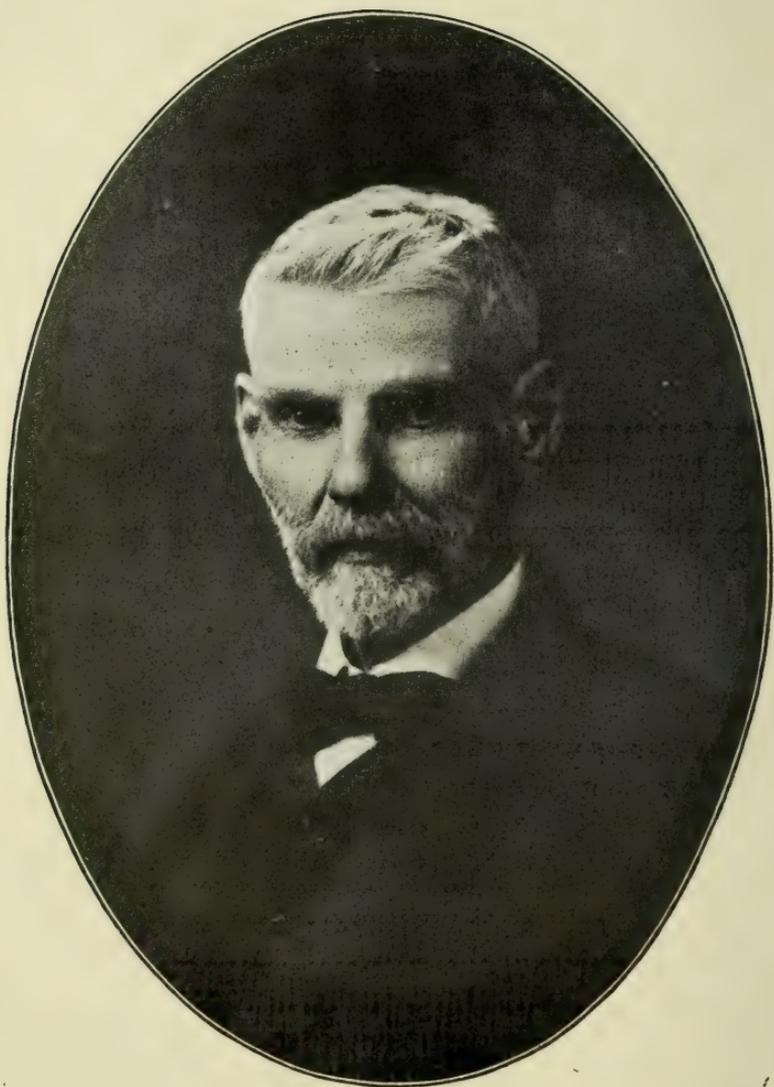
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HERBERT HUNTINGTON SMITH

THE NAUTILUS.

Vol. XXXIII

JULY, 1919

No. 1.

AN OLD COLLECTING GROUND REVISITED.

BY CHARLES W. JOHNSON.

While a resident of St. Augustine, Florida, from 1880-88, I made a careful study of the mollusca of the harbor and vicinity. The habits of the various species and the factors governing their distribution, which in many cases was much restricted, especially appealed to me. With these facts in mind it was with great interest that I visited the old city after an absence of thirty-one years. Time and the ever-shifting sands have played sad havoc with many of my old collecting grounds, and I looked in vain for some of the rarer species.

The accompanying maps can give only a general idea of the changes that have taken place.¹ The "Lagoon" of the eighties is gone and there are now two inlets with about the same depth of water on each bar according to the government chart, survey of 1910, although I was told that the southern channel has now much less water on the bar than the other. Marsh Island at the mouth of Hospital Creek is also gone, and the sand bar that was formerly only east of the island now extends to the fort. There is no trace of the site of the old Spanish lighthouse,

¹Figure 1 shows the harbor and vicinity about 1883, before the St. Sebastian marsh was filled, also the approximate positions of the "Lagoon" and Marsh Island. The figures refer to the species mentioned in the text that were found at those particular places.

Figure 2 is based on the U. S. coast survey chart, No. 159, survey of 1910, and represents in a general way present conditions.

which was probably at the extreme end of the now exposed ledge of coquina and about 200 feet below the present high-

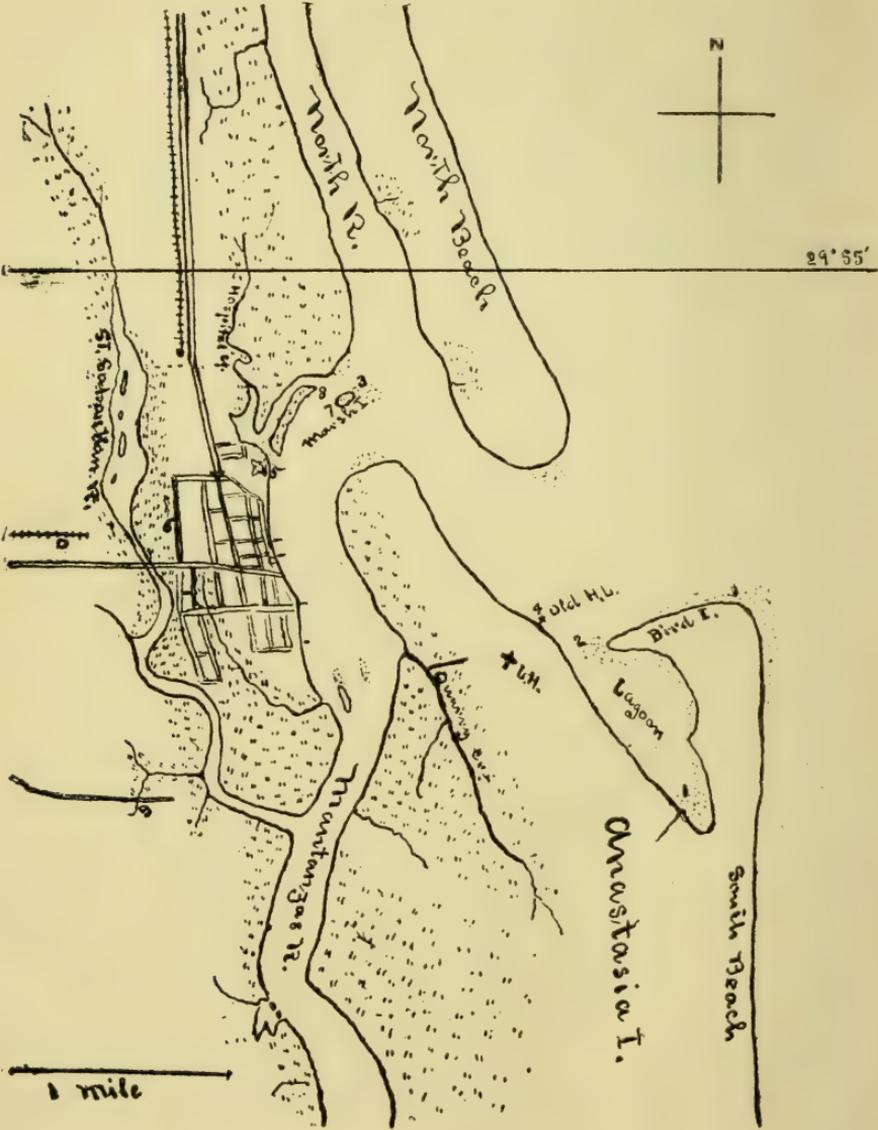


Fig. 1. St. Augustine, about 1883.

water mark. The government has endeavored to prevent the wearing away of this portion of Anastasia Island by construct-

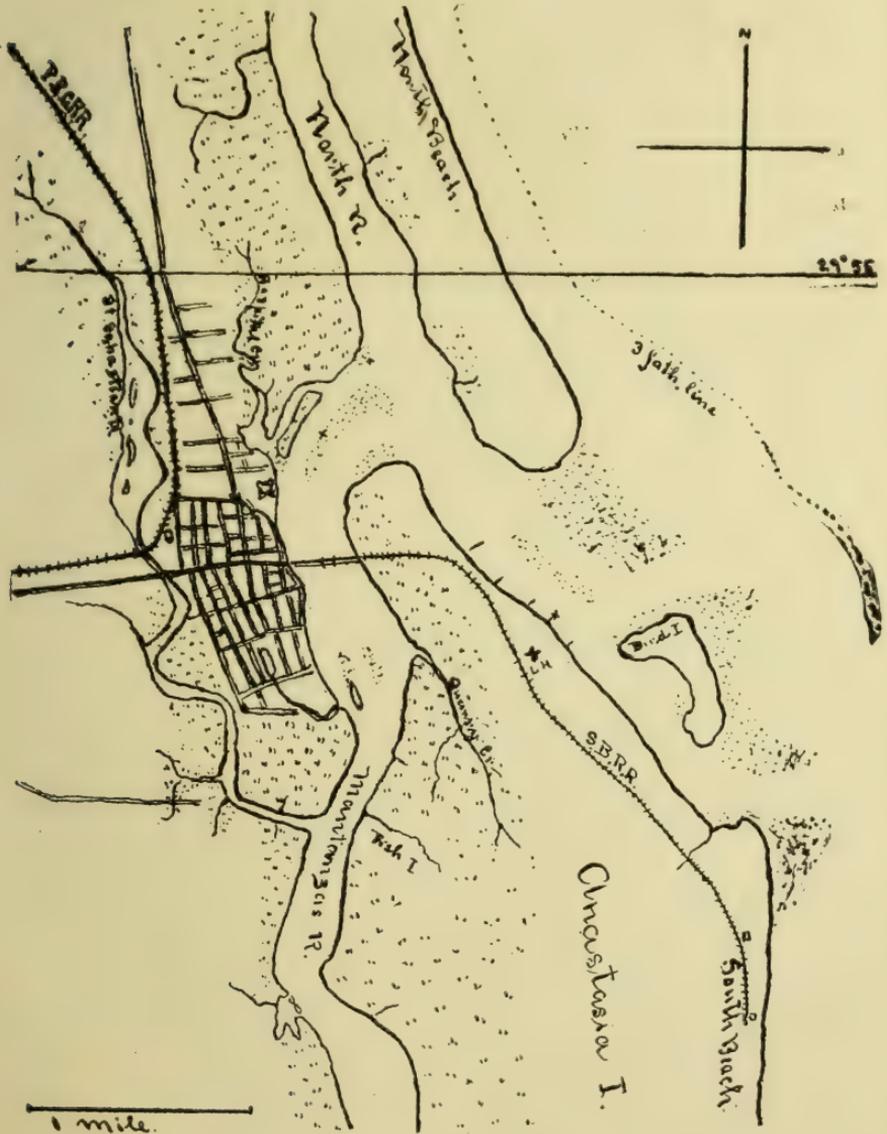


Fig. 2. St. Augustine at present.

ing four jetties, one below and three above the ledge referred to, but the erosion apparently still continues. The following notes are based chiefly on those species that were very limited in their distribution and which therefore may have become locally extirpated by the many changes affecting their environments. A list of about 200 species published by the writer in 1890¹ forms the basis of some of the following remarks.

Macrocallista nimbosa Sol. (1) This is the *Callista gigantea* Gmel. of my list. It was found only in the shoal water at the head of the "Lagoon," seeming to prefer the quiet water, as I never found a trace of it on the ocean beach. At most only six or eight specimens were found, and many of these were broken, probably by the large ray or "clam cracker" as the butterfly ray (*Pteroplatea maclura*) is called by the fishermen.

Donax obesa d'Orb. (2) This little chunky species was formerly common on the sand bars at the mouth of the "Lagoon," where there was a slight shifting of the sand at every tide. The larger species, *Donax variabilis* Say, was (and probably is) exceedingly abundant on the ocean beaches, especially the "South beach." I was quite amused at Daytona to hear the popular name of "coquina" applied to this shell, and one young man talking about "coquina bouillon." While this is entirely proper, as the Spanish word coquina means, broadly speaking, shell-fish, the name has become so generally used for the shell-rock (often made up largely of this species) that at first it sounded like pretty hard diet. I am sorry that opportunity did not permit my getting a large series of this species including the young, as I should have liked to have made some comparisons of the young of *D. variabilis* with that of the typical or more northern *D. fossor* Say. As I remember I could never satisfactorily separate the two forms at St. Augustine and omitted the latter from my list, although it is recorded from the entire coast of Florida and westward to Texas. Mazyck in his "Catalog of Mollusca of South Carolina," says of *D. fossor*, "very rare, Sullivan Island."

¹ An Annotated List of the Shells of St. Augustine, Florida, THE NAUTILUS, vol. iii, pp. 103, 114 and 137, vol. iv, pp. 4-6.

On one visit to the South beach I found it literally strewn with perfect specimens of *Divaricella quadrisulcata* d'Orb. (*Lucina dentata* of my list), but never again did I find them in such numbers. At another time quantities of an *Arca* referred to in my list as *Arca americana* Gray, were found. It is more elongated than those found in the harbor, with a thinner and lighter brown periostracum, and probably represents only a variety or ocean form of *A. campechiensis* Dillw. (*Arca pexata* Say).

Lucina philippiana Reeve (*Loripes edentula* of my list). Large single valves were frequently found and occasionally at the mouth of Hospital creek shells were found in the mud with both valves intact, but like the *Phacoides filosa* Conr. in Portland harbor, Maine, always dead. It may also be of interest to note that two specimens of *Solemya velum* Say, and a few single valves of *Mya arenaria* were found on the north beach, the most southern records for the species.

Panopea bitruncata Conr. (3) This large and variable shell which was referred to in my list under both *Glycimeris reflexa* Say, and *G. americana* Conr., was later the subject of a paper by the writer¹ in which the synonymy was straightened out, and a fine specimen found on the bar east of Marsh island was figured. Common in the pliocene of the Caloosahatchie, but recent examples are exceedingly rare. Living deep in the mud they are difficult to obtain, unless on rare occasions extensive harbor dredgings might bring some to the surface. They are also very apt to be destroyed by changes such as encroaching sand bars, sedimentary deposits, and harbor pollution.

The rocks that represented the ruins of the old Spanish lighthouse (the tower of which fell in June, 1880, while the keeper's house had fallen several years before) were a favorite place for *Thais floridana* Conr. (*Purpura haemostoma* var. *floridana* of my list). During my recent visit I failed to find a living specimen of this species either on the ledge or jetties, but the tides were not very low and it may be that they could have been found at a lower tide. On all of the rocks including the

¹THE NAUTILUS, vol. 18, pp. 73-75, pl. 4, 1904.

jetties were great numbers of *Siphonaria naufragum* Stearns (*S. lineolata* d'Orb.). One thing that seemed to impress me more than when I lived there, was the great abundance of oysters on all the rocks, even around the water battery of the fort and also on the piling. In speaking to an old friend regarding the matter, he said he thought that around the fort it was due to cleaning off the rocks a few years ago, thus presenting a clean surface for the young to cling to. This array of bristling oysters around the water battery of the fort deterred me from a hunt for *Nerita peloronta* and *N. versicolor* (5), three living specimens of which I found there together with *Litorina angulifera*, being the most northern record for the three species.

Cerithidea scalariformis Say (6). The only place that I ever found this species at St. Augustine was in the more sandy portion of the marsh west of the city between King street and Orange street, not far from where the Y. M. C. A. building now stands. The filling-in of the marsh has probably locally extirpated this species. Another related species *Cerithium floridanum* Mörch (7), *C. atratum* of my list, was also restricted to a small area, an old oyster bed at the west end of Marsh island. This is now a sand bar and the species may now be entirely absent in the harbor. At the latter place I also found my only living example of *Murex fulvescens* Sowb. (*M. spinicostata* Val.).

At the mouth of Hospital creek was a large patch of the grass-like Gorgonia—*Leptogorgia virgulata*. On this lived the little *Simnia uniplicata* Sowb. 8 (*Ovula uniplicata*), as the Gorgonia varied in color so did the shells of the *Simnia*, agreeing in color with the bunch of Gorgonia on which they were found—either white, light-yellow, orange or pink. On one occasion while hunting for *Simnia* a conspicuous object attracted my attention, its flesh-colored mantle with irregular blackish markings was very striking, and as it contracted I found I had a *Cyphoma gibbosa* Linn. (*Ovula gibbosa*), common to the West Indies. For some time I wondered why the animal of this shell should be so very conspicuous; then the thought occurred to me that in more southern waters probably most of them live on the "sea-fans" (*Rhipidogorgia flabellum*) and with their

reticulated structure as a background the animals would be scarcely distinguishable, like the Sargassum fish (*Pterophryne histrio*) in the gulf-weed (Sargassum).

Cyrena carolinensis Bosc. (9). In making a bridge across a small branch of the St. Sebastian River I first discovered this species. It was a large and interesting variety in which the umbones were unusually high, many of the specimens closely resembling in size and form the figure of *C. olivacea* Carp. from Mexico, as given by Prime (Monograph American Corbiculidae, p. 17, fig. 12, 1865). Although the tide flowed freely up the little creek, there was at low tide a small stream of fresh water even at the driest time. At the junction of this little stream and the high ground there was a small colony of *Neritina lineolata* Lam. (*N. reclinata* Say). I looked in vain for this species during my recent visit, nor did I find *Cyrena* near the little bridge, but it may still exist in other parts of the stream which time did not permit me to examine thoroughly. At the mouth of Pellican creek near the Matanzas Inlet was a colony of *Neritina virginea* Linn. They were the olive-green or more brackish water type and probably represent the most northern limit of this species on the Atlantic coast. About seven miles south of Matanzas Inlet was a large cypress swamp in what was known as "Bike's Hammock," here was found *Ampullaria depressa* var. *hopetonensis* Lea, which seems quite distinct from those of the St. Johns River drainage. There were also fine specimens of *Ancylus peninsulæ* Pils. & Johns.—erroneously referred to *A. filosus* in my list. The east coast canal has drained much of this section now called Bikes Prairie on the coast survey chart. In many places I saw truck arms as I passed through the canal on my way north from Daytona.

These notes suffice to show some of the changes that can take place in a limited area in a comparatively short time, and the probable effect of such changes on certain species. It is not at all peculiar to St. Augustine, for similar changes are going on at many other places along the coast and in the vicinity of our cities. The importance of a careful study of a local fauna cannot be too strongly urged. The destruction of the forests, the

draining and filling of swamps and marshes, the construction of dams, etc., all tend toward lessening the fauna and flora of a given area.

NEW LAND SHELLS FROM ALABAMA AND TENNESSEE.

BY GEO. H. CLAPP.

POLITA CUMBERLANDIANA, n. sp.

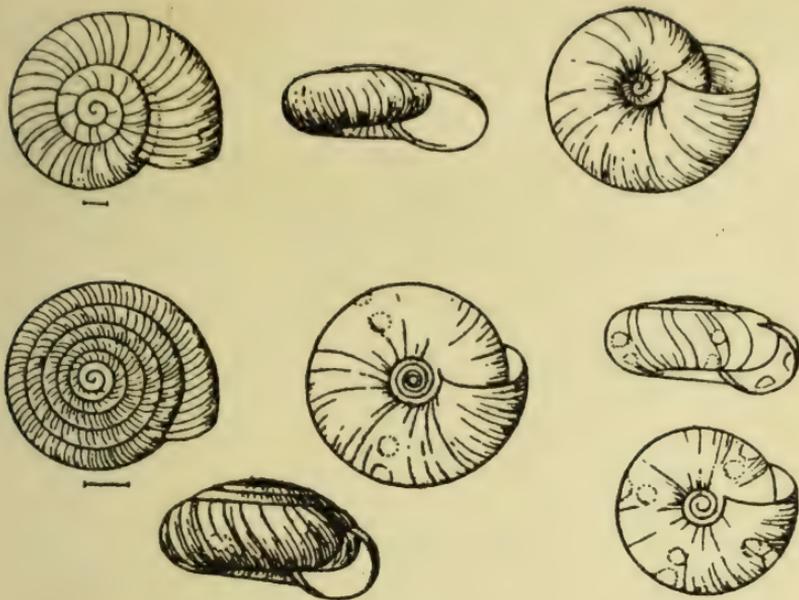
Shell widely umbilicated, flattened, very slightly convex above and below, glossy, thin and translucent, light horn color, regularly but lightly sculptured across the whorls by curved, closely set radiating impressed lines parallel with the lines of growth which are very faint; spire flattened; stature shallow; whorls about 4, rapidly increasing, the last decending at the aperture which is elongate-oval flattened above, lip very slightly reflected at the columellar insertion; umbilicus wide, displaying all the whorls and contained about 4 times in the diameter of the shell.

Greater diameter 3, lesser 2.5, altitude 1.25 mm.

Collected by Herbert H. Smith on the Cumberland Plateau near Stevenson, Jackson Co., Alabama, also near Anderson, and near Sherwood, Franklin Co., Tennessee.

Types No. 9157 of my collection. Paratypes in the collections of the Academy of Nat. Sci., Philadelphia and Bryant Walker, Detroit, Mich.

At first glance this species may be taken for immature *V. radiatula* as the general shape and the sculpture of impressed radiating lines are the same, but it is uniformly small with the same number of whorls, the sculpture is weaker and the shell more flattened. Under high magnification there is merely the faintest trace of impressed spiral sculpture. It is much smaller than *Polita rhoadsi*.



Polita cumberlandiana: upper three figures.

Vitrea pilsbryana: lower five figures, two at the right being immature shells, to show teeth of the neanic stage.

VITREA (PARAVITREA) PILSBRYANA, n. sp.

Shell widely umbilicate, elevated, convex above, flattened below, thin, translucent, highly polished when immature but becoming more opaque and yellowish in adults, light horn color, sculptured with unequally spaced radial grooves stopping at the periphery which is rather high; suture well impressed; whorls about 8 very closely coiled and slowly increasing, the last flattened above and below; lip simple very slightly reflected where it joins the columella, ends united by a thin callus; umbilicus wide, contained a little more than 3 times in the diameter of the shell, and showing all of the apex.

There are 3 or 4 pairs of large, tubercular, sometimes slightly oval teeth, visible thru the base of the shell at all stages of growth and in immature shells the upper teeth are visible from above. The upper teeth, which are slightly below the periphery, are the larger, more elevated and round at the top. The lower teeth are about centrally located on the base and are flattened

on top. When four pairs of teeth are present they are equally spaced at intervals of 90° and this appears to be the normal arrangement as only a few shells show three pairs which are spaced from 100° to 120° . The single fully adult shell (figured) appears to have but 2 pairs of teeth, but the shell is a dead one and quite opaque. Two young shells, 1.5 mm diameter with 3.5 whorls and 2.5 mm. diameter, with 4.5 whorls, each have 3 pairs of teeth.

Greater diameter 5, lesser 4.5, altitude 2 mm.

Collected by Herbert H. Smith in a "Cove" on the Cumberland Plateau, 3 miles north of Anderson, Franklin Co., Tenn.

Types No. 9159 of my collection. Paratypes in the collections of the Academy of Nat. Sci., Philadelphia, and Bryant Walker, Detroit, Mich.

This species belongs to the same group as *V. capsella lacteodens* and *V. andrewsæ*. It differs from both by the smaller size and wider umbilicus and from *andrewsæ* by the tubercular teeth arranged in pairs.

I name this species after Dr. H. A. Pilsbry whose "Revision of Paravitrea", Proc. Acad. Nat. Sci., 1903, pp. 204-212, Pls. X, XI, has done much to clear up this most interesting group.

A NEW FORM OF AMPULLARIA.

BY WILLIAM HEALEY DALL.

AMPULLARIA (FELIPPONEA) NERITINIFORMIS n. sp.

Shell solid, whitish or lurid purple under an olivaceous rather strong periostracum, frequently banded with four or five purple-black broad spiral bands which are most conspicuous on the white inside of the outer lip, the white interspaces being subequal; these bands however show but little on the exterior except at resting stages, in the specimens examined; the form of the shell viewed from behind, strongly recalls that of *Neritina reclinata* or *meleagris* though with a rounded base; from in front it looks like a short spired heavy *Campeloma*. The nucleus is small and

blunt, always more or less eroded; there are about four whorls in the adult with indications of about five resting stages; the surface is smooth except for inconspicuous lines of growth; the young are somewhat naticoid, with a small umbilicus, but this shape rapidly changes; the whorls enlarge rapidly, being as it were appressed toward the suture which is distinct but not channeled, while the umbilicus becomes relatively larger and more or less funicular; the aperture is egg-ovate, entire, the posterior commissure solidly filled with callus, the outer lip internally thickened, patulous not reflected; the inner thickened, continuous over the body; height of shell 33; of last whorl 31; of aperture 23; maximum diameter (in front of the middle of the whorl) 26 mm. U. S. Nat. Mus. Cat. No. 332780.

Habitat. Rio Uruguay, Department of Paysandu.

The operculum is horny, concentric, with the nucleus at the inner third; the radula is typically Ampullarioid and might be quite accurately represented by Troschel's figure of the radula of *A. urceus*, in the "Gebiss der Schnecken."

The literature has been carefully searched, both on the lines of *Ampullaria* and *Campeloma*, but nothing of the sort has been discovered.

The subgenus is named in honor of Doctor Florentino Felipe, whose energy and interest in exploring the fauna of Uruguay are deserving of great praise.

The peculiar form of this species, and its funicular umbilicus, so different from that of any other in the genus, seem to authorize its separation.

A NEW SPECIES OF PHYSA FROM NEW YORK STATE.

BY FRANK C. BAKER.

PHYSA ONEIDA n. sp. Shell of medium size, ovate, slightly inflated; whorls about five, slowly increasing in diameter; spire short, broad, the whorls flattened; color yellowish-horn; surface smooth and shining, with rarely a trace of spiral striae, but the

lines of growth may form more or less marked raised lines in some specimens; sutures slightly impressed, bordered below by a wide white band; protoconch smooth, rounded, rich wine color; aperture long-ovate, twice the length of the spire; peristome bordered within by a thickened rib edged with dark brown; columella thickened, slightly twisted; parietal wall covered by a thin callus which is folded over into and completely closing the umbilical region.

Length, 11.0; width, 7.5; aperture length, 8.0: width, 3.5 mm. Type.

Length, 13; width, 8.5; aperture length, 10.5 mm. Paratype.

Length, 10.5; width, 7.2; aperture length, 7.5; width, 3.7 mm. Paratype.

Length, 15.0; width, 9.0; aperture length, 11.0; width, 5.0 mm. Paratype.

This Physa has been included under *warreniana* Lea by the writer for a number of years. It is a small edition of that species agreeing in outline with Lea's figure and description in all essential details except size (see Lea's Observations, xi, p. 120, pl. 24, fig. 81). Lea's species, however, differs not only in size but has strong spiral lines on the surface which are absent in *oneida*. The shell in the smaller species is also more swollen and less cylindrical, and the spire is more depressed than in *warreniana*. It resembles *ancillaria* and has been constantly associated by the writer with that species as a variety. The shell is not as broad as *ancillaria* and the whorls are not shouldered. It perhaps more nearly resembles Walker's *ancillaria crassa*, but differs constantly in being less solid, lacking the variceal bands, the body whorl is less swollen, the columella is not as heavy, the spire is higher, the outer lip is not as much arched, and the aperture is more elongate. The color of *crassa* is purplish-white with an opaque texture while *oneida* is yellowish-horn, polished, with a translucent texture. *Heterostropha* has a longer, more acute spire, a rounder aperture, somewhat shouldered whorls, and a more twisted columella. There is some variation in *oneida* in the height of the spire, immature specimens having a somewhat longer spire than mature

shells. The surface is usually destitute of spiral sculpture, only a few faint impressions being observable in rare specimens. One individual, however, had been injured when the body whorl was about half completed and the part of the shell succeeding the injured portion is very heavily impressed with spiral lines, while the rest of the shell is perfectly smooth.

This shell was first recorded from Tomahawk Lake, Wisconsin, as *Physa ancillaria warreniana*. The same form occurs in Lake Maxinkuckee, Indiana, on the shore of Lake Michigan at Chicago, and a somewhat similar form has been received from Georgian Bay, Canada. It is the most abundant mollusk in Oneida Lake where it occurs on a wave-beaten shore. It is probably widely distributed, and will be found in collections labeled *ancillaria* and *heterostropha*. Specimens that have survived a second year and are of large size compare favorably with *warreniana* but may at once be separated by the absence of spiral sculpture which is especially strong in shells of Lea's species from South Dakota and other western states.

The bibliography of the new species is as follows:

1902. *Physa heterostropha* Baker (non Say). Moll. Chicago Area, Part II, p. 308, pl. 34, fig. 2 (part). Lake Michigan.
1911. *Physa ancillaria warreniana* Baker (non Lea). Trans. Wis. Acad. Arts, Sci. and Letters, XVII, p. 234. Tomahawk Lake, Wis.
1916. *Physa ancillaria warreniana*. NAUTILUS, XXX, p. 8. Oneida Lake, N. Y.
1916. *Physa ancillaria warreniana*. Tech. Pub., N. Y. State Coll. For., Syracuse Univ., No. 4, p. 273, *et seq.*, Fig. 45, nos. 34, 35. Oneida Lake.
1918. *Physa warreniana*. NAUTILUS, XXXI, p. 89. Oneida Lake.
1918. *Physa warreniana*. Tech. Pub., N. Y. State Coll. Forestry, No. 9, p. 173, *et seq.* Oneida Lake.

MOLLUSCA FOUND IN THE VICINITY OF DUBOIS, ILLINOIS.

BY A. A. HINKLEY.

For the identification of many of the species the author is indebted to Dr. Bryant Walker, Dr. V. Sterki, Dr. H. A. Pilsbry, Mr. F. C. Baker and Dr. Geo. H. Clapp.

Polygyra appressa (Say). Lowland timber, a small form.

Polygyra pennsylvanica (Green). Upland timber, a small rough form.

Polygyra thyroides (Say). General distribution, variable in size, some small and thin.

Polygyra clausa (Say). Upland timber, depauperate, few found.

Polygyra hirsuta (Say). Lowland, a few found but once.

Polygyra monodon (Rack.) Upland timber, once found in numbers about old logs in a pasture from which the timber had been removed. This form has been known as *P. leaii* (Ward).

Strobilops labyrinthica (Say). On decaying logs and under leaves.

Strobilops affinis Pilsbry. Found with the last.

Pupoides marginatus (Say). R. R. embankment, scarce.

Gastrocopta armifera (Say). Common.

Gastrocopta contracta (Say). Common, also a variety for which Dr. Sterki has proposed the name *abrupta*.

Gastrocopta corticaria (Say). Found in numbers on standing trees.

Gastrocopta pentodon (Say). Scarce, found in small numbers in an outside entrance to the cellar of a deserted house.

Gastrocopta tappaniana (Adams). A common species.

Vertigo milium Gould. Scarce, under pieces of board and sticks.

Vertigo ovata Say. But one specimen found.

Circinaria concava (Say). Only one specimen.

Vitrea hammonis (Ström.). Scarce.

Vitrea wheatleyi (Bland). Rarely found.

Vitrea indentata (Say). Common, generally found in open situations.

Vitrea cryptomphala Clapp. With the above but not as plentiful.

Euconulus fulvus (Müll). Not found often.

Zonitoides arborea (Say). All situations, numerous.

Zonitoides limatula (Ward). Lowland timber, scarce.

Zonitoides minuscula (Binney). Not common.

Zonitoides milium (Morse). With the above, scarce.

Taxodonta significans (Bland). One dead specimen.

Agriolimax campestris (Say). During wet seasons they do more or less damage to the fruit in the strawberry fields. In the fall of 1916 they were innumerable in the orchard.

Philomycus carolinensis (Bosc.). Common.

Pyramidula solitaria (Say). Under leaves in timber; like many of the species found here these are of small size.

Pyramidula alternata (Say). A few found in one place.

Pyramidula perspectiva (Say). Common in the bottom lands.

Helicodiscus parallelus (Say). Rather scarce, a few have been found in cellars.

Punctum pygmaeum (Drap.). Generally distributed.

Sphyradium edentulum (Drap.) One specimen only, although careful search was made in the same place three times.

Succinea concordialis Gould. North of the R. R. bridge on the west side of the embankment, where they were found for three or four years; of late they have disappeared.

Succinea avara Say. Individuals are scattering but found in various situations; some difference in size.

Carychium exile H. C. Lea. Wet place below the reservoir, numerous under fallen leaves.

Pseudosuccinea columella (Say). Generally distributed in the creeks.

Galba caperata (Say). In pools of a small branch near Sheller lake.

Galba modicella (Say). Pools and mud of a dry branch, Hinkley farm.

Planorbis trivolvis Say. Beaucoup creek and Sheller lake.

Planorbis antrosus Conrad. Little Muddy and Beaucoup creeks and Sheller lake.

Planorbis parvus Say. Pond north of the R. R. bridge.

Planorbis dilatatus Gould. Generally distributed.

Gundlachia stimpsoniana (Smith). Doubtfully determined. Associated with *Ancylus fuscus*, in the reservoir; generally on the under side of fallen leaves from the surrounding timber, never on the leaves of the elm and hickory. Both species were plentiful in 1908 and 1909, but have since disappeared.

Ancylus rivularis Say. Little Muddy creek.

Ancylus tardus Say. Beaucoup creek.

Ancylus fuscus Adams. Reservoir and Little Muddy creek.

Ancylus kirklandi Walker. Little Muddy and Beaucoup creeks.

Physa heterostropha Say. Sheller lake. (This is a R. R. reservoir.)

Physa gyrina Say. All streams and other bodies of water.

Physa sayi Tappan. Reservoir, one specimen; it may be a freak of *gyrina*.

Physa hildrethiana Lea. Pond north of the R. R. bridge.

Physa elliptica Lea. Above the R. R. bridge.

Physa integra Haldeman. Pond on the Hinkley farm.

Physa oleacea Tryon. Pool near the R. R. bridge.

Physa crandalli Baker. Pond on the Hinkley farm.

Pleurocera neglectum (Anthony). Little Muddy between Du Bois and Sheller lake; quite different from *C. subulare*.

Amnicola cincinnatiensis Lea. Puncheon, Locust and Little Muddy creeks.

Pomatiopsis lapidaria Say. Low land of Little Muddy creek, scarce.

Viviparus contectoides Binney. Beaucoup creek, a small variety.

Campeloma subsolidum (Anthony). Little Muddy, Locust and Beaucoup creeks.

Quadrula latecostata (Lea). Little Muddy creek.

Lampsilis distans (Anthony). Little Muddy and Locust creeks.

Lampsilis subrostratus (Say). Little Muddy creek and Sheller lake.

Lampsilis texasensis (Lea). Little Muddy creek.

Lampsilis parvus (Barnes). Little Muddy, Beaucoup and Locust creeks.

Anodonta imbecilis Say. Creeks and ponds.

Anodonta grandis ovata Lea. Creeks and ponds, plentiful.

Anodonta grandis salmonia Lea. Beaucoup creek.

Unio merus tetralasmus (Say). Little Muddy and Beaucoup creeks.

Sphaerium sulcatum (Prime). Little Muddy and Puncheon creeks.

Sphaerium striatinum (Lam.). Little Muddy and Locust creeks.

Sphaerium stamineum (Conrad). Little Muddy and Locust creeks.

Sphaerium solidulum (Prime). Little Muddy and Beaucoup creeks.

Sphaerium occidentale (Prime). Little Muddy creek.

Musculium transversum (Say). Little Muddy, Beaucoup and Locust creeks.

Musculium contractum (Prime). Little Muddy creek.

Musculium truncatum (Linsley). Little Muddy creek.

Musculium elevatum (Hald.). Little Muddy and Beaucoup creeks and pond on the Hinkley farm. Closed to *Musculium hodgsonii*.

Pisidium compressum Prime. Little Muddy creek, Sheller lake and pond north of the R. R. bridge.

Pisidium fallax Sterki. Little Muddy creek.

Pisidium fraudulentum Sterki. R. R. reservoir.

Pisidium illinoisensis Sterki. Reservoir and pond on the Hinkley farm.

Pisidium politum decorum Sterki. Pond north of the R. R. bridge.

Pisidium punctatum Sterki. Little Muddy and Puncheon creeks.

Pisidium punctatum inerme Sterki. Beaucoup creek.

Pisidium sargenti Sterki. Puncheon creek.

LAND SHELLS OF SOUTHERN FLORIDA.

BY E. G. VANATTA.

The following species of land shells were picked from leaf mould collected in Lee County, Florida, by Mr. Clarence B. Moore on Keys not mentioned in THE NAUTILUS, volume XXVI, page 16.

Weeks Place, Crawford's Key near Marco.

<i>Polygyra cereolus carpenteriana</i>	<i>Gastrocopta rupicola</i> Say.
Bld.	<i>Guppya gundlachi</i> Pfr.
<i>Gastrocopta p. hordeacella</i> Pils.	<i>Zonitoides minuscula</i> Binn.

Addison's Key near Marco.

<i>Polygyra c. carpenteriana</i> Bld.	<i>Polita dalliana</i> 'Simps.' Pils.
<i>Gastrocopta p. hordeacella</i> Pils.	<i>Zonitoides minuscula</i> Binn.
<i>Gastrocopta rupicola</i> Say.	

Demorey Key.

<i>Truncatella bilabiata</i> Pfr.	<i>Gastrocopta rupicola</i> Say.
<i>Polygyra c. carpenteriana</i> Bld.	<i>Strobilops hubbardi</i> Br.
<i>Thysanophora plagioptycha</i>	<i>Guppya gundlachi</i> Pfr.
Shutt.	<i>Zonitoides minuscula</i> Binn.
<i>Pupoides modicus</i> Gld.	<i>Zonitoides singleyana</i> Pils.
<i>Gastrocopta p. hordeacella</i> Pils.	

Josselyn Key, Pine Island Sound.

<i>Truncatella c. succinea</i> Ad.	<i>Gastrocopta rupicola</i> Say.
<i>Helicina orbiculata</i> Say.	<i>Strobilops hubbardi</i> Br.
<i>Thysanophora plagioptycha</i>	<i>Euglandina rosea parallela</i>
Shutt.	Binn.
<i>Thysanophora cæca</i> Guppy.	<i>Polita indentata</i> Say.
<i>Polygyra c. carpenteriana</i> Bld.	<i>Guppya gundlachi</i> Pfr.
<i>Gastrocopta contracta</i> Say.	<i>Zonitoides minuscula</i> Binn.
<i>Gastrocopta p. hordeacella</i> Pils.	<i>Zonitoides singleyana</i> Pils.

NEW LAND SNAILS COLLECTED BY THE FERRISS AND HINKLEY
EXPEDITION OF 1919.

BY H. A. PILSBRY AND JAS. H. FERRISS.

Sonorella montana. Resembling *S. walkeri* in form. Umbilicus one-eighth to one-tenth the diameter. Embryonic whorls densely granulose with rather sparse protractive threads, the next whorl indistinctly granose, later whorls very smooth. Aperture large, the outer margin expanded, basal somewhat reflected. Anatomically it is distinguished by the extremely short and slender penis, smaller than in any other species examined. Montana Peak, near the Montana mine, not far from Oro Blanco, and Bear canyon, further southeast, Pajarito range.

Alt. 14, diam. 23.7, umbilicus 3 mm.; $4\frac{3}{4}$ whorls.

Alt. 16.3, diam. 25.5, umbilicus 2.6 mm.; 5 whorls.

Sonorella hinkleyi, n. sp. The shell is small, depressed, solid, umbilicus about one-sixth the diameter. Embryonic shell radially rugose with sparse, irregular divaricating threads, later whorls slightly striate. Peristome very little expanded. A dark band is normally present, but at Station 244 albinos were found in abundance. Alt. 8.5, diam. 16 mm.; $4\frac{1}{4}$ whorls. Cayetano Mountains. Anatomically characterized by the long penis and vagina, the latter with a weakly marked muscular dilation. Papilla spirally plicate.

Sonorella cayetanensis, n. sp. Shell thin, light, the band pale-bordered above and below, umbilicus contained about 8 times in the diameter. Embryonic sculpture about as in *S. hinkleyi*, the later whorls polished, faintly striate. Peristome thin, little expanded. Alt. 11.7, diam. 21 mm.; $4\frac{3}{4}$ whorls. A thinner, larger, more capacious shell than *S. hinkleyi*, resembling it considerably in soft anatomy. Highest peaks of the Cayetano Mountains.

Sonorella tumacacori, n. sp. Except by its larger size, the shell is similar to *S. hinkleyi*. The genitalia differ by the larger node on the vagina, the more tapering penis-papilla and the very short penial retractor muscle. Alt. 10.4, diam. 17.8 mm.; $4\frac{1}{2}$ whorls. Stations 209, 210, in a large gulch draining the northeastern side of Tumacacori Peak.

Sonorella patagonica, n. sp. The shell is rather capacious with umbilicus about one-seventh the diameter, polished, rather solid, the band rather wide, pale-bordered on both sides, sculpture and form about as in *S. papagorum* P. & F. The vagina is swollen at base; penis-papilla large, tapering, conspicuously wrinkled transversely; flagellum distinct. Alt. 13, diam. 22 mm.; nearly 5 whorls. It is often larger. Mt. Washington, Patagonia Mts.

Bulimulus nigromontanus, n. subsp. Differs from *B. nigromontanus* by the narrower umbilicus, and is therefore temporarily separated as a subspecies. Pina Blanca in the Pajarito Mountains.

Sonorella mustang, n. sp. The shell is rather openly umbilicate, dilute cinnamon-buff with a pale-bordered dark band, glossy, nearly smooth, the embryonic shell coarsely, irregularly wrinkled with some irregular protractive threads. Last whorl descending rather deeply. Peristome expanded, the edge of parietal callus usually distinct. Alt. 15.3, diam. 26.5 mm.; 5 whorls. Mustang Range. Albinos were taken at Station 284.

Sonorella montezuma, n. sp. The shell is small, narrowly umbilicate, cinnamon, fading to nearly white on the base and on both sides of the chestnut-brown band. Embryonic whorls without protractive threads. Peristome slightly expanded. Alt. 9.4, diam. 15 mm.; $4\frac{1}{2}$ whorls. Montezuma Canyon, Huachuca Mts. It is smaller than any known Huachuca species except *S. g. parva*, which inhabits the opposite end of the range.

Sonorella elizabethae, n. sp. Shell dilute cinnamon-buff fading on the base and on both sides of the narrow chestnut-brown band. Embryonic whorl having numerous, irregular protractive threads; later whorls microscopically lineolate-granulose. Aperture small, the peristome slightly expanded. Alt. 10.7, diam. 19.2, umbilicus 3.2 mm. Canillo Hills.

Sonorella cotis, n. sp. Shell dilute cinnamon-buff fading on base and on both sides of the chestnut-brown band. Embryonic whorls with weak protractive threads. Last whorl rather deeply descending in front. Peristome somewhat expanded, edge of the parietal callus distinct. Alt. 12.3, diam. 20, um-

bilicus 3.3 mm.; $4\frac{1}{2}$ whorls. Whetstone Range. Most specimens taken this year are larger than the type lot, collected by Ferriss and Daniels in 1914.

Sonorella insignis, n. sp. The shell is much depressed, rather solid, openly umbilicate. Band is broad with pale borders. Surface roughened by low wave-like ribs in the direction of growth-lines, and microscopic incised lines. Aperture small. Peristome very little expanded, blunt. Alt. 9.8, diam. 20.5 mm.; $4\frac{1}{2}$ whorls. Whetstone Range. One of the finest *Sonorellas* collected in 1919, recalling *S. dalli* by its depressed form.

MOLLUSCA OF FORRESTER ISLAND, ALASKA.

UNIVALVES (Continued from page 69).

BY GEORGE WILLETT.

Tornatina carinata Gld. *Tornatina culcitella* Gld. *Cylichna alba* Brown. These three species were taken occasionally in the dredge, the latter being the most uncommon.

Dentalium pretiosum Nutt. Very plentiful in 10-40 fathoms.

Dentalium dalli Pils. A few young specimens secured in 50 fathoms.

Limacina pacifica Dall. Appeared swimming in the water in great numbers at times during calm weather. Extensively eaten by several species of fish.

Siphonaria thersites Cpr. Abundant in some localities, mostly in short moss growing on the rocks considerably above low tide line.

Crassispira perversa Garb. Dredged occasionally in 40-50 fathoms.

Crassispira rotula Dall. More plentiful than the last in about same depth.

Crassispira (Suavodrillia) sp.? A specimen dredged is now in National Museum. Stated by Dr. Dall to be undescribed.

Mangilia oldroydi Arnold. *Mangilia eriopis* Dall. *Mangilia crebricostata* Cpr. A very few specimens of each of these three species were taken in the dredge.

Bela tabulata Cpr. *Bela fidicula* Gld. *Bela impressa* Beck. *Bela pyramidalis* Strom. The two former fairly common, the two latter rare, all being taken in dredge.

Taranis strongi Arnold. Fairly common in 45-70 fathoms. Dr. Dall informs me that my Forrester Island specimens are the first living ones known to science, the species having been described from fossils taken in California.

Cancellaria modesta Cpr. A few dredged in 40-50 fathoms. Taken in inside channels, between Dall and Prince of Wales islands, in less than 15 fathoms.

Cancellaria couthouyi Jay. Three dead specimens dredged in about 50 fathoms.

Olivella pedroana Conr. Very abundant 15-40 fathoms. Apparently much larger than along the California coast; many specimens being well over 20 mm. in length and correspondingly broad.

Volutella pyriformis Cpr. Dredged occasionally; taken at Waterfall, Prince of Wales Island, under rocks near low tide line.

Mitromorpha gracilior Hemp. A few taken in dredge.

Alectrion mendicus Gld. Common 15-25 fathoms.

Buccinum cyaneum Brug. Common under rocks in many localities well above low tide mark. Occasional on rock walls.

Buccinum plectrum Stimp. Dead shells dredged occasionally in 40-60 fathoms. Not taken alive.

Buccinum erronis Dall. Very few dead specimens taken in 50 fathoms.

Chrysodomus phoeniceus Dall. One dead shell taken in 40 fathoms.

Chrysodomus liratus Mart. One dead young shell dredged. Rather plentiful in some localities in inside waters.

Chrysodomus rectirostris Cpr. Fairly common 40-70 fathoms.

Beringius crebricostatus undatus Dall. A dead young specimen taken in 50 fathoms. Possibly brought to the locality by currents.

Columbella tuberosa Cpr. *Columbella gouldi* Cpr. Former rather common 10-30 fathoms, and latter common in about 50 fathoms.

Columbella californiana Gask. One living specimen taken from root of kelp washed ashore in storm. Common under rocks at Waterfall.

Amphissa corrugata Rve. Common on rocks near low tide line.

Amphissa versicolor reticulata Dall. Abundant 15-20 fathoms.

Purpura foliata Mart. Rather common on rocks near low tide line. Most specimens on Forrester Island are much worn by heavy seas.

Boreotrophon stuarti Smith. *Boreotrophon tenuisculptus*. Cpr. Both of these forms dredged occasionally in various depths, the latter the most plentiful.

Boreotrophon pacificus Dall. Occasional on rocks near low tide line, much more abundant at waterfall.

Ocenebra interfossa Cpr. *Ocenebra lurida aspera* Baird. Fairly common on rocks near low tide line.

Thais emarginata projecta Dall. Locally on rocks well up toward high tide mark. Extremely variable in color, running from gray through brown, purple and green into yellow and red. Practically all seem to have drawn-out spire typical of this form.

Thais lima Mart. *Thais canaliculata* Ducl. Both these species are common on the rocks near low tide line. The former is the more gregarious and appears to favor the smoother rocks, while the latter is more scattered and is found mostly among short moss or in mussel beds. *T. lamellosa* Gmel., abundant in inside waters, apparently does not occur on Forrester Island.

Epitonium wroblemski Morch. *Epitonium pluricostatum* Dall. Both dredged at various depths, the former common, the latter rare.

Epitonium gronlandicum Perry. Only noted from fragment dredged.

Epitonium indianorum Cpr. *Epitonium columbianum* Dall. *Epitonium catalinae* Dall. The first dredged quite commonly in 25-60 fathoms. The latter two taken in about same depths but much less frequently.

Melanella micans borealis Bartsch. *Melanella macra* Bartsch. *Melanella tacomaensis* Bartsch. Four specimens of the first,

three of the second and one of the last species, represent all the *Melanellas* taken during the four seasons spent on the island. They were all dredged.

Turbonilla lordi E. A. Smith. Dredged occasionally in 25-50 fathoms.

Turbonilla canadensis Bartsch (Proc. U. S. N. M., Vol. 52, p. 640). The type and eight more specimens dredged in 25-50 fathoms.

Odostomia satura Cpr. *Odostomia cookeana* Bartsch. *Odostomia amtchitkana* Dall. *Odostomia vancouverensis* D. & B. *Odostomia stephensi* D. & B. *Odostomia columbiana* D. & B. Specimens of all of these forms were dredged, though in small numbers. *Satura* and *Amtchitkana* were seemingly the most common. At Waterfall I also secured specimens of *O. talpa* D. & B., *grippiana* Bartsch, and *willetti* Bartsch (Proc. U. S. N. M., Vol. 52, p. 666).

Priene oregonense Redf. Common from the low tide line to about 15 fathoms. Specimens in former locality are shorter and heavier than those found in deeper water.

Cerithiopsis stephensae Bartsch. A few dredged. Specimens of two other, apparently unnamed, species were also taken.

Bittium filosum Gld. *Bittium attenuatum* Cpr. Common, the former a little above low tide line and the latter in 10-20 fathoms.

Alvania dinora Bartsch (Proc. U. S. N. M., Vol. 52, p. 678). The type and four additional specimens dredged.

Alvania carpenteri Wein. Dredged occasionally.

Rissoina newcombei Dall. Dredged with last.

Trichotropis cancellata Conr. Rather common from low tide line to about 20 fathoms.

Trichotropis conica Moll. Two specimens dredged in 50 fathoms. Dr. Dall informs me that this is the first record for the Pacific coast.

Caecum crebricinctum Cpr. Dredged abundantly in 20-30 fathoms.

Veremetus squamigerus Cpr. Abundant on rocks near low tide line.

Tachyrhynchus lacteolus Cpr. Rather common 50-60 fathoms.

Littorina scutulata Gld. *Littorina stitchana* Phil. The former not very common, the latter abundant and varying greatly in color.

Lacuna divaricata Fabr. Fairly common on rocks.

Calyptraea mamillaris Brod. Common in 15-25 fathoms.

Crepidula nivea Gld. *Crepidula dorsata* Brod. Neither very common, but found occasionally from low tide line to 30 fathoms. The young of the former species is frequently found on the operculum of Priene.

Natica clausa B. & S. Rather common 15-40 fathoms.

Lunatia pallida B. & S. Not rare in 50-60 fathoms.

Velutina laevigata Linn. Fairly common in spongy growth on rocks near low tide line.

Velutina cryptospira Midd. Found common only in one locality. A short distance off shore was a large rock with a crevice ten to fifteen ft. wide worn right through the center from one side to the other. The water in this crevice was deep and the walls nearly perpendicular. On these walls at about the extreme low tide mark were great numbers of Ascidians and in these *cryptospira* was found in abundance. Though it was seldom smooth enough to allow me to enter this crevice with a boat at extreme low tide, I was able to do so on two or three occasions and obtained a fine series of living specimens. Some of these were very large, one measuring 31 by 28 millimeters. I am very much averse to referring this and the next species to the genus *Velutina*, as in life they are so entirely dissimilar to *laevigata*, the type of that genus. In *laevigata* the shell is mossy and is, so far as I have seen, entirely bare, while in these two species the shell is smooth and completely covered by the animal. On the other hand, both the animal and shell differ markedly from the genus *Lamellaria*.

Velutina rubra, new species. Description. In life similar to *V. cryptospira* but animal bright vermilion in color (this color soon disappears in alcohol). Shell smaller than that of *cryptospira*, rounder and with only a trace of spire. The type measures $13\frac{1}{2}$ mm. in length by 9 mm. in breadth. This type together with four additional specimens were taken on Forrester Island by the writer. Three of these specimens were found at

extreme low tide mark and the other two were dredged in 40 fathoms.

Lamellaria stearnsi Dall. Two living specimens taken from among *Velutina cryptospira*.

Acmaea persona Esch. *Acmaea pelta* Esch. *Acmaea patina* Esch. Abundant on rocks, the first being found in somewhat more exposed positions than the other two.

Acmaea instabilis Gld. Three living specimens were taken on stems of holdfast kelp at extreme low water line. One dead specimen also found, as well as a few fragments.

Lepeta concentrica Midd. Dredged rarely.

Molleria quadrae Dall. Two specimens dredged.

Leptothyra carpenteri Pils. Rather common on rocks.

Calliostoma costatum Mart. *Calliostoma annulatum* Mart. *Calliostoma variegatum* Cpr. The first was common on rocks near low water line, the second rather common from low water mark down to 20 fathoms, and the third was much less plentiful and taken only with the dredge in from 15-40 fathoms.

Margarites pupillus Gld. *Margarites helycinus* Fabr. *Margarites succinctus* Cpr. *Margarites laevior* Jeff. All rather common about low water mark. Over 900 of the latter species were taken from the craw of a surf duck (*Oidemia perspicillata*).

Tegula pulligo Mart. Fairly common along extreme low tide line.

Solariella peramabilis Cpr. Abundant in from 15-50 fathoms. Some specimens taken were very large, measuring over twenty millimeters in height.

Solariella cidaris A. Ad. Fairly common in from 30-50 fathoms.

Solariella obscura Couth. Seven specimens dredged in about 50 fathoms.

Halistylus pupoides Dall. Three specimens dredged.

Haliotis kamtchatkana Dall. Common at low water mark.

Puncturella multistriata Dall. *Puncturella cucullata* Gld. *Puncturella galeata* Gld. *Puncturella cooperi* Cpr. All four of these species were dredged in from 15-50 fathoms. *Cucullata* was also taken rarely at extreme low tide mark. *Multistriata* and *galeata* were rather rare.

Submarginula yatesi Dall. It was a very pleasant surprise to find this species—previously known, I believe, only from near Monterey, California—occurring at Forrester Island. It was, however, quite rare and, though particularly sought for, only nine specimens were taken. Five of these were living when found and the other four dead. One small live one was taken at extreme low water mark and all the others were dredged in from 15–30 fathoms. The largest, a dead one, measures 77 x 57 millimeters.

Fissuridea aspera Esch. Common along low water line.

Megatebennus bimaculatus Dall. Fairly common on rock walls near low water mark. Largest measuring 18x13 millimeters.

Leptochiton cancellatus Sby. Dredged in 20 fathoms.

Tonicella lineata Wood. Adults common along low tide line. Young rather common in 15–20 fathoms.

Tonicella ruber Linn. *Tonicella submarmorea* Midd. Dredged in from 15–30 fathoms; the latter the most plentiful.

Cyanoplax raymondi Pils. *Schizoplax brandti* Midd. Common locally along low tide line, generally in crevices in rocks.

Ischnochiton interstinctus Gld. *Ischnochiton mertensi* Midd. Abundant at from 10–20 fathoms.

Ischnochiton willetti Berry. (Proc. Cal. Acad. Sci., vol. 7, p. 236). *Ischnochiton trifidus* Cpr. Taken at about the same depth as the last but in much smaller numbers, *willetti* being fairly common and *trifidus* rare. *I. radians* was taken at Waterfall but not on Forrester.

Ischnochiton retiporosus Cpr. Occasional in from 15–50 fathoms, occurring in deeper water than any other chiton found in the locality.

Trachydermon flectens Cpr. A few dredged in from 15–30 fathoms.

Mopalia ciliata Gld. *Mopalia ciliata wosnessenskii* Midd. Fairly common from a little above low water line to about 15 fathoms. I find considerable difficulty in differentiating these two forms but Dr. S. S. Berry tells me that, while most of my specimens are referable to *wosnessenskii*, there are a few that are nearer true *ciliata*.

Mopalia hindsii Rve. *Mopalia lignosa* Gld. Rather rare on

rocks between tides. Seven specimens of the former and two of the latter were taken. All the former were exceptional in size, one measuring 90 x 45 millimeters.

Mopalia imporcata Cpr. *Mopalia sinuata* Cpr. Dredged in from 15-25 fathoms, the former fairly common, the latter rare.

Placiphorella velata Cpr. Only two specimens, both taken at extreme low tide line.

Placiphorella rufa Berry (Proc. Cal. Acad. Sci., vol. 7, p. 241). The type and about fifteen additional specimens of this new form were dredged in from 15-25 fathoms.

Katherina tunicata Sby. *Cryptochiton stelleri* Midd. The former abundant, the latter common between tides. The *Katherina* is eaten to a considerable extent by the natives.

LAND MOLLUSCS.

Circinaria vancouverensis Lea. Common.

Ariolimax columbianus Gld. Abundant in following colors: white, black, gray, yellow and mottled.

Polygyra columbiana Lea. Abundant.

Pupa (sp. ?). A single Pupa was seen in a dead spruce cone. It was lost before being identified.

A NEW CAMAENA FROM THE PHILIPPINE ISLANDS.

BY WM. F. CLAPP.

CAMAENA FORBESI n. sp. PLATE I.

Shell solid, globose, depressed, opaque, with numerous faint oblique growth-wrinkles throughout, faintly spirally striate only on the post-nepionic whorls; the ultimate whorl Naples yellow with a narrow russet line at the suture, a russet band between the suture and the periphery and a broader russet band just below the periphery, the bands becoming fainter on the earlier whorls; whorls five, consisting of two nepionic and three post-nepionic, slightly convex, the last slightly deflexed, suture very slightly impressed, last whorl rounded; peristome expanded, light purple drab, excepting where the light sutural zone terminates; the slightly thickened and reflexed edge walnut brown, margins connected by a very thin transparent

callus; columellar lip reflexed over one-third of the umbilicus; aperture oblique showing the bands within.

Four specimens give the following measurements:

	<i>Altitude.</i>	<i>Greater diam.</i>	<i>Lesser diam.</i>
1 type No. 35601	29.5 mm.	37.5 mm.	33. mm.
2	25.3	36.5	32.
3	24.0	35.	29.5
4	29.3	37.	31.5

Specimens of this new species were included in a large collection of Philippine shells given to the Museum of Comparative Zoology by W. Cameron Forbes, former governor of the Philippine Islands. They were collected by Mr. C. W. Weber at Bacuit, northern Palawan. I have named this shell for Governor Forbes as a slight acknowledgment of the great interest that he has taken, and the work that he has accomplished, in adding to our knowledge of the fauna of the Philippine Islands.

The specimen selected as the type, and described, is the most typical of the species. The specimen designated as number two in the table of measurements, is exactly similar to number one in color, and in the arrangements of the bands, differing only in being more depressed. Number three is very similar to number two in size and shape, but differs from numbers one and two in color, the lower band in this form having spread over the entire base, the upper band extending to the suture, leaving only at the periphery a narrow band of the typical naples yellow. Number four is similar to the type in size and form, and to number three in color. The variation is therefore expressed along two independent lines; first, a tendency for the shell to become more or less depressed; and secondly, for the bands to become broader and darker. Intermediates between all forms are in the series before me. The tendency in each individual specimen for the color to become darker as the shell increases in size, is constant in both the light and the dark forms.

The differences between this species and the description of what appears to be the most closely related species, *Camaena*

avus, as described by Pfeiffer (Proc. Zool. Soc. Lond., 1852, p. 83) are constant and may be tabulated as follows;

<i>Camaena avus</i>	<i>Camaena forbesi</i>
whorls 4	whorls 5
last whorl carinated	last whorl rounded
aperture scarcely oblique	aperture oblique as usual in Camaena
peristome thick	peristome slightly thickened
peristome white	peristome dark
margins joined by thick callus	margins joined by very thin transparent callus
altitude 18 mm.	altitude 29.5 mm.

The figures of *Camaena avus* in the Manual of Conchology (ser. 2, vol. 6, 1890, pl. 27, f. 15, 16, 17) were copied from Pfeiffer's original figures in the Conchylien Cabinet, t. 157, f. 12-14, and, besides showing a much more widely expanded and thickened peristome than occurs in *C. forbesi*, also show that *C. avus* is far more widely umbilicate.

Hidalgo (Obras Malacologicas, Estudios preliminares sobre la fauna malacologica de las Islas Filipinas, 1901, p. 196) states that the *C. avus* in the Quadras collection is similar to the *C. avus* of Mollendorff (Verz. Philipp. Landmollusk., 1898, p. 64) but differs from *C. avus* of Pfeiffer in size, in the bands, and in the umbilicus. It is possible that the *C. avus* of Quadras and Mollendorff is equal to *C. forbesi*. The figures of *C. avus* given by Hidalgo (loc. cit. pl. 133, fig. 4y5), however, do not represent *C. forbesi*.

Note.—In the figures (pl. I) reproduced from photographs by Mr. George Nelson, the reflected light on the glazed surface of the parietal wall greatly exaggerates the parietal callus, making it appear somewhat heavy and opaque, whereas in the specimen photographed it is very thin and transparent. The photographs have also failed to show sufficiently well the dark color of the lip.

NOTES.

MITRA AMANDA: A CORRECTION.¹—In my little preliminary paper "New Marine Mollusks from the Philippine Islands," Proceedings of the Biological Society of Washington, volume 31, pp. 181-188, December 30, 1918, I published *Mitra amanda* new species from the Philippines, type Cat. No. 221815, U. S. N. M., collected by the author at Dumurug Point, Cataingan Bay, Masbate.

In monographing this group I note that the same combination was used by Lowell Reeve, Proceedings of the Zoological Society London, 1842, p. 59, and Conchologica Iconica, 1845, species number 318, type "from the islands of Burias and Negros, Philippines," now known as *Turricula amanda* Reeve.

It is therefore necessary to bestow a new designation on my shell, which may now be known as *Mitra signa*.—PAUL BARTSCH.

OPEAS PUMILUM PFR. IN PHILADELPHIA.—This snail has been living in the decayed boards of fences at the rear of the houses in the 1800 blocks of North 17th and N. Willington Streets for some time. I found the first specimen in 1917 and collected eight others April 30 and May 22, 1919. It may be of interest to record this West Indian species as it is new to Philadelphia. The colony is in the built-up part of the city, at the sides of a cemented alley and not near any hothouse. The animal excretes a white froth like soapsuds when it retracts into the shell. The eyes are very small and black. The body of the living specimens is pale yellow in color, with lighter tentacles. They are quite active in daylight after a rain.—E. G. VANATTA.

DR. HERMANN VON IHERING, formerly Director of the State Museum of São Paulo, Brazil, has accepted the position of Director of the State Museum of Sta. Catharina, to be organized by him. During the last few months he has been sent by the government on a scientific expedition to Argentina and Chile, charged with the study of the fishes and fisheries of these Re-

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publics. He hopes to be back and take up his new work in May. His address is: Director do Museu do Estado, Flerianopolis (Estado de Sta. Catharina, Brazil).

NOTE ON THE NAME DUPLICARIA.—In 1908, in THE NAUTILUS, volume XXI, p. 124, I used the name *Duplicaria* for a subdivision of the old genus *Terebra*. I had omitted to notice that Rafinesque had used the same name for a species of *Chilina* in 1833, in his Atlantic Journal, p. 165. I propose, therefore, to substitute for the preoccupied name the new appellation *Diplomeriza*, with the same type, *Terebra duplicata* Lamarck.—W. H. DALL.

PUBLICATIONS RECEIVED.

TWO NEW LAND SHELLS OF THE EPIPHRAGMOPHORA TRASKII GROUP. By Paul Bartsch (Proc. U. S. Nat. Mus., vol. 54, pp. 523-524, pl. 83, 1918). The new subspecies are *E. cuyamensis lowei* and *E. traskii isidroensis*.

NEW MARINE SHELLS FROM PANAMA. By Paul Bartsch (Proc. U. S. Nat. Mus., vol. 54, pp. 571-573, pl. 88, 1918). The new species are *Cylichnella zeteki*, *Odostomia zeteki*, *Heliacus panamensis*, *Discopsis panamensis* and *D. argentea*.

NEW MARINE MOLLUSKS FROM THE PHILIPPINE ISLANDS. By Paul Bartsch (Proc. Biol. Soc. Wash., vol. 31, pp. 181-188, 1918). Eight new species and two new subspecies are described.

THREE NEW PHILIPPINE ISLAND LAND SHELLS. By Paul Bartsch (Proc. Biol. Soc. Wash., vol. 31, pp. 189-202, 1918).

A REVIEW OF THE AUSTRALIAN REPRESENTATIVES OF THE GENUS ISCHNORADSLA. MONOGRAPH ON THE GENUS STENOCHITON WITH DESCRIPTIONS OF TWO NEW SPECIES. NOTES ON SOUTH AUSTRALIAN POLYPLACOPHORA, WITH ADDITIONS TO THE FAUNA, TOGETHER WITH A LIST OF AUSTRALIAN POLYPLACOPHORA, SHOWING THEIR DISTRIBUTION IN THE AUSTRALIAN STATES. By Edwin Ashby (Trans. Royal Soc. South Australia, vol. 42, pp. 62-87, pls. 13 and 14, 1918).

THE DOLABELLINAE. By F. M. MacFarland (Mem. Museum Comp. Zool., vol. 25, pp. 301-348, pls. 1-10, 1918). The systematic characters of the Opisthobranchiata, the bibliography of the described species of *Dolabella* and description of a new species *Dolabella agassizi*, is followed by a most extensive account of its internal anatomy, beautifully and clearly illustrated.

A NEW WEST INDIAN FOSSIL LAND SHELL. By Paul Bartsch (Proc. U. S. Nat. Mus., vol. 54, pp. 605-6, pl. 93). *Pleurodonte debooyi*, from kitchen-midden deposits on Salt River, St. Croix. This is the flat-whorled form long known from St. Croix as *P. caracolla*. The same form occurs living in Vieques and some places in Porto Rico, such as Arecibo and Utuado. At Guayama and in the Sierra de Luquillo the whorls are not quite so flat, and it is rather difficult to say where the line is to be drawn between this race and typical *P. caracolla*.—H. A. P.

ON THE GENERIC POSITION OF SONORELLA WOLCOTTIANA BARTSCH. By H. A. Pilsbry (Proc. Acad. Nat. Sci, Phila., p. 139, 1918). The soft part shows that it belong to genus *Micrarionta*.—C. W. J.

THE JOURNAL OF CONCHOLOGY, SEPT., 1918, VOL. 15, No. 10.

The Pisidium Fauna of the Grand Junction Canal in Herts, and Buck. By A. W. Stelfox, pp. 298-304, pls. 7-9. One new species *P. tenuilineatum*.

Descriptions of a new Zebina and a new Liotina. By J. R. le B. Tomlin, p. 305, pl. 10. (*Z. lis* and *L. cycloma*, Japan.)

Description of three new species of Marginella from South Africa, with a note on M. sutoris Dunker. By J. R. le B. Tomlin, pp. 306, 307, pl. 10. (*M. aphanacme*, *M. ithychila*, and *M. atractus*.)

Neritina fluviatilis at Chester. By W. H. Davies, p. 307.

PROCEEDINGS OF THE MALACOLOGICAL SOCIETY OF LONDON, AUG., 1918, VOL. 13, PARTS 1 AND 2.

On the Radula of the genus Acanthina, G. Fischer. By the Rev. A. H. Cooke, pp. 6-11. A paper of special interest to the West Coast Conchologists. A new subgenus *Acanthicella* is proposed for *A. punctulata* Sowb., (= *lapilloides* Conr.); *A. unicar-*

inata Sowb. (= *engonata* Conr.) and *A. punctilirata* Stearns. The subgenus *Neorapana* is proposed for *Monoceros muricata* Brod. and *M. grandis* Sowb.

On the Taxonomic Position of Zemira H. and A. Adams. By the Rev. A. Cooke, pp. 12-14. The character of the radula would place it in the family Muricidae.

On the Occurrence in England of Hygromia odea (Locard) [Helix limbata Drap., 1804, non Da Costa, 1778]. By A. S. Kennard and B. B. Woodward, pp. 14, 15.

On Siliquaria wilmana n. sp., from South Africa. By J. R. le B. Tomlin, p. 16.

Note on a white specimen of Ena montana (Drap.) By H. Overton, p. 17.

Description of two new species of land Mollusca. By G. K. Gude, pp. 17, 18 (*Khasiella fultoni*, Assam; *Plectotropis chondroderma* var. *subinflata*) Tonkin.

On Everettia klemmantanica n. sp. from Borneo. By G. K. Gude, p. 19.

Note on the Malacophagous Propensities of Helix nemoralis Linn. By Dr. W. T. Elliott, p. 20.

On the North American genus Oreohelix. By Junius Henderson, pp. 21-24.

On the dates of issue of the parts of Forbes and Hanley's History of British Mollusca. By Alexander Reynell, pp. 25-26.

The Index Testaceologicus of W. Wood and S. P. Hanley. By A. Reynell, pp. 26-27.

Molluscan Nomenclatural Problems No. 1. By Tom Iredale, pp. 28-40. The author starts this interesting article with the following summary:

Tritonia, Cuvier discussed.

Euphurus, Rafinesque, 1815, should replace *Triopa*, Johnston, 1838.

Sphaerostoma, Macgillivray, 1843, must be used instead of *Tritonias* Cuvier, 1803, and of recent authorities not of Cuvier-Lamarck, 1798-1801.

Dotona, gen. nov. for *Melibæa fragilis* Forbes=Doto, Oken, 1815, not 1807.

Eubranchus, Forbes 1838, should be used for *Galvina* Alder and Hancock.

Laskeya, nom. nov. for *Eumeta*, Mörch, 1868, not Walker, 1855.

Collonista, gen. nov. for *Collonia picta*, Pease.

Talopena, gen. nov. for *Monilea incerta*, Iredale.

Korovina, gen. nov. for *Vanikoro wallacei*, Iredale.

Forskalena, gen. nov. for *Trochus fanulum*, Gmelin.

Enigmonia, gen. nov. for *Anomia rosea*, Gray = *Aenigma aenigmatica*, Ancti.

Amyclina, gen. nov. for *Buccinum corniculum*, Olivi.

Pyreneola, gen. nov. for *Columbella abyssicola*, Brazier.

Caporbis, Bartsch, is a Vermetid nucleus.

Propebela, gen. nov. for *Murex turricula*, Mont.

Calceolata, nom. nov. for *Calceolina* A. Adams.

Mirothyca, not *Microtheca*.

Turrid names discussed:

Colicryptus, gen. nov. for *Buccinum fusiforme*, Broderip.

Siphonorbis marshalli, nom. nov. for *Fusus attenuatus*, Jeffreys.

Cominella and *Euthria* subdivided:

Afrocominella, gen. nov. for *elongata*, Dunker.

Burnupena, gen. nov. for *porcatum* Gmel. = *cincta*, Bolten.

Evarna, H. & A. Adams, must be used for *linea*, Martyn.

Euthrena, gen. nov. for *vittata*, Quoy & Gaimard.

Japeuthria, gen. nov. for *ferrea*, Reeve.

Syntagma, nom. nov. for *Donovania*, Bucquoy, D., & Dollfuss.

Acostæa, Orbigny, will replace *Mulleria*, Ferussac, 1828.

Gistel's Molluscan Generic Names, 1848, enumerated.

Damoniella, gen. nov. for *Bulla cranchii*, Fleming.

Muricodrupa, gen. nov. for *Purpura fenestrata*, Blainville.

Teretianax, gen. nov. for *Scalenostoma suteri*, Oliver.

Presidential Address. By J. R. LeB. Tomlin. *A Systematic List of the Fossil Marginellidae*, pp. 41-56.

A SYNOPSIS OF THE CLASSIFICATION OF THE FRESH WATER MOLLUSCA OF NORTH AMERICA north of Mexico, and a CATALOGUE OF THE MORE RECENTLY DESCRIBED SPECIES, with notes. By Bryant Walker. Univ. of Michigan Mus. of Zoology, Misc. Pub. No. 6. Students of North American fresh-water mollusks of this generation have had as a basis the invaluable manuals

by W. G. Binney, Prime and Tryon, issued by the Smithsonian Institution, 1865-73, and the works of Lea on Unionidae, of about the same date. Some single groups have been elaborately treated since, the Uniones by Simpson, the Lymnaeidae by Baker; but most of the progress in the last fifty years has been recorded in a host of papers, by many authors and in many journals. To systematize this material and make it readily accessible, Dr. Walker has prepared this synopsis of the classification as understood today, giving definitions of the families, genera and minor groups, with figures of types or typical species of each, frequently also of anatomical structures important in classification.

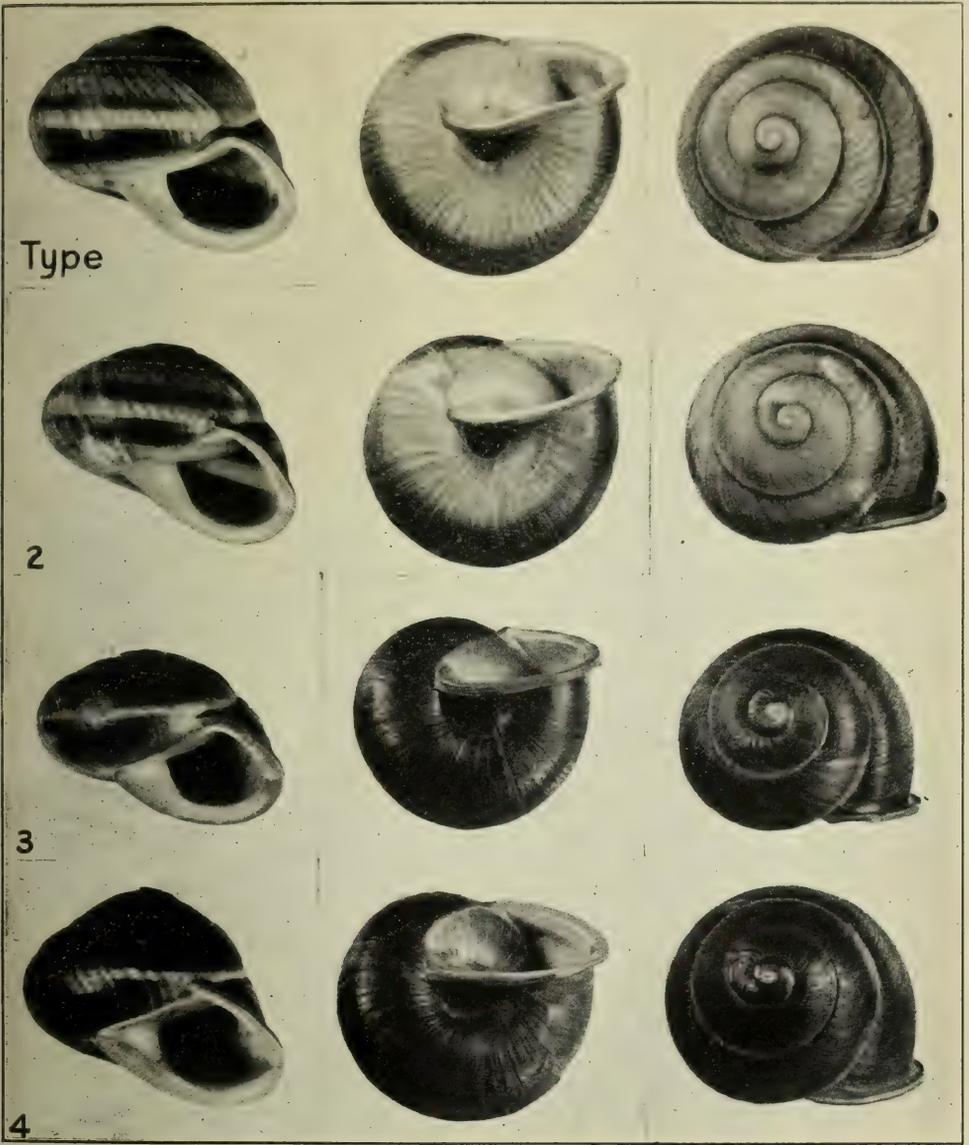
The second paper is devoted to species published since the appearance of the monographic works alluded to above, together with those omitted, formerly misunderstood, or concerning which there has been diversity of opinion. The great utility of such a catalogue will be apparent.

Together, these papers give a most interesting epitome of the progress made by the present generation in the study of our fresh-water mollusks, so far as classification and description are concerned. Dr. Walker's long familiarity with the subject enables him to present it lucidly and completely.—H. A. P.

NEW LAND SHELLS FROM THE PHILIPPINE ISLANDS. By Paul Bartsch (Proc. U. S. Nat. Mus., vol. 55, pp. 291-307, pl. 18-20, 1919). Six new species and subspecies of *Cochlostyla*, one new *Chlorea* and a new *Leptopoma* are described and figured.

DESCRIPTIONS OF NEW SPECIES OF CHITONS FROM THE PACIFIC COAST OF AMERICA. By William H. Dall (Proc. U. S. Nat. Museum, vol. 55, pp. 499-516, 1919). Five new species of the genus *Lepidopleurus*; two new *Nuttallina*, fourteen new *Ischnochiton*, one new *Chaetopleura*, seven new *Callistochiton*, four new *Mopalia*, *M. grisea* being the type of a new subgenus *Semimopalia*, one new *Acanthochiton* and two *Tonicia*. None are figured.

THE UNIONE FAUNA OF ALABAMA. By Bryant Walker (20th Rept. Mich. Acad. Sci., 1918). An interesting summary. The State has the largest Unione fauna of any area of similar size in the world. Three faunas are represented known as the Tennessee, Alabama and Atlantic faunas. Of the 533 species of Unionidae belonging to North America, more than 300 are found in Alabama.—C. W. J.



CAMAENA FORBESI W. F. CLAPP

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ALONG THE MEXICAN BORDER, 1919.

BY JAMES H. FERRISS.

New Year's day a turkey dinner in Tuscon with Frank Cole. The next day Sonorellas in the Santa Catalina foothills; but it was not until the 13th, at the Tumacácori Mission, on the Santa Cruz river that the whole party answered roll call. A. A. Hinkley, our Mexican and Central American explorer, of Du-Bois, Ill.; Robert Camp, collecting everything, alive or dead, for the American Museum, of Brownsville, Texas; Miss Elizabeth Pilsbry, of Philadelphia, daughter of our NAUTILUS Editor, and Mrs. Ferriss answered. I called the roll. Miss Rell Gelder, of Detroit, Michigan, joined the party later.

This camp was in easy walking distance of the Tumacácori and San Cayetano ranges, and in an hour by auto we attacked the slides of the foothills south of the Santa Ritas. It was a rich location, also agriculturally and historically. Here came the Spanish priests from Mexico as early as 1601. The foundation of the Mission was laid in 1700 and the building still occupied in 1911. Here too was a mining city, Tubac, in the midst of rich fields of gold and silver. The priests were also miners, and later came a company equipped at Los Angeles, Texas, that prior to the civil war took out silver by the million dollars.

In fact the Aztecs were energetic miners way back, and the ruins of a large city in the Tumacácori mountains is supposed to mark the town site of one of those seven cities of Cibola. Says J. Donald Mitchell, an Arizonian historian: "On the sides

of the mountain lie the ruins of many dwellings and on top, carved from the solid rock, is the Aztec god standing guard over the silent city. Near by on a large flat rock are the basins, or cups, carved in the rock, that held the bleeding hearts of the unfortunate victims that were sacrificed to appease the wrath of this stone god. History tells us that often the victims were pretty little girls chosen from among the thousands who visited these Aztec cities every year during the great fiesta.”

Aztec legends tell us 2050 burro loads of white silver and 905 of gold and silver were buried by those Indians a certain number of paces from a certain point, but the rare and noble *Sonorella walkeri aguacalientensis* P. & F. was again discovered by us in a small group of hills on Josephine Canyon between the Santa Ritas and the Cayetanos. Three new Sonorellas were dug up in the Tumacácoris, *S. tumacacori*, *S. hinkleyi fraterna* and *S. walkeri montana*; in the Cayetanos *S. hinkleyi* and *S. cayetanensis*. Miss Pilsbry put the Mission on canvas and sketching pad. Camp gathered many kinds of bats and lizards. Others have given a lifetime here at Tubac, digging and exploring, tormented by cat-claw, cacti and rough traveling, but have not found the Aztec gold or silver.

These many generations of miners have left but little timber on the hills. A few oaks on the mesas and peaks, and only in the heads of deep gulches is there anything like reforestation. In earlier days, with Arizona snail hunters it was at least a climb of 8,000 ft. for Sonorellas, and rock covering of three feet or no work. In the Cayetanos without regard to elevation they were found in the soil next to boulders and under spawls lying about the gravelly cliffs. Often a cliff or rock slide ten feet square would yield a cocoa-can full. Once we obtained two cans full, 452 by count, and all albinos except 24. Near the peak of the highest mountain at the southern end of the range, on the north-east side, is a gentle sloping cove of about forty acres of Sonorella rocks. But the sun was just going down as it was discovered and only a few Sonorellas were gathered.

The Pajarita Range is a wide expanse of rolling hills, a continuation of the Tumacácori, on both sides of the international line, timbered, well watered and sodded. The Governor

of the state of Sonora has built a barbed-wire fence along the line to keep the cattle thieves on their own side. Although not in the cattle business we did not cross over. It was a different country in character from anything seen in Arizona, and so pleasing we camped in these hills for three weeks.

We spread our blankets under the wide branches of the live oaks and visited the Phil Clark ranch. A couple of caged eagles were at the door and young Clark was found reading by lamp light with a fool quail perched on his shoulder. This is one of the rarest of the quail family, a good introduction. We talked birds and things till a late hour. Clark junior led us to the snail slides and the bat caves the following day, and ever after was a very helpful companion in our excursions. The first day out he heard something in an old mining tunnel he was exploring for bats, and a shot in the dark brought a wild pig. We ate about all but its head and feet. We camped again in Pina Blanca Canyon at the Moon U. S. Forest Station, and I went with Clark to the Bear Canyon, a scenic picnic resort, and found *Asplenium firmum*, a fern rare even in Florida, and again rediscovered *Agave parvifolia*, the smallest of the century plants. We picked up a new pin-cushion cactus large as a table bowl. Also a pair of whip snakes for Camp. We found *Sonorella walkeri montana* here and at the Tumacácori pass and it was also found by Hinkley at the Montana Mine, near Oro Blanco.

Among the smaller Sonorellas in the Pina Blanca Canyon and again across the mesa in the Tumacácori, the first *Bulimulus* for Arizona was noted living in a strange situation, for it is a snail of the grass and brush.

At old Calabasas at the mouth of Sanoita creek, emptying into the Santa Cruz, junction also of the two branches of the Southern Pacific Railway entering Mexico, we camped a few days to work that end and the best of the Cayetanos. Again we were in claw and thorn desert surroundings. At the Mission robins by the thousand, bluebirds, thrashers, cardinals and jays and Gamble's quail came after the hackberries, but the Calabasas camp was a little tame. However Camp secured rats, mice and gophers on the kangaroo plan, and our luck in snails was pleasing.

In the Eighties Calabasas was one of the wonders of that decade, according to the promoters' literature in New York. The Metropolis of the Far West was its name. Side-wheel steamers plied the Santa Cruz, whereas we had a hard time crossing that stream in the dry sand. The docks were piled high with cotton and tobacco bales in the pictures, hogsheads of sugar and pigs of metal. Picturesque Mexicans hustled cattle into the stock yards. The Indians just across the river were chasing buffalo, deer and elk. Lithographs also revealed hotels, boards of trade and banks, their corridors filled with excited investors in silk hats and sombreros. The hotel and another large building remain, but the land for miles around after being in the courts for many years is now in the possession of the heirs of a Spanish grant—the Bacca Float.

On the west side of Mount Washington, of the Patagonia range, *Sonorella patagonica* can be found in the boulder dikes and islands of the canyons and the dead were plentiful in the foot hills west of the Nogales-Duquesne highway. A hard half-day in the brush and briars of the Red Mountain, property of the Red Mountain Mining Co., north side, netted two Sonorellas.

Mt. Washington seemed to be above 8,000 feet high, and our camps about 5,000. There was much snow on both sides, east and west, and the pass was long and steep. Army-truck drivers camped with us for the night as the pass was too difficult for anything except the best of daylight. It took three trips to get our party over and then Hinkley with the empty auto and empty trailer on the fourth trip was hung up on the brow of the mountain in a snow storm all night. Merely for company I was in the party. With a good fire we were fairly warm and dry, and slept some.

At Duquesne *Sonorella parietalis* was found in the same colony with *patagonica*, sixty of them alive. A large collection of Pupae and other small ones were gathered and Mr. Hinkley is now sorting them out of the dirt. He also has the fresh-water collection. This mining property owned by the George Westinghouse heirs was the liveliest camp in our journey. Copper was being rolled out at war-time speed and the ore shipped to El Paso via a Mexican R. R. station, at the foot of the San

Jose peak, where *Sonorella mearnsi* dwelt at the time of the Boundary Survey.

Bound for the Huachucas to pick up better sets of former collections, we dropped down the Patagonia mesa through a thick grove of young oaks with cultivated ranches in the canyons. Then out upon a Kansas prairie landscape where the highway crosses the head of the Santa Cruz running south and the Barbacomari running north. Here are a number of prairies, without brush or thorns as beautiful to the eye as any state can produce. The Canillo Hills for thirty miles or more are covered with a thick growth of oak and juniper. At the high peak east of our road we found *Sonorella elizabethae* in abundance, and in the limestone hills west were small colonies of *Holospira* for three miles under spawls close to the stratified terraces, but a foot or so in height. Also in the rocky hillsides.

Across another beautiful prairie we were again in the Huachucas at the Manilla mine, at the northwestern end. Here we were comfortably housed at the property owned by some of my Joliet friends, and at the home of the typical *Holospira ferrissi* Pils. It seemed convenient to have lamps and a cook stove. Again we camped in Carr Canyon, near the home of our friend Biederman the entomologist and father of walnut grafting. Side trips were made to Garden, Brown, Miller and Ash Canyons.

Around the southeast point of the range we went into new territory, Montezuma and Copper Canyons, and again gathered *Ashmunella heterodonta* at Ida Canyon. These are rich canyons and so extensive they have not been thoroughly explored. One of the smallest of Sonorellas turned up in Montezuma Canyon, *Sonorella montezuma*. It was found abundant in lime, granite and porphyry. Again we had splendid quarters, a stove and lamp, on the State of Texas mining property. These mountain ridges run into Mexico, and ranchmen obtain permits from the Mexicans, when they desire to journey into Tombstone, Naco and Douglas with a vehicle.

From the Huachuca camps several raids were made on the Mustang and Whetstone ranges about twenty miles away. The first range, about 6,000 feet, has shells in every stone-pile, and the climbing is easy and clean. It is a model for collectors to

follow. In one colony of large *Sonorellas* about one in ten was an albino, beautifully modeled and with yellow lips. We worked here into a bank of clay and broken stone until we had a face to our mine high as our heads. The *Sonorellas* dwelt in the spaces between the clay and stone and at twenty feet in live *Sonorellas* were found. It was then dark and I had undermined a large *Ocotillo* that rolled me over and left a bump on my head for this summer. Again we had trouble in finding *Sonorella dalli* Bartsch, at Garden Canyon (Tanner's) in the Huachucas. Here we followed a wide crevice in the limestone filled with soil. At a depth of about two feet we followed crevices a couple of times and found over seventy alive. The sixty *Sonorellas* at Duquesne and as many red *Sonorellas* in Miller Canyon were found in like manner. In Brown Canyon at the foot of a high cliff of limestone dead shells were abundant. Accidentally a scale of the cliff was torn off, and here was the live *Sonorella granulatissima latior*, we were looking for, with *Oreohelix* and *Ashmunellas*.

About this time we admired our skill. After these many years, one of us said, we have become 100 per cent. shell collectors. On my first journey to Arizona I had raked over the leaves and turned logs and stones lying on the soil. I walked through the grand Tanner Canyon disdainfully past these rich *Sonorella* mines.

But to follow this mutual admiration convention, we did not find live *Oreohelix* in the Mustangs though dead shells covered the ground and crowded the rock slides. Here however the limestone cliffs did not scale. They were cracked apparently from one side to the middle, or the other side.

We made two trips to the Whetstones before finding a shell of any kind. We thought we knew whether a mountain had shells or not by merely looking at it. On the third trip a long slide facing east was discovered. This had a great abundance of the most delicate and artistically constructed *Sonorella* so far identified. All were dead except a few less than half grown. The colony had been destroyed by some insect that had evidently dissolved the lime with some of its juices, making a hole in the shell large enough to crawl in and eat 'em up. The

opening was usually oblong and about one or two millimeters long. Here the trail was so thorny and the gulches so deep we could walk only about a mile per hour in the mountain. Two days were given to the slide.

We had good success in the Tumacácori, Cayetano, Patagonia and other mountains on *all* sides of the peaks and had forgotten that in some ranges shells lived only on the north side. On the fourth trip to the Whetstone, while passing the north side of a small peak to get to the largest in the range, another *Sonorella* was found alive and plentiful. Also *Oreohelix huachucana* and a *Holospira*.

We feel certain there are a considerable number of undiscovered snails in the limestone, well watered and timbered (8,000 feet) peaks of the Whetstones, on the north side. Some of these we examined, on the south side.

The rains arrive in Arizona in July, which is the best growing month; but this year in the first week of May the Mariposa group of lilies covered the slopes. The west mesa of the Santa Ritas was a golden yellow, for the poppies were in bloom. Also the large white thistle poppy. The Ocotillo (Crown of Thorns) with a deep crimson spike, and cactus bloom, white, crimson and orange, warmed up the desert hills. The last night out blankets were spread in the dry bed of a stream in a pass of the Mustangs. It was really a beautiful place. Gravel makes a good bed, as desert beds run, and the banks were decorated with spreading walnuts and oaks. The junipers and cottonwoods were artistically rounded and all in full leafage. Three kinds of doves were talking, a cardinal, a thrasher and the vermilion fly-catcher were singing just at sundown, and the black and white scolding hummingbird in our tree, nervous in the face of distinguished company, had settled down in his thimble nest for the night.

The Mustangs are not large mountain, but they have pleasing profiles, domes and table tops, for background purposes, when the moon is up a little way and the evening star is in close conjunction. Arizona nights are a cut-glass, crystal affair. Not smoky and beclouded.

When the after-glow was just about right I led the partner

who has made life so pleasant these many years in housekeeping and business, over the shallow bank where only a few nicely terraced oaks were to be seen, and striking an attitude, front of stage, exclaimed "Look at that. That is perhaps the one best view, celestial, we will ever get."

In the morning Henry was halted at the windmill to be filled up. The owner of the pasture, we had learned to like; "he is white" we said, with his helper was doing his chores. He carried a double row of cartridges in his belt; a forty-five and a telescope lay upon a barrel-head, and a rifle rested against the derrick. The equipment was the best.

"Going a hunting?" I asked, innocent-like.

"Not this morning," he answered. "The fact is," he added, "it takes two of us to watch that fellow over in the other house. We have been shot at in this corral several times. Our fences have been cut and three horses and a cow shot this week. He wants me to buy him out and I don't want his ranch at the price he asks."

It is but a short distance from one thing to another all round the world. On the fifth of May we were again in Tuscon having collected at 134 stations.

NOTES ON THE SPECIES OF FASCIOLARIA OF THE SOUTHEASTERN UNITED STATES.

BY CHARLES W. JOHNSON.

The following notes of long standing are brought together for the purpose of pointing out some discrepancies that seem to have passed unnoticed. Another object is to supply a demand from some of our readers for something more pertaining to the marine mollusks.

Fasciolaria gigantea Kiener.

F. papillosa Sowerby, Tankerville Cat. App. p. 16, 1825; Reeve, Conch. Icon., (*Fasciolaria*) vol. 4, pl. 1, f. 1a, 1b, pl. 7, f. 1c, 1d, 1847.

F. gigantea Kiener Icon. Coq. Viv., (*Fasciolaria*) p. 5, pl. 10 and 11.

Tryon's Manual Conch., vol. III, p. 75, fig. 14-16, 1881.

F. crocata Philippi, Zeitschr. f. Malak. p. 25, 1848: Abbild. Besch. Conch. III, (Fasciolaria) Tab. I, f. 3, 1849.

F. reevei Jonas, in Philippi, Abbild. Besch. Conch. III, (Fasciolaria) Tab. III, f. 2, 1850.

Even this large shell is not free from a nomenclatorial tangle. *F. papillosa* Sowb., as pointed out by Tryon, seems to be the oldest name. I have not access to the Tankerville Catalogue, but if the young specimen as figured by Reeve (fig. 1a, b) and copied by Tryon (fig. 15) is the type, then this name seems somewhat doubtful. The spire and canal are both too long for a specimen of that size, in fact I cannot see any difference in figs. 1a and 1b, and the figure of *F. coronata* Lam. as figured by Reeve (pl. VI, f. 14 a, b.) Figure 1c and d of Reeve and copied by Tryon (fig. 16) is *F. gigantea*. The *F. crocata* Phil. from Yucatan is undoubtedly the young of this species and not related to *F. filamentosa* as suggested by Tryon.

In regard to its size, Tryon says: "Length 1 to 2 feet. This is the largest known species of univalve shell." Charles T. Simpson (Davenport Acad. Nat. Sci., v, 51, 1886), says: "On the Keys I have seen dead shells two feet in length, the largest Gastropod in the world." In THE NAUTILUS, XIX, 108, I had occasion to review Mr. Charles Hedley's paper, "On a large example of *Megalatractus aruanus* (L.), and incidentally mentioned that this Australian giant had a rival on our Florida coast, *F. gigantea*, quoting one of the above references. Mr. Hedley replied in a letter saying: "Give it in inches, I do not like the sound of the word feet." I remember a specimen 23 inches (about 575 mm.) in length, and there was a very large specimen in the collection of the late Joseph Wilcox which I cannot now locate. In writing to Dr. Dall, he says: "The largest specimen we have of *F. gigantea* measures 20 inches in length, with probably half an inch lost from the tip of the spire and as much more from the end of the canal; I have seen a bigger one but I do not remember the exact length of it. Call ours 530 mm. and it would, I think, be fair." The largest in the American Museum of Natural History is 20.25 inches and that in the Academy of Natural Sciences about the same.

Var. *reevei* Jonas.

This is not a form of *F. princeps* as suggested by Tryon. Although the type is comparatively small (135 mm. in length) the form is easily recognized and not uncommon on the Gulf coast of Florida. It was found by the writer at Marco. The prominent nodes become obsolete or wanting, especially on the body whorl; the shell is also thinner and does not reach the size of the typical form. While *F. gigantea* and *F. princeps* (from the west coast of Central America resemble each other superficially, there is a most remarkable difference in their opercula. The former has only the prominent concentric lines of growth on the exterior, while the latter has five deep longitudinal furrows on the middle and inner edge and irregular diagonal ribs on the outer edge.

The large bunches of egg-capsules of *F. gigantea* are conspicuous objects on the Florida beaches. These are poorly figured by Tryon (Manual, Vol. 2, pl. 7, figs. 78 and 79) as "Capsules of an unknown Muricoid mollusk." A bunch of capsules from Key West, Fla., nine inches in length and containing approximately 400 capsules was attached to a broad band which has no doubt contracted considerably in drying. Three of the capsules contained respectively 66, 70 and 76 embryonic shells. If these should average 70 per capsule, the entire bunch would produce upwards of 30,000 shells, but the death rate is enormous and very few ever reach maturity. Each capsule is wedge-shaped, the angles slightly winged and the sides with five or six irregular ridges. It is about 40 mm. in length, attached to the band by a pedicel about 12 mm. long.

The capsules of *F. tulipa* are in small clusters attached to shells and stones. It is also wedge-shaped and pedunculate, the sides are smooth, but the upper edge is ornamented by numerous undulations around its entire margin. In *F. distans* there is only a single indentation on the upper edge, forming a lobe that extends over the opening through which the young shells escape. The latter is figured by Tryon (Manual II, pl. 7, fig. 77) as *F. tulipa*?

Fasciolaria tulipa (Linné).

Colus achatinus Bolten, Mus. Bolt., 117, 1798. A variable

shell both in sculpture and color. A perfect shell of the smooth or more typical form shows interesting phases in sculpture in the early growth of the shell, the protoconch and about half a whorl of the young shell being smooth, followed by about half a whorl with only longitudinal ridges; this is followed by two whorls with prominent spiral ridges which gradually become obsolete or wanting except near the suture, these subsutural ridges increasing in prominence and often becoming crenulated or beaded on the last two whorls. On the anterior portion of the shell are also prominent spiral ridges. Some of the specimens from the Bahamas have a decided shoulder on the body whorl. Color whitish, mottled with brown or reddish blotches and with from 26-33 dark-brown spiral lines on the body whorl. Two specimens from the West Indies are uniformly light brown with the usual dark-brown spiral lines. Simpson says: "A mahogany-colored form is occasionally found on the Keys." It varies in length from 5 to 8 inches (125 to 200 mm.) and is found from North Carolina to the West Indies and Venezuela.

The varietal name of *obsoleta* was applied to a smooth form from St. Thomas, but this cannot really be separated. There is, however, a form in which the spiral grooves and ridges cover the entire shell. Tryon (Manual III, 74) says: "I figure a rugose form which Dunker intended at one time to describe as *F. scheepmakeri* but finally illustrated in his 'Novitates' as a variety of *F. tulipa*." This name might therefore be used in a varietal sense for this form which is quite common on the Gulf coast of Florida.

Fasciolaria distans Lamarck.

As pointed out by Dr. Dall and others, this is a good species and not a variety of *F. tulipa* Linn., as stated by Tryon and later by Miss Rogers in the "Shell Book." It is smaller and smoother, having only faint spiral sulcations on two of the early whorls near the nucleus, and spiral ridges on the narrow anterior portion. There is also present an internal ridge on the body whorl in front of the suture. Color whitish, with bluish-gray or brown blotches and usually with five or six equidistant,

revolving, dark-brown lines. One specimen shows ten, but five of these are somewhat obsolete and close together near the narrow anterior portion of the shell. I have found living specimens at St. Augustine, Fla., in which the blotches were a light rose-pink, with the six revolving lines of a similar color. Dr. Dall records, from Belize, a pale salmon-colored specimen with the lines obsolete. The species varies in length from 65–85 mm. It ranges from North Carolina to Florida and westward to Mexico.

THREE NEW ALPINE VERTIGOS FROM CALIFORNIA.

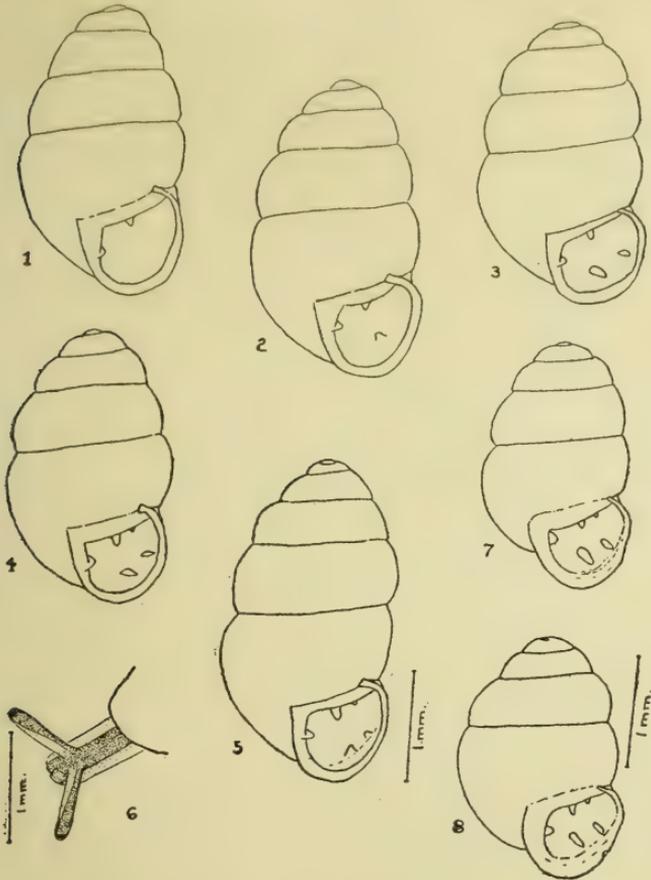
BY S. STILLMAN BERRY.

Among numerous *Pupillidae* collected from the higher mountain regions of California during the past few years appear several apparently undescribed forms, diagnoses of three of which are given below.

VERTIGO MODESTA MICROPHASMA, new subspecies. Figs. 1–6.

The shell is cylindro-conic, rimate-umbilicate, thin, very pale horn color, by transmitted light transparent and colorless. The surface is glossy and distinctly irregularly, obliquely striate, especially on the upper whorls. The spire tapers from the last whorl, at first gradually, then more rapidly, to the obtuse apex. The whorls are strongly convex, the last with an indentation just back of the aperture over the lower palatal tooth, subsequently with a narrow, abrupt, axial constriction, then swollen to form a low, wave-like crest just back of and parallel to the lip. The aperture is rounded triangular, scarcely constricted on the outer margin, the peristome thickened and porcelain white in color, showing through the back of the shell as a white line, but the sharp lip scarcely reflected except over the columella. The posterior angle of the outer lip curves in rather sharply to the body whorl. The number of teeth varies from 2 to 5. The palatal and columellar lamellae are always well developed. In addition there is almost always a well developed lower palatal. A smaller, but variable upper palatal

is frequently present, as also a minute angular lamella. All the teeth are porcelain-white in color.



1-6, *VERTIGO MODESTA MICROPHASMA*. 7, *VERTIGO ALLYNIANA*.
8, *V. A. XENOS*.

Length of type 2.6; diameter to lip edge 1.5; length of aperture 0.9 mm.; whorls 5.

Type: Cat. No. 2740 of the writer's collection. Paratypes in the Academy of Natural Sciences of Philadelphia, California Academy of Sciences, Southwest Museum, United States National Museum, and the private collections of Mr. George H. Clapp and others.

Type Locality: 7,550 feet altitude, cienaga near Bluff Lake, San Bernardino Mountains, California; under sticks and logs at edge of forest; Nina G. Spaulding, G. E. Dole and S. S. Berry, August, 1910; 59 specimens in this and neighboring cienagas.

Also taken at 7,200 feet altitude, west slope of Falls Creek Canyon, near the narrows about one mile above Dobbs Cabin, Dollar Pass Trail, San Bernardino Mountains, California; under small sticks and pine cones on springy slope; G. E. Dole and S. S. Berry, Sept. 29, 1918; 32 specimens.

Remarks: This very puzzling little mollusk is one of the most beautiful of American Vertigos. It is very close to *V. modesta parietalis* and may also be described as an albinistic race of that subspecies, but it is a protean form and some shells are equally close to *V. modesta modesta* or even to *V. m. castanea*. That it is more than a mere "albino" of the recognized type is strongly evidenced by its occurrence in such abundance and at scattered localities, as also by the fact that its distribution is by no means coincident with that of any of the other forms mentioned. Nor, although usually associated, do the white or brown shells occur in any apparent regular ratio. At the second locality above cited diligent outlook yielded but three specimens of the brown *parietalis*. It is evidently a comparatively recent offshoot from the parent stock, but the field evidence is that it already is a race with its peculiar characters heritable to a marked degree.

It seems rather remarkable that such features as the color, shell texture, and similar characters in this form should exhibit such constancy as compared with the variability shown in the development of the lamellae. In 39 specimens of the type lot now before me, 1 has only 2 teeth (columellar and parietal), 15 have 3 teeth (columellar, parietal, and lower palatal), 9 have 4 teeth (an upper palatal usually the one added), and 14 have a full set of 5 teeth. No mature specimens with fewer than 2 nor more than 5 teeth have been noted. This variation in a single well-defined colony (its members having, as shown by the other characters noted, an undoubtedly close phylogenetic relationship with one another) throws a valuable bit of light on the difficulty of attempting the separation of the var-

ious races of the *modesta*-series by means of variations in the number of teeth alone. It chanced that the specimen chosen as type is one of the 3-toothed forms.

The animal is bluish-gray or slate in color, the body quite dark, the foot and peripheral portions much lighter and semi-transparent. A rough sketch of the cephalic region of one of the Falls Creek specimens is offered in fig. 6.

Whether the hereditary value of this race is that of a "form" or a subspecies can only be shown by the more detailed study which must be left for the future. Until then the personal equation must necessarily largely govern. In any case it will prove useful to have a name for it.

VERTIGO ALLYNIANA new species. Fig. 7.

The shell is minute, short, robust, ovate-conic in outline, thin, dark reddish-brown in color, with only a dull gloss; weakly, irregularly striate. The spire tapers with increasing rapidity from the last whorl to the obtuse apex. The whorls are convex, the last having a shallow but distinct excavation in the palatal region and a weaker one over the upper palatal tooth, the latter extending to the lip, which thus becomes flattened or very slightly indented on its outer segment. The aperture is pyriform in outline, and would be rather small except for the quite flaring lip, which is little thickened and very fragile at the edge. There are 5 teeth constantly developed in all the material examined. The parietal, columellar, and upper and lower palatal lamellae are well developed, and there is a distinct, though small angular lamella. The columellar is situated well back in the aperture and quite high up on the pillar. The lower palatal is also rather deeply immersed.

Length of type 2.1; diameter to lip edge 1.3; length of aperture 0.81 mm.; whorls $4\frac{3}{4}$.

Type: Cat. No. 3764 of the writer's collection. Paratypes in the Academy of Natural Sciences of Philadelphia, and the private collection of Allyn G. Smith.

Type Locality: Donner Lake, California; A. G. Smith, May 30, 1916; 22 specimens.

Remarks: I am not quite certain of the relationships of this

small *Vertigo*. The texture of the shell, as well as the shape, are strongly reminiscent of *V. occidentalis* Sterki, a more weakly toothed species from the San Bernardino Mountains. None of the other species with which I am familiar require any special comparison. *V. corpulenta* (Morse) has a somewhat similar outline, but otherwise does not seem especially close.

VERTIGO ALLYNIANA XENOS, new subspecies. Fig. 8.

With the preceding occurred a single specimen of a very similar form having the same number of teeth, but differing abruptly in its shorter, much more robust and swollen outline, its more transparent, glossier texture, and lighter brown color. The columellar tooth is placed distinctly further down on the pillar, and the remaining lamellae differ slightly from those of the shells described above both in size and position.

Length of type 2.0; diameter to lip edge 1.5; length of aperture 0.85 mm.; whorls $4\frac{1}{2}$.

Type: Cat. No. 4128 of the writer's collection.

Type Locality: Donner Lake, California; A. G. Smith, May 30, 1916; 1 specimen.

EXPLANATION OF FIGURES.

Figs. 1-5. *Vertigo modesta microphasma* Berry. Camera drawings of type (Fig. 2) and four other specimens of the original lot, showing variation in number of lamellae and shape of shell.

Fig. 6. *Vertigo modesta microphasma* Berry. Camera drawing of cephalic region of living animal as extended in crawling.

Fig. 7. *Vertigo allyniana* Berry. Camera drawing of type.

Fig. 8. *Vertigo* (*allyniana* var?) *xenos* Berry. Camera drawing of type.

All figures drawn to same scale.

Redlands, California.

A NEW CALIFORNIAN MICRARIONTA.

BY HENRY A. PILSBRY.

MICRARIONTA RIXFORDI n. sp.

The shell is strongly depressed, umbilicate, the diameter of umbilicus contained about 5 times in that of the shell. Embryonic shell of $1\frac{1}{2}$ whorls at first densely pitted, the pitting rather irregular, passing into granulation, and on the last half whorl transformed into short strong wrinkles, roughly parallel to the suture and often anastomosing. Subsequent whorls are delicately marked with growth lines only, moderately convex, the last slowly and rather deeply descending to the aperture, rounded peripherally, and encircled with a brown band above the periphery. The aperture is strongly oblique, irregularly oval. The peristome is thin, basal margin narrowly expanded, columellar margin somewhat dilated, but covering only a very small part of the umbilicus. The parietal callus is very thin.

Alt. 9.5; diam. 16.6 mm.; umbilicus 3.1 mm.; $4\frac{2}{3}$ whorls.

This snail was received too late for illustration in the present number. It was collected by Dr. Emmet Rixford among rocks at the foot of the mountains on the southern edge of the Mojave Desert about 10 miles west of Twentynine Palms, Riverside Co., California. Type and two other specimens, No. 129781 A. N. S. P.

Compared with *M. indioensis* (Yates), which is its nearest neighbor, this species is far more depressed and more openly umbilicate. *M. desertorum* Pils. & Ferr. and *M. hutsoni* Clapp are much smaller related forms from Arizona.

The specimens were picked up dead and except for the shoulder band, show no color.

A NEW CHINESE CLAUSILIA.

BY H. A. PILSBRY.

CLAUSILIA (EUPHAEDUSA) STEETZNERI n. s.

The shell is very slender, slowly tapering, the outlines of the spire straight, very slightly concave near the summit; opaque,

not glossy, vinaceous-russet fading to cinnamon-brown at the early whorls. First 3 whorls nearly smooth, the rest ribbed, the ribs straight, narrower than the slightly striate intervals, about 25 on the last whorl. The upper whorls are rather convex, the penult somewhat and the last strongly compressed laterally. The aperture is small, about one-sixth as long as the shell, piriform, the light brown peristome expanded and slightly reflected. Superior lamella rather small, marginal, oblique, not continuous with the spiral lamella, which is about a half-whorl long. The inferior lamella is situate high, converging to the superior; it ascends in a broad spiral a little past the dorsal line. The subcolumellar lamella is very deeply immersed, not visible in the mouth, but rather strong within the back. The principal plica is rather short, dorso-lateral, its lower end visible with difficulty in an oblique view in the mouth. There are quite short, subparallel upper and lower palatal plicae.

The clausilium is quite broad, curved almost in a semicircle, passing without notch or excision into the filament.

Length 13.6; diam. above aperture 2.4 mm.; length of aperture with peristome 2.3 mm.; 13 whorls.

Wenchuan (Wentschuan), Szechuan, China. Type 44660 A. N. S. P., coll. by Mr. Steetzner, received through Dr. Bryant Walker.

The dull, strongly sculptured surface, small aperture and large number of whorls are the more salient external features of the species, and distinguish it from other Euphaedusae having similar palatal structure, such as *C. planostriata* Hde. It is named for the collector.

**A COLLECTING TRIP ON THE ISLAND OF OAHU, HAWAIIAN ISLANDS,
BY THE GULICK NATURAL HISTORY CLUB.**

BY JOSEPH J. GOUVEIA.

Early Sunday morning on May the 25th, 1919, we started on the first trip planned by the *Gulick Natural History Club*. The purpose of this trip was to give the members of the club an opportunity to work on different lines.

Mr. F. Grinnell, with his necessary paraphernalia, started out prepared to collect plants and insects, while Messrs. Bryan, Emerson, Antone Gouveia and the writer for goats and shells.

The writer and Antone Gouveia took the first car towards Waialae, which leaves Kalihi Street at 5:45 a. m., and, after riding fifty minutes, we joined the rest of the members at the end of the car line.

At 6:45 we started out for Keawaawa. We had about eight miles to go before we could reach the foot of the valley and about three miles to go before we reached our hunting grounds.

The day was clear, and while on our way up the valley the talk was upon different subjects pertaining to the Hawaiian Islands and their history, among them the decrease of the Hawaiian population. When the white people first came to these islands they found them thickly populated with pure Hawaiians. To-day, about two-thirds of the Hawaiian population are half-breeds. Discussing the cause of their disappearance, we agreed that it was due to the following: wars, human sacrifice, pestilence, oppression by kings, chiefs and priests, liquor, wearing of clothing, and amalgamation with white people.

After an eight-mile walk along a hard coral road we reached Keawaawa at 8 o'clock. We were now ready to face a trail well overgrown on both sides with the Glue Bush and Lantana. It is not very pleasant to hike through these on account of their thorns. After about an hour's walk we arrived at the forest, our shelling grounds. On our way up we followed cattle trails which led along the bottom of the valley, and up near the drops we followed a zig-zag trail which wound to the top of the west Keawaawa ridge.

When we reached the outskirts of the forest, Grinnell and Gouveia followed a ravine on the right-hand side going up. This is where our day's collecting began. The following shells were collected in the above ravine:

Philonesia baldwini var. 6 specimens.

Lyropupa magdalenæ 6 spec.

Lyropupa microthauma var. 4 spec.

Lyropupa microthauma var. 6 spec.

- Nesopupa plicifera* 3 spec.
Nesopupa wesleyana var. *tryphera* 1 spec.
Tornatellides procerulus var. *acicula* 2 spec.
Tornatellides macromphala var. 63 spec.
Tornatellaria newcombi 6 spec.
Leptachatina gummea 23 spec.
Leptachatina fusca 3 spec.
Amastra tristis 2 spec.

Edwin Bryan, Oliver Emerson and the writer followed the ridge trail. We collected shells on our way up to the backbone. Shelling is not what it used to be, for shells are very scarce in this section of the Koolau Range. We managed to get seven specimens of *Achatinella viridans*: we considered this a lucky find. While on our way to the backbone, we heard some goats in the valley west of Keawaawa (Kuliouou Ike valley). Mr. Emerson carried a 45-70 caliber rifle, an efficient weapon for reducing the mountain pest.

Mr. F. Grinnell and Antone Gouveia joined the other members at the backbone. After a few minutes the party separated again, and this time we all started off in earnest for our different aims. Emerson and Bryan started across the backbone towards Kuliouou over a narrow goat trail about a foot wide in places; barely enough for one to crawl over, while Grinnell, Antone Gouveia and the writer started east looking for insects and shells. We were not able to find any *Achatinella*. We traveled a little further on until we came to a grove of banana and here we found the following shells:

- Nesopupa plicifera* 6 spec.
Tornatellides sp.? 4 spec.
Tornatellides macromphala var. 9 spec.
Tornatellaria newcombi 3 spec.
Helicina rotelloidea 18 spec.
Leptachatina gummea 7 spec.
Amastra tristis 1 spec.
Succinea rotundata 1 spec.

We spent about forty minutes collecting and then returned to the main ridge. On our way back we stopped about three hundred feet east of the Kuliouou-Keawaawa ridge and hunted

on bunch grass about 18 inches high. Here we collected the following:

- Nesopupa boettgeri* 5 spec.
- Pronesopupa acanthinula* 5 spec.
- Tornatellides leptospira* 16 spec.
- Tornatellides brunneus* 9 spec.
- Tornatellides brunneus* var. 3 spec.
- Philonesia baldvini* var. 6 spec.
- Auriculella diaphana* 20 spec.
- Leptachatina gummea* 2 spec.

At 11:30 we ate lunch and after half an hour's rest we started out again; this time we worked down the first ravine east of the main West Keawaawa ridge. While on the backbone ridge we noticed some kukui trees (*Aleurites moluccana*) which looked very promising. On our way down the valley to these kukui trees we collected the following shells:

- Nesopupa plicifera* 2 spec.
- Tornatellaria macromphala* 3 spec.
- Tornatellaria newcombi* 2 spec.
- Helicina rotelloidea* 1 spec.
- Amastra eos* 48 spec.
- Amastra tristis* 31 spec.
- Leptachatina gummea* 27 spec.
- Leptachatina fusca* 12 spec.

After spending about an hour collecting these we headed for the kukui trees. We found a few dead specimens of *Achatinella phæozona* under these trees, and, after a careful search we found twelve live specimens. Two were found on Lantana and the rest were found near the tops of the kukui trees. It was a surprise to us, for we were told that these shells were extinct in Keawaawa. On Lantana and oee weed we found thirty-two specimens of *Achatinella viridans*. Some of them were dark-brown in color and many of them had broad white and light-brown bands around the last whorl.

This was a good find. The forest is dying away fast and in the course of time these shells will be extinct. About three years ago the writer and Antone Gouveia collected a few dead

specimens of *Achatinella viridans* in the valley east of Keawaawa. These shells once thrived there, but the trees that they lived on have died away and consequently the shells have died off with them.

We all met at the foot of one of the small ridges at about 4 o'clock, ready for our homeward journey. Messrs. Emerson and Bryan had returned from their hunting trip. They were successful in wounding a goat and collecting a few specimens of *Achatinella viridans* on the windward side of the backbone ridge. Mr. Grinnell collected some interesting insects and native plants. After two long hours' walking at a good gait, we reached the car line, and about 6 p. m. we boarded the car for home.

Thus the *Gulick Natural History Club* finished its first trip with quite a success in the collecting line.

The shells listed were identified by Dr. C. Montague Cooke, Jr.

A NEW VARIETY OF *OLIVA SERICEA MINIACEA*.

BY H. C. HIGGINS.

Having become greatly interested in the Olividae, their beauty and the great variation of the species are to me a never-ending source of pleasure, marred only by the many perplexities in nomenclature. To what extent names should be given to the various forms, authors differ in opinion, but it seems more convenient to refer to certain well-marked forms by name when they are well figured in standard publications, than to say a variation of *O. sericea* subspecies *miniacea* figured in the *Thes. Conch.*, Vol. IV, pl. 7, f. 110.

Having brought together a remarkable series of 250 specimens of *Oliva sericea* (*tremulina-miniacea* group) showing all the named varieties as well as many intermediate specimens, I was impressed with the fact that a shell in the *miniacea* group corresponding to variety *pica* in the *tremulina* group, has no varietal name, therefore I propose the name *Oliva sericea miniacea* var. *johnsoni* for this shell, in honor of Mr. C. W. Johnson, curator of the Boston Society of Natural History, as a slight acknowl-

edgment of his untiring work with, and published articles on, the Olividae, as well as for the kindly interest he has taken in my own collection of *Oliva*, and the assistance given me in identifying specimens.

This variety is figured by Marrat in Sowerby's Thesaurus Conchyliorum, Vol. IV, pl. 7, f. 110. It is represented in my collection by six specimens of which one, no. 1652, has to be selected as the type.

COLLECTING IN THE VICINITY OF NEWARK, NEW JERSEY.

BY FRED TABLEMAN.

During 1917-1918 I decided to study the molluscan fauna in the vicinity of Newark, N. J. Limiting myself to twenty cents car fare for each trip I started to see what I could find within this area.

Most of the work was done in Essex County, in one instance within walking distance from my home. Visiting the Newark Meadows I found a station for *Polygyra thyroides* by seeing some dead shells. I looked for live specimens but could not find any owing to the density of the underbrush and flies. Going later when they were hibernating I collected about 150 and could have gotten more. They live under debris that is overgrown with the balloon-vine on which I believe they feed. This station has been destroyed by the opening of the Port Newark Terminal.

The next place visited was Great Notch Brook, Upper Montclair. On this brook is a small pond formed by a dam at the head of which in a marshy place I found *Lymnaea palustris* in great quantities, and also one specimen of *Pseudosuccinea columella*. I was fishing at the time and ran short of bait, so turning over a rotten log I got not only bait but a nice lot of *Pyramidula alternata*, which are now in my collection. Going to the same place later in the season and exploring one of the mountains as far as possible, I obtained a few small *Pyramidula alternata* and two *Polygyra albolabris*, one dead and one living.

Going to Cable Lake, West Orange, I collected *Planorbis antrosus*. The lake is a small one situated on the top of a mountain, the shore of which is partly sand and stones. Here is the home of the Planorbes, which are covered with algae.

The Rahway River, in Union Co., was next visited in search of Unios. Two specimens of *Anodonta cataracta* in perfect condition were secured, but further search failed to produce more of that species; but about fifty *Unio complanatus* were obtained. I also collected *Physa heterostropha* along the bank in company with *Lymnea palustris*, and in the shallows *Campeloma rufum* was found in company with a small variety of *Planorbis trivolvis* and *Sphaerium* sp.

The last three trips to Bloomfield proved the best. The collecting was done in Great Notch Brook which flows through part of the town where it comes from Brookdale. Starting at the end of the trolley line and working up stream I found small dead *Planorbis trivolvis* that had been washed in hollows and crevices among the stones. Live ones were gathered farther up stream and also *Unio complanatus*, which I will compare with the Rahway River shells later.

Going still further up stream, I found the first specimens of *Goniobasis virginica* in the shallow water near the bank; also broken *Campeloma decisum*, later two perfect specimens were found. The *Goniobasis* were large specimens ranging up to an inch in length, many of them so eroded as to be hardly recognizable except by the animal itself. Still further up the *Goniobasis* became more plentiful and also *Lymnaea palustris*, both alive and dead in the drift, which was composed of the dead of both and a few valves of Unios.

The *Lymnaeas* were found on the stems of water plants and also floating on the surface, foot up; the *Goniobasis* were clinging to the stones and crawling on the bottom. Both the smooth and ribbed variety (*multilineata*) were found, both banded and plain. More Unios were found, so I returned home satisfied with the afternoon work.

On the last trip I found but few specimens of *Goniobasis*. A heavy rain a few days before had made the stream moderately high, and the few specimens that I obtained were buried ver-

tically in the sandy bottom with the body whorl only exposed. I do not know whether they buried themselves or the shifting sands did.

The *Unio complanatus* collected varies greatly with the locality. Those from the Rahway River are cleaner than those from Notch Brook and are not so ventricose. The anterior end is more elongate than the brook form, and the sexes are hardly distinguishable. The Notch Brook females are much shorter than the males and more truncated, as the following measurements of the largest specimens show:

Locality.	Sex.	Length.	Breadth.	Thickness.
Rahway River . . .	Male.	70 mm.	35 mm.	18 mm.
	Female.	75 mm.	38 mm.	20 mm.
Great Notch Brook.	Male.	72 mm.	38 mm.	19 mm.
	Female.	63 mm.	40 mm.	19 mm.

Having collected only in two localities this year I obtained the following species. From Branch Brook Park, Newark, *Planorbis parvus* and *Planorbis antrosus*. These species were found in shallow water near the shore.

At Halcyon Park (Bloomfield) in a small pond, if it can be called such, I found large *Planorbis trivolvis*, the largest of which measures 25 mm.; also *Pseudosuccinea columella* and a species of *Ancylus* which I have not identified. I believe the shells in this pond came with the water-lilies that are growing there.

SHELLS OF LA JOLLA, CALIFORNIA.

BY C. R. ORCUTT.

My acquaintance with La Jolla dates back to 1879, when there was not a human habitation on the coast from San Dieguito on the north to the old lighthouse, 500 feet above the beach, at the extremity of Point Loma at the entrance to San Diego Bay. Now there are several flourishing towns along the way, the delight of summer and winter tourists, among whom not a few have been conchologists.

Taking charge of Hotel Strand at La Jolla in July, 1918, I have since busied myself quite as much with the molluscan fauna of La Jolla as with the hotel business, with some interesting results.

Mr. Maxwell Smith has contributed a list of La Jolla shells to THE NAUTILUS (volume 21, pages 55 and 65), and Mr. Joshua L. Bailey, Jr., has contributed a supplementary list (on page 92). A few additional notes may be of interest.

Haliotis fulgens.—In the spring of 1916 San Diego was visited with great floods, and a great amount of silt was washed into the ocean via San Diego and False Bay with the fresh water. This proved to be fatal to many mollusks, and I am told that many thousands of this shell were washed up along the shore from False Bay to La Jolla. One gentleman told me that a train of cars could have been filled with these shells which were piled a foot deep on the beach in many places. Another filled two sacks with the shells and nearly broke his back tugging them to the top of the cliff at what in early days we called Seal Rock, now named Bird Rock Beach. These he has finally placed at my disposal, and I found the two sacks full chiefly of this species. *Haliotis cracherodii* and *H. rufescens* were missing, as well as *H. assimilis*. Out of the lot I found six specimens of the following species and nine specimens of its variety.

Haliotis corrugata.—These were not very strongly corrugated, but properly referable to the species.

Haliotis corrugata diegoensis.—This form differs in the entire lack of the corrugations typical of the species, but otherwise

with nearly the same characters. All of the corrugated specimens possessed three holes, while of the nine specimens of this variety one had one hole, two had two holes, and the rest had three.

Haliotis californiensis.—The Japanese gardeners at La Jolla are good fishermen also, and frequently gather abalones for the meat. One of them gave me a specimen which for lack of a better name I have given the above name. It is $5\frac{1}{4}$ inches long, $4\frac{3}{8}$ across, 2 high, and has 11 small nearly circular holes outside, showing traces of two closed holes. The inside contains a large "pearl" or muscular impression, triangular in shape, and instead of the clear pearly white of *H. cracherodii*, there are large blotches of brown, green, blue and pink iridescence. I have had many similar specimens from the west coast of Baja California, which have never been determined to my satisfaction. Dr. Stearns I believe tentatively referred them to the above species of Swainson.

Caecum orcutti Dall.—This seems to be absent from the lists given in THE NAUTILUS. The type locality was at a point about two miles south of La Jolla's caves, where under a flat rock I must have found more than 100,000 examples of this minute species. I have sent the U. S. National Museum what I estimated as near 50,000 specimens, which I believe breaks the record for any single collection in this genus. It has been found at San Pedro, Cal., I believe, and at Todos Santos Bay, Baja California.

Helix pisana.—This snail has been recorded in THE NAUTILUS as from La Jolla (though not in the lists referred to above). The first of September, 1918, I found it for the first time, and reported its occurrence as a menace to California horticulture. A representative of the County Horticultural Commission counted nearly 800 living on one bush about a foot high with a spread of three feet. A dozen would frequently be found on one stem of the wild oak. It seemed to have no preference, but was abundant on native and cultivated plants alike, and thousands were observed on the sides of the cement curbing and on the sides of houses near by. But the tens of thousands observed were apparently confined to a district less than half a

mile in extent in any direction. The authorities attempted their destruction, but I have noticed hundreds yet remaining alive. It was first reported to our local society of natural history in 1914, when three specimens donated were "all that could be found."

Bifidaria hemphilli.

Bifidaria calamitosa.

Vertigo californica diegoensis.

Some years ago Mr. Henry Hemphill told me that there were no Pupae in this region, stating as his belief that they could not exist in our arid climate. Then I found a few under the stem of a decaying yucca on the mesas back of San Diego, and later more than 500 under some decaying cacti in the same vicinity. Still later individuals were found not at all rare on decaying plants on the seashore not far south of La Jolla, chiefly on the Hottentot Fig or Beach Strawberry (*Mesembryanthemum æquilaterale*). These were found at Pacific Beach and no doubt exist within the limits of La Jolla, if one will search with care.

Helix traskii Newc.

Helix tudiculata Binn.

These are apparently not rare in the environs of La Jolla. The first was not previously reported.

Helix aspersa Müll.—Mr. Smith reports that he turned a few dozen of these loose at La Jolla. They now exist by the tens of thousands and are very destructive to the vegetables in the gardens. Some way should be found to make Mr. Smith take them away. It seems to be a different form from the one now naturalized in San Diego gardens, where it is also a much hated pest.

Mytilus californianus.—*Modiolus californiensis* of Smith's list was doubtless an error for the above, which occurs plentifully on our coasts. Just south of the international boundary this species has yielded many pretty pearls. The larger shells measure about seven inches long.

Schizothaerus nuttallii.—This favorite clam was formerly abundant in a bed of rocks just inside the entrance to False Bay, which was formerly the home of many choice shells. This was the type locality of *Chlamydoconcha orcutti*, since reported from Monterey Bay by Dr. Berry.

Semele decisa, *Saxidomus nuttalli* and other bivalves were equally abundant, but now nearly exterminated. A list of the mollusca from this bed would be extremely interesting, but now hopeless of ever being written, as it is no longer the ideal home for mollusks that it once was. Over 100 *Cypraea spadicea* were found there in one day, and an equal number of *Ranella californica* were yielded by the adjacent sandy beaches. While the shells from this lagoon do not properly belong with the La Jolla list, yet fragments or dead specimens of all noted by Mr. Smith may occasionally be found at La Jolla.

Tagelus californianus.—This is extremely abundant in False Bay and is gathered in quantities for bait by fishermen, and thus the shells are scattered freely all along the La Jolla shores.

Pedipes unisulcata.—Smith reports many of the dead shells attached to sea anemones, but I found it years ago in company with *Truncatella simpsoni* on round water-washed boulders in caves near La Jolla.

Pedipes liratus.—This was also found at La Jolla in early days and later by Prof. Kelsey.

Milnerea minima.—Abundant. Attached to the under side of stones. Usually reported as living on the shells of *Haliotis*.

Mytilus adamsianus.—This was long called *M. bifurcatus*; later known as *M. stearnsi*. Smith and Bailey, like many other collectors, seem to have overlooked it, probably mistaking it for the young of *Septifer bifurcatus* which it nearly resembles, except for the absence of the septum. It is equally abundant.

Mytilus denticulatus.—This is similar to the last but much smaller. It is *Modiolaria denticulata* of former lists, and might easily be overlooked, but is apparently not rare on our rocks.

Adula diegensis.—North of the Scripps Biological Station about a mile north of La Jolla is a rocky beach at the base of high cliffs. Much of the rock is a soft clay stone, and perforated by millions of pholads. In places this species has entire possession, and often they have made their cells so close together that no partitions of rock are left to separate the shells.

Pholas pacifica.—This is one of the pholads found at the above station with others already noted.

Petricola denticulata.—This is extremely abundant in the

above locality also, square yards of surface of some of the flat rocks being filled with its shells. This species seems to abound from San Pedro, Cal., to Magdalena Bay, Baja Cal., where I found millions of the young shells in the drift (determined by Dr. Dall).

Acmaea patina cumingii.—This is the commonest species at Bird Rock and all along our coast, but seems to have been overlooked by Smith and Bailey.

Tegula ligulatum.—One of the commoner shells on all our beaches.

Pecten hastatus.—In kelp holdfasts washed ashore at Pacific Beach.

Pecten hericeus.—Valves frequent in the drift.

Phacoides californicus.—Frequent in the drift on all our beaches.

Phacoides richthofeni.—Valves occasionally washed ashore. Mr. Emery found it living in False Bay.

Fissurella volcano.—This is probably one of the most abundant and widely distributed species on our coast. I have generally looked with contempt on the gathering of dead shells; but for lack of better material I have gathered several thousand of this from the drift, from very minute to specimens of maximum size. It occurs from Monterey, Cal., south at least as far as Salina Cruz, Oaxaca, where I have collected it in abundance. The beach-worn shells show a beautiful diversity of color not observable in the living shells. About fifteen per cent. of the shells picked up at La Jolla are of the var. *crucifera* Dall, sometimes the arms of the cross extending only halfway down the sides of the shell, sometimes wholly worn away at the apex, often one or more arms missing; in young specimens, say 2 mm. long, frequently only the lateral white arms appear halfway to the lower margin of the shell. The ground work is usually reddish, the gray or black forms being much rarer. From the four white arms of var. *crucifera* there occurs every variation in number up to 20 or 30 or more, the red rays on a white ground—like red-hot lava flowing down the sides of a mountain, having given it its name. This is probably the typical form.

Acmaea triangularis.—One specimen detected in the drift on the beach.

Calliostoma supragranosum Cpr.—Detected in kelp holdfasts.

Cyanoplax hartwegii.—Perhaps our commonest chiton, on rocks near high-water mark, strangely omitted from Smith's list.

Columbella fuscata.—One specimen was found living years ago, but no doubt estray from southern waters as well as a single well-developed living specimen.

Thais biserialis, not rare.

Saxicava arctica.

Corbula luteola, not rare.

Saxidomus nuttallii.

Crepidula rugosa norrisianum.

Terebratella transversa.

Crepidula unguiformis.

Thracia curta.

Crepidula dorsata.

Thracia squamosa.

Hipponyx antiquatus.

Transennella tantilla.

Hipponyx cranioides.

Turbonilla castanella.

Hipponyx tumens.

Odostomia aequisculpta.

Kellia laperousii.

Venerupis lamellifera.

Kellia suborbicularis.

Mactra californica.

Modiola capax.

Mactra falcata.

Mytilimeria nuttallii.

Mactra nasuta.

Pecten latiauritus.

Mactra planulata.

Psammobia californica.

Phacoides nuttallii.

The above are some of the shells omitted from the lists referred to that I have noted on the beach, quite a number of them in kelp holdfasts washed ashore.

A considerable number of minute shells yet undetermined will add considerably to the list, besides several chitons and larger shells that are being studied.

LA JOLLA, CAL., 21 Dec., 1918.

LAND SHELLS OF LAUREL SPRINGS, NEW JERSEY.

BY E. G. VANATTA.

The following species of land shells were picked from forest debris collected by Mr. Bayard Long on the north branch of Timber Creek, at Laurel Springs, Camden County, New Jersey, during 1918 and 1919.

<i>Polygyra fallax</i> (Say).	<i>Striatura milium</i> (Morse).
<i>Polygyra albolabris</i> (Say).	<i>Euconulus fulvus</i> (Müll.).
<i>Polygyra thyroidus</i> (Say).	<i>Zonitoides arborea</i> (Say).
<i>Strobilops floridana</i> Pils.	<i>Zonitoides minuscula</i> (Binn.).
<i>Pupoides marginatus</i> (Say).	<i>Zonitoides minuscula alachuana</i> Dall.
<i>Gastrocopta corticaria</i> (Say).	<i>Agriolimax campestris</i> (Binn.).
<i>Gastrocopta contracta</i> (Say).	<i>Pyramidula alternata fergusonii</i> (Bld.).
<i>Gastrocopta armifera</i> (Say).	<i>Pyramidula cronkhitei anthonyi</i> Pils.
<i>Gastrocopta pentodon</i> Say.	<i>Helicodiscus parallelus</i> (Say).
<i>Vertigo tridentata</i> Wolf.	<i>Punctum pygmaeum</i> (Drap.).
<i>Vertigo milium</i> Gld.	<i>Succinea ovalis</i> Say.
<i>Vallonia pulchella</i> (Müll.).	<i>Carychium exiguum</i> Say.
<i>Columella edentula</i> (Drap.).	
<i>Polita hammonis</i> (Ström.).	
<i>Polita indentata</i> (Say).	

PUBLICATIONS RECEIVED.

OBSERVATIONS ON LIVING LAMELLIBRANCHS OF NEW ENGLAND. By Edward S. Morse (Proc. Boston Soc. Nat. Hist., Vol. 35, no. 5, July, 1919). In this valuable memoir Professor Morse describes and figures the expanded animals of 48 species of New England lamellibranchs. Hitherto most of the work on these mollusks has been done with alcoholic examples, which in their contracted condition give little idea of the beautiful and elaborate structures guarding the siphon openings and mantle edges of the living animal. Only those who have attempted to draw living mollusks can appreciate the application and patience required,—they are often stubborn, and refuse to show off; but all will admire the beautiful line drawings of these graceful structures. The figures of *Solemya*, *Nucula* and *Yoldia* are especially interesting. Some of the genera have the foot remarkably specialized.

Professor Morse takes the occasion to land a few resounding whacks on the nomenclature shifters. It is obvious that many of the changes (such as the adoption of Bolten's very German catalogue) were unnecessary and detrimental to science; yet

other changes mentioned were surely essential to progress. We might even recall that Morse himself threw a grenade into the nomenclature of land and fresh-water shells in his Maine Catalogue of 1864.—H. A. P.

DESCRIPTIONS OF NEW SPECIES OF MOLLUSKS OF THE FAMILY TURRITIDAE FROM THE WEST COAST OF AMERICA AND ADJACENT REGIONS. By Wm. H. Dall (Proc. U. S. Nat. Mus., Vol. 56, pp. 1-86, pls. 1-24, 1919). A very exhaustive faunal work on this family. Over 200 species are considered, of which 181 are new. The illustrations are excellent, many of Carpenter's species being figured for the first time. In regard to the family name Dr. Dall says: "Some question having been raised as to the spelling of the family name which I have retained as first proposed by Henry and Arthur Adams in 1853, I submitted the question of Turridae *versus* Turritidae to two expert Latinists, who after due consideration of all the data, concluded that, while either was correct, the latter term under the circumstances was to be preferred."

PELECYPODA OF THE ST. MAURICE AND CLAIBORNE STAGES. By G. D. Harris (Bull. Amer. Paleontology, Vol. 6, 1919). A valuable contribution to American Paleontology. The work contains 268 pages and illustrated by 59 plates, every species and variety being figured. About 250 species and varieties are described, of which more than 50 are new. Two new subgenera—*Mauricia* and *Pachecoa* are proposed. The work is dedicated by the author to the Hon. Truman A. Aldrich.

SEXUAL ACTIVITIES OF THE SQUID, *Loligo pealii* (Lea). By Gilman A. Drew (Journal of Morphology, Vol. 22, No. 2, and Vol. 32, No. 2). An extremely interesting and well illustrated account of phenomena rarely observed. The second paper deals with the structure and activities of the spermatophore. The observations were made upon specimens kept in aquaria at Woods Hole, Mass.

NOTES ON WEST AMERICAN CHITONS, II. By S. Stillman Berry. Proc. Cal. Acad. Sci. (4), IX, 1919. In this well considered and fully illustrated paper the following new forms are described.

Leptochiton (Xiphiozona) heathi, off Monterey.

Hanleya spicata, Monterey Bay.

Mopalia phorminx, Monterey Bay.

Mopalia egretta, Forrester Island, Alaska.

Ischnochiton (Lepidozona) asthenes, White's Point, Los Angeles Co., Cal.

Various points of classification are considered, and *Rhombochiton*, a "new group to rank near or under *Lepidozona*, with *L. regularis* (Carpenter) as type" is proposed.—H. A. P.

NOTES.

SHELLS FROM THE CHIRICAHUA MOUNTAINS, ARIZONA.—Dr. Witmer Stone camped in Pinery canyon, on the western slope of the Chiricahua Range, from June to August of this year, studying the distribution of the fauna and flora. Near the top, in the forks of the head of the north branch of Pinery canyon, at approximately 6500 to 7000 ft., he obtained the following snails. The locality is near the high ridge separating Pinery from White Tail canyon, where Ferriss and the writer collected in 1906 (Proc. A. N. S., Phila., 1910, p. 75, fig. 6). The rock is limestone.

Sonorella virilis leucura P. & F.

Oreohelix chiricahuana obsoleta P. & F.

Ashmunella duplicidens Pils.

Holospira cionella intermedia P. & F.

Polita indentata umbilicata (Ckll.).

Gastrocopta ashmuni (St.).

Gastrocopta dalliana (St.).

Gastrocopta pilsbryana (St.).

The last three were found in debris, but some living specimens of all the others were taken.—H. A. PILSBRY.

HELIX HORTENSIS: I am sending under separate cover a specimen of *Helix hortensis* Müller. It was found in a prehistoric shell-heap on Mahone Bay, about 75 miles west of Halifax, N. S.—W. J. WURTEMBERG.

A SYNONYMICAL NOTE: The shell described and named by Pilsbry and Bryan in THE NAUTILUS, XXXI, 3, 1918, p. 99, pl. IX, as *Drupa walkeræ* from Honolulu Harbor, is the same species which was described by G. B. Sowerby in the Annals and Magazine of Natural History, Ser. 8, Vol. XVI, p. 166, pl. X, 1915, as *Pentadactylus fusco-imbricatus*. A recent letter from Sowerby and Fulton suggested this after an examination of a specimen sent to them. A careful comparison of the descriptions and figures convince us of the same conclusion. All the specimens known are from the Honolulu Harbor dredgings from May to August, 1915. The teeth vary from 5 to 7 in the specimens before us. We hope to make a study of the variations of this and other shells later.

F. GRINNELL, JR.,
J. M. OSTERGAARD.

INSECT LARVÆ DESTROYING PHYSA.—There is a small artificial pond in Waveland Park which joined my former home grounds in Des Moines, Iowa, that I had never considered of much importance conchologically, owing to its small size and rather recent construction. A visit to it one day in the summer of 1907, however, only added greater strength to Mr. Simpson's motto, "Look everywhere."

I found here a form of *Physa integra* Haldeman quite plenty, but nearly all dead. They were enveloped in what at first appeared to me to be a growth of moss, but which Dr. C. M. Child of the Department of Zoology, University of Chicago, pronounces as insect cases, "probably some dipterous insect, but none of the men in the Department are able to identify more exactly the insect that is responsible for them." As I have heard nothing further, it is fair to presume that the insect is new or little known.

The deposition and multiplication of these microscopical in-

sect larvæ and their cases had in many instances formed a thick mass over the entire surface of the shell, completely closing the aperture, thus causing the animal within to die. Scarcely a living individual could be found that was not more or less infested in this manner.

Burr-oak trees stand near the margin of the water, and the acorns which had fallen from them in the water were often brought out with my little hand-dredge together with cockle-burrs, in company with the infested shells. The cockle-burrs were often difficult to distinguish from some of the shells, covered as they were with the larvæ cases.

When closely observed, I noticed that the majority of the dead shells were lying on the bottom of the pond with aperture up; some could be seen lying in this manner with but a slight opening remaining in the aperture, in which I could see the yet living animal struggling for freedom.

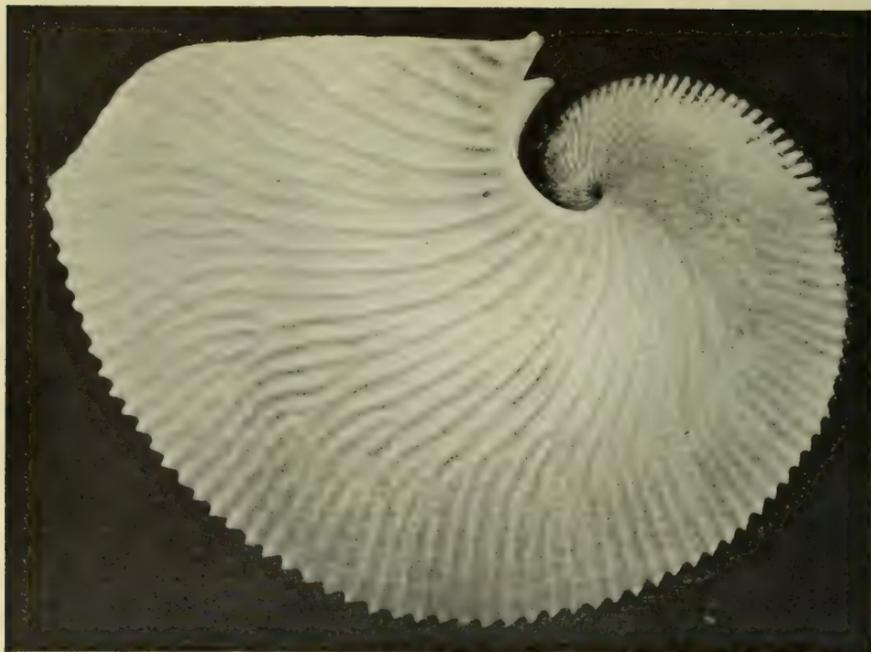
A few living ones were to be found on the vegetation growing in the water which were in all stages of infection.

I revisited the pond in the fall, after the warm weather, and found a few living shells and plenty of recently dead ones; but scarcely a vestige of the insect cases was to be seen anywhere, thus showing that they flourish during the hot weather and after maturing the cases soon decayed, leaving no trace of the perpetrator that so rapidly devastated the colony.—T. VAN HYNING.

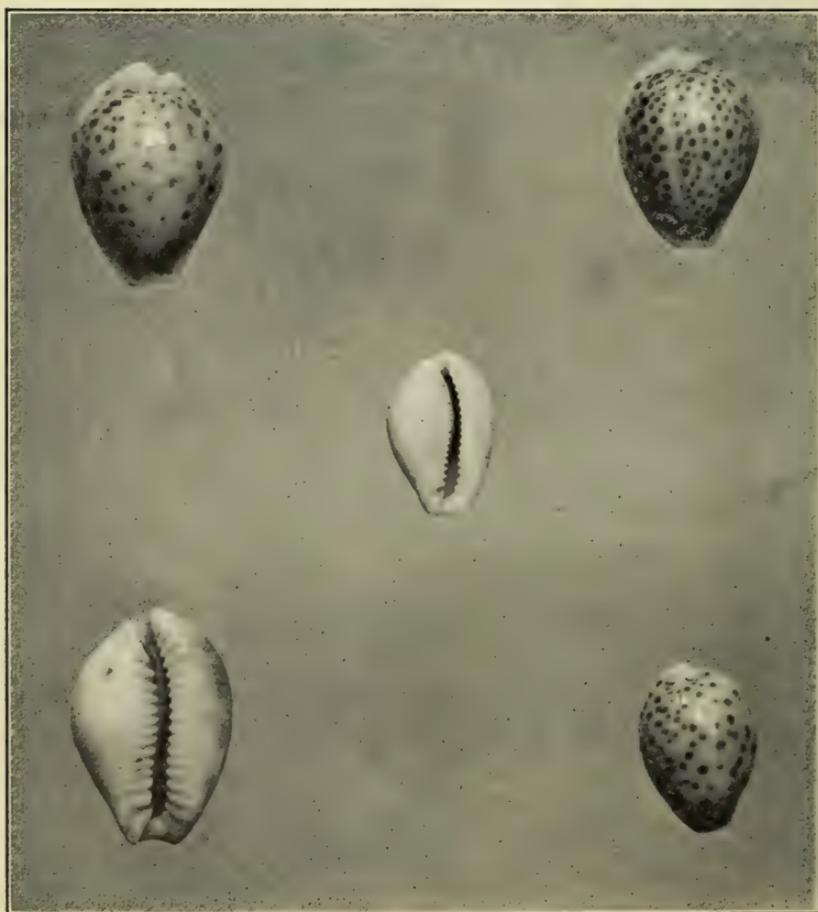
POLYGYRA PLANA BAHAMENSIS Van. n. var.—This variety is distinguished from the typical *P. plana* (Dkr.) of Bermuda by frequently having a spiral internal lamina as in *P. cereolus carpenteriana* (Bld.) of Florida. The surface of the spire has finer sculpture than *P. carpenteriana* (Bld.'s) and a trifle coarser than the typical *P. plana* (Dkr.).

The types are in the collection of the Academy of Natural Sciences of Philadelphia, being tray number 44463, from Current Settlement, Eleutha, Bahama Islands, collected by Mr. C. J. Maynard in 1897.

The Academy's collection contains other specimens of this variety from New Providence and Inagua Islands.—E. G. Vanatta.



THE LARGE ARGONAUTA COMPRESSA



CYPRAEA PACIFICA OSTERGAARD

THE NAUTILUS.

Vol. XXXIII

JANUARY, 1920.

No. 3.

GONIOBASES OF OHIO.

BY CALVIN GOODRICH.

Some months ago I had occasion to map the known distribution of *Goniobasis livescens* Menke and *G. semicarinata* Say within the borders of Ohio. This distribution is somewhat peculiar.

Beginning on the western side of the state above the central line we find that *livescens* is the *Goniobasis* of the Maumee river system and of the shallows of Lake Erie as far as Sandusky Bay, where *G. haldemanni* occurs in company with *livescens* in the drift of the beaches. So far as exploration thence east shows, *livescens* appears alone to the northeastern corner of Ohio. It is the species of Sandusky River, flowing into Sandusky Bay, of Rocky and Cuyahoga Rivers which enter the lake at Cleveland, and of Conneaut Creek near the eastern border. Below the divide between the lakes and the Ohio River drainages, I found *livescens* in Beaver Creek, a tributary of the Wabash. There is then a great gap in its occurrence until the Hocking River is reached, east of a north and south central line drawn through the state. Just east of this, again, *livescens* has been collected in the Tuscarawas River of the Muskingum system by Dr. Sterki, and in at least one of the Tuscarawas branches. The *G. gracilor* Anth. of the Summit county lakes is plainly an offshoot of *livescens*, as indicated by connecting forms taken in this same region.

Goniobasis semicarinata, less variable and more easily recognizable even in the field than *livescens*, is the species of the Great Miami, Little Miami and the Scioto Rivers, all in the

Ohio River drainage. Between the Scioto and the Hocking Rivers is a fairly large stream known as Raccoon Creek. It is now polluted with mine waste and at the time of my visit to it three or four years ago I found no living mollusks in the creek, and only one or two dead Unios.

East of the Muskingum system is the Mahoning River and Beaver Creek, crossing the Ohio border into Pennsylvania. I know nothing of the *Goniobases* of these streams, but suspect that if any occur in them it is *G. pennsylvanica* Pilsbry, the *Goniobasis* of the upper Ohio rivers.

The chart of this distribution shows that *livescens* crosses the northern section of Ohio in the drainage of the Great Lakes and down two streams of the Ohio River drainage. *Semicarinata* occupies the three largest streams of the Ohio River drainage from the Scioto at about the center to the Great Miami, discharging at the southwest corner of the state.

If we grant that the same laws which have governed the re-peopleing of Lake Erie with Naiades have controlled in the case of *livescens*, this species entered the Maumee River through the Wabash, spread eastward to the Niagara and beyond. It managed—by means which the geologists might explain—to cross the divide between the Cuyahoga and Tuscarawas River, possibly thence into the Hocking.

Other species of *Goniobasis* than those mentioned have been recognized as occurring in Ohio, and other local races may yet be described, but I feel certain they can all only prove to be descendants of the two parent stocks, *livescens* and *semicarinata*.

SOME LARGE SPECIMENS OF ARGONAUTA.

BY CHARLES W. JOHNSON.

The largest species, or the largest example of a species, is always a subject of special interest, both to the biologist and the collector. Individual variation is not fully understood and cannot always be attributed to favorable or unfavorable environment, or the abundance or lack of nutrition. Individual variation has often led to arguments among conchologists as to

whether certain species dissolve their shells and construct new ones as their bodies increase in size.

A large example of an Argonauta in the collection of the Boston Society of Natural History has been frequently referred to in literature. At a meeting of the Society, held March 15th, 1854 (Proc. Boston Soc. Nat. Hist., vol. 5, p. 35), it was recorded that "Dr. A. A. Gould made some remarks upon the collection of shells presented to the Society by the family of the late Col. Perkins. * * * To one shell in particular he called attention, the large Argonauta, commonly called Paper Nautilus, and which is the largest specimen known to exist. Its measurements are $11\frac{3}{4}$ by $7\frac{1}{2}$ inches; the next largest specimen in the Museum of the College of Surgeons, London, measures $\frac{3}{4}$ of an inch less than this. This large specimen was brought from the Indian Ocean."

In the same vol., p. 370, this shell was again referred to under the title "On the Animal of the Argonauta Shell," by John C. Warren. He says: "The beautiful specimen of the *A. compressa* Blain. presented to the Society by Col. Thomas H. Perkins was also exhibited; this shell, which cost him \$500, is, according to Dr. Cabot who has made the comparison, the largest Argonauta shell in any cabinet in Europe or America. D'Orbigny in his great work gives as the measurements of the largest he has examined: greatest length of the shell $9\frac{1}{2}$ inches, while our specimen is 10 inches; greatest diameter of the opening $6\frac{1}{8}$ inches, in our specimen it is $6\frac{1}{2}$ inches; greatest width of the opening, including the auricular appendages, 3 inches, while in ours it is four inches."

In the Structural and Systematic Conchology, vol. I, p. 151, Tryon says: "The Boston Society of Natural History possesses an *Argonauta argo* or Paper Nautilus shell, which is said to have been purchased for \$500 by the gentleman who presented it to that Society. It is a common species, and the only reason for the great valuation of this specimen is that its diameter is about two or three inches greater than any other individual known to naturalists."

Tryon again refers to this specimen in the Manual of Conchology, vol. 1, p. 136. This specimen was later figured and

mentioned in the Bull. No. 9 of the Boston Society of Natural History, April, 1917, where the exact size, $10\frac{3}{8}$ in greatest diameter was given, as there was a discrepancy of $1\frac{3}{4}$ inches in the two accounts in the Proceedings. The writer is indebted to the Society for the use of the figure illustrating this article.

In regard to the nomenclature, it seems hardly necessary to enter into any discussion when we consider that we are not dealing with a true shell, but a shell-like structure confined to the female, and only in part a secretion of the mantle, for a portion of it is formed by the two expanded tentacles. Internal partitions are lacking and the structure serves as a nest for the eggs. Tryon, in the Manual of Conchology, places the Indo-Pacific *A. compressa* Blainville (*A. maxima* Gualt.) in the synonymy under *A. argo* Linn., of the Mediterranean. In the absence of a thorough knowledge of the animals it seems best to keep the various forms described from distant regions separate until such time as future investigations prove them to be either the same or distinct.

In this connection I would like to call the attention of readers to a rival of the above specimen. It is a very large example of *Argonauta nodosa* Solander, in the American Museum of Natural History, New York, and measures $8\frac{5}{8}$ by 11 inches. I am indebted to Mr. Arthur Jacot for these measurements.

SOME AURICULIDAE AND PLANORBIDAE FROM PANAMA.

BY HENRY A. PILSBRY.

The Panamic fauna has a particularly rich and interesting group of Auriculidae. The following new forms were found among the species collected by Mr. James Zetek.

DETRACIA ZETEKI, n. sp. Figs. a, b, c.

The shell is oval with short, almost straightly conic spire and minute, mucronate apex; dusky buff, the spire, a band near the suture and another near the base, carob brown. Surface glossy, rather closely marked with ripples of growth. Whorls of the spire narrow and flat, the greatest convexity of the last whorl above the middle. Aperture extremely narrow, having a

white, lirate callus a short distance within the outer lip. The very short columella bears a thin, wide, entering and descending lamella. Above it, on the lower part of the parietal wall, there is a low, subtriangular callus. It is much more prominent in young than in adult shells.

Length 8.6, diam. 5, length of aperture 6.7 mm.; 11 to 12 whorls.

Panama City and Paitilla, near by.

This species is very peculiar by its many narrow whorls, very narrow aperture, and the large, inwardly descending columellar lamella. It seems remarkable that it was not found by Professor Adams, but nothing described in his catalogue agrees with it. Perhaps it is his unidentified No. 316.

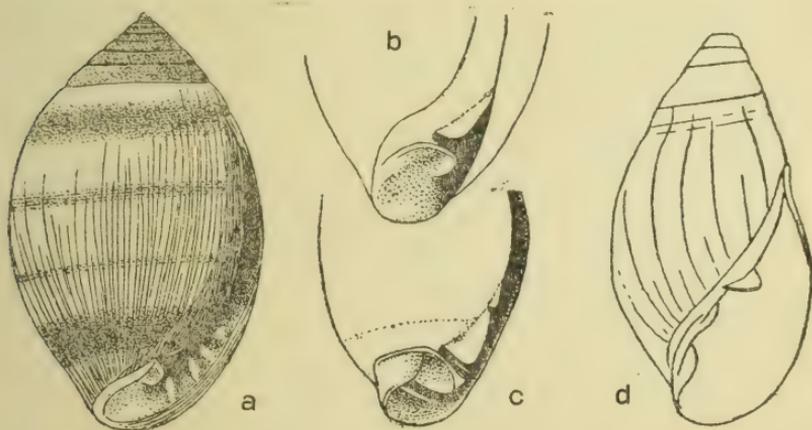


Fig. a represents the type; fig. b is the basal part of the same specimen rolled more towards the left. Fig. c is the lower part of a young specimen, to show the larger lamellae of that stage.

PHYTIA BREVISPIRA. Fig. d.

The shell is oblong-conic, not very solid, cinnamon-brown, glossy marked with weak growth-lines only. The spire is straightly conic, shorter than the aperture; whorls very slightly convex, the last somewhat concave below the suture, with one or two spiral lines in the concavity defining a wide sutural margin. The aperture is pinched in above, becoming moderately wide and rounded below, the outer lip thin, without in-

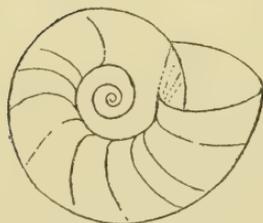
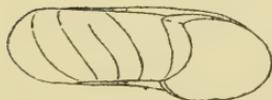
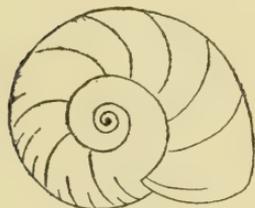
ternal folds or callus. There is a strong, deeply entering diagonal parietal lamella, a smaller one below it; columella terminating in a spirally entering lamella.

Length 8, diam. 4.1, length of aperture 5.1 mm. (fig. d, apex lost).

Panama City and Paitilla, near the city, collected by James Zetek, 1917. Also Taboga Island.

This species stands near *P. triplicata* (Anton) and *P. acuta* (Orb.) both of which have similar teeth. It is, however, decidedly narrower than the first, wider than the second, so that while I hesitate to add another species to this genus, it appears that none of those described will receive it. *Phytia rhoadsi* (Pils.), described as a *Marinula*, and *P. setifer* (Caop.) are more northern species, the former somewhat related to *P. brevispira*. In this species the aperture is longer than the spire, as in *Marinula*, but the other characters are decidedly those of *Phytia* (*Alexia*).

PLANORBIS ISTHMICUS, n. sp.



The shell is compressed, the thickness about one-third of the diameter, thin, very pale brown, somewhat transparent, glossy. Concavity of the right side showing three whorls and a central pit, that of left side shallow, showing $4\frac{1}{2}$ whorls, the last whorl more convex near the sutures, rounded peripherally, not deflected towards the left near the aperture. Sculpture of fine growth-lines, very distinctly decussated by fine spiral lines on the inner whorls, the spirals weak, in part obsolete, on the last whorl. The aperture is oblique, heart-shaped, the lip thin.

Diam. 10.5, alt. 3.7 mm.

Panama City, in Chinese wells. Collected by James Zetek, Sept., 1918.

Planorbis liebmanni Phil., *maya* and *orbiculus* Morel., are flatter shells, with

the spire wider. *P. boucardianus* Prest. has a more oblique

aperture, no spiral striation, and is smaller. *P. fieldii* Tryon is a much smaller shell without spiral lines, and higher relative to its diameter.

Probably all of this group should be regarded as toothless forms of *Planorbula*.

GUATEMALAN NOTES.

BY A. A. HINKLEY.

Coelocentrum gigas Von Martens, identified by Dr. H. A. Pilsbry as a dark variety,¹ is the largest land shell the writer ever had the pleasure of hunting. On Feb. 20, 1913, the first dead specimen was found by a large log in a banana field. Probably an hour was spent searching for a live one but without success. Leaving the banana field, I followed up a branch of the Cavech River to where it issued from the mountain side. The labor of working through jungle and over rocks was rewarded by finding the finest specimens of *Pachycheilus indiorum* which I secured. From here the return was around the side of another mountain, heavily wooded; on this mountain 5 living *C. gigas* were found. This was considered a great find.

The next day another place was visited beyond the mouth of the Cavech River to where the mountain came out to the shore of the gulf. After working through the thick undergrowth at the foot of a mountain, the vegetation was more open, making it easier to climb up or down. The first shell found was a fine *C. gigas* in the act of depositing eggs in a round pit about $\frac{3}{4}$ of an inch across, and probably a half-inch deep, scooped out of the mellow earth and containing 35 to 40 eggs.

The best part of the day was spent on this mountain, looking for these shells, of which 19 were secured. They were nearly always partly covered with leaves. No more nests of eggs were found, but others were seen which had been destroyed by some enemy.

¹ The specimens are not "yellowish gray," as von Martens described it, but between walnut brown and burnt umber.

LEPTINARIA LIVINGSTONENSIS, n. sp.

The shell is imperforate, oblong-conic, the length twice the diameter, pale yellow, composed of 6 moderately convex whorls. Apex rather obtuse, surface glossy, coarsely but weakly striate. The sharp outer lip is strongly arched forward at its upper third. Columellar plait strong, dividing the columellar margin into two arcs, the lower one slightly shorter and deeper. Parietal lamella present in the embryos of $1\frac{1}{2}$ whorls. It is quite strongly developed in some shells of 6 mm. long, wanting in others. In older shells it becomes very low, and not quite one-fourth of a whorl long; or in others it disappears entirely.

Length 9.5, diam. 4.7, aperture 4.5 mm. (lamella low).

Length 11, diam. 5, aperture 5 mm. (lamella minute).

Found in rubbish about the city of Livingston, Guatemala, with *Subulina octona*, taken February 19, 1913. This shell is about the same size as *L. tamaulipensis*, but differs from that species by having a parietal lamella and an imperforate umbilical region. The last whorl is less enlarged than in *L. lamellata*, *L. elisæ* or *L. convoluta*, which resemble this species in being imperforate with a lamellate parietal wall.

The small lot taken in 1913 seemed divisible into two species, according to whether a parietal lamella was present or not, but in the abundant series collected on the second trip, it appears that the lamella is variable, being present in many but not all immature shells, but always very low or wanting in the large ones.

SOME NOTES ON PHILOMYCUS.

BY V. STERKI.

In Ohio we had known only *P. (Tebennophorus) caroliniensis* Bosc. Then a few *dorsalis* Binney were found here and there. Some years ago, near Chippewa Lake, Medina Co., I found two specimens of an entirely distinct species, as listed in the Ohio catalogue; the genitals, etc., remain to be examined. The slug may be the same as *P. pennsylvanicus* Pils., but closer comparison is necessary.

Fifteen and twenty years ago, in this vicinity, I found repeatedly a form which then was taken for one of the color variations of *P. caroliniensis*, although averaging larger, and unfortunately and stupidly I did not examine it exactly. Some time ago one specimen of exactly the same was found, with about a dozen *caroliniensis*, as described by Binney and W. G. Binney. It was evident at first sight that the animal is of a distinct species, and it may be one of those named by Rafinesque, as mentioned in W. G. Binney, *Man. Amer. Land Shells*, p. 247, but I have not the literature for comparing. In order to have a designation, it may be named *biseriatus*, provisionally the specimen was 70 mm. long when fully extended. The color, over most of the back, is brownish, not grayish, somewhat irregularly mottled, and not sharply defined towards the margins. On the back there are two parallel series of 10-12 irregular black spots, streak-like when the animal is fully extended, the largest in the middle, evanescent towards the anterior and posterior ends. Irregularly distributed, mainly along the outer side of each series are irregular "white" spots; that is, they appear whitish, but the ground color is a pale tan, and there are small dots, rather granules, of a glistening bluish white, and such dots are also distributed over the balance of the mantle surface. On each side, between the series of black spots and the lateral margin, there is another series of slightly marked, cloudy, dark spots, some of them barely visible. The sole is whitish without any color tinge, while in *caroliniensis* it has a rusty tinge from minute dots of that color, especially along the margins. Along the middle, mostly in the posterior part, there is an obscure line of dark, as it is also in *caroliniensis* and some other snails. The head and the posterior end of the foot are somewhat slate-colored, the eye peduncles darker. The whole body is different in appearance from that of *caroliniensis*, and somewhat more translucent.

This description may be imperfect, but I believe that any specimens of the same kind will be readily recognized from it. While the genital organs of two *P. caroliniensis*, of the same size, were fully developed, those of "*biseriatus*" will still quite rudimentary, and nothing could be made out of them. The jaw

was of nearly the same shape in both species, but that of "*biseriatus*" was dark-colored, from horn in the upper part to black at the cutting edge, while the jaw of *caroliniensis* is of a yellowish or reddish horn. The details of the surface must be compared with more material. The radula, with its anterior (older) end torn off, had 141 (+ . . .) rows of 45 + C + 45 teeth of rather the same shape as those of *caroliniensis*; only the mesodonts of the outer laterals (about 13th-25th) seemed larger and longer; one of the *caroliniensis* had 210 rows of 54 + C + 54 teeth.

As Mr. T. D. A. Cockerell suggested, some of the so-called color variations of *P. caroliniensis* may prove to be distinct species. This, and their interrelations, and those of variation, or varieties, should be carefully ascertained and also their distribution. It may be mentioned, in this connection, that *P. wetherbyi* W. G. Binney, originally known from Kentucky, has also been found in northern Michigan, as stated by B. Walker.

Scientifically it may not be justified to publish these rudimentary notes. But there is another reason for doing so. The season is already well advanced. These interesting slugs have been badly neglected, and our knowledge of them is still far from satisfactory. Besides, they are getting more and more scarce in consequence of deforestation of the land, and will disappear in many sections before long, and faster than most other snails. Therefore, every conchologist should pay special attention to anything in this line that can be found. And, to mention it again, by the way, the term "shells" is not the proper one to be used in books and catalogues; we should say mollusks!

With respect to the generic name, I agree with W. G. Binney that the forms and species known should be ranged under one genus, whether their jaws be ribbed or not, if there are no other more significant differences. The jaw of the Chippewa slug seems to be really intermediate between the "smooth" and ribbed forms. W. G. Binney rejects the name *Philomycus*, because Rafinesque did not correctly describe this genus under that name. There is hardly a conchologist who doubts now but that Rafinesque really understood the slugs under consider-

ation. In comparing them with *Limax* and *Arion*, he did not find the mantle shield much shorter than the body, and plainly evident, like the one of those slugs, and came to the conclusion that there was none at all; conceded that it was one of the careless things he was in the habit of doing. Also, if *Philomycus* was not the same thing as *Tebennophorus*, etc., the family name *Philomycidæ*, in the sense as used, has no claim for recognition.

THE SHELL OF *PHILOMYCUS CAROLINIANUS* (BOSC).

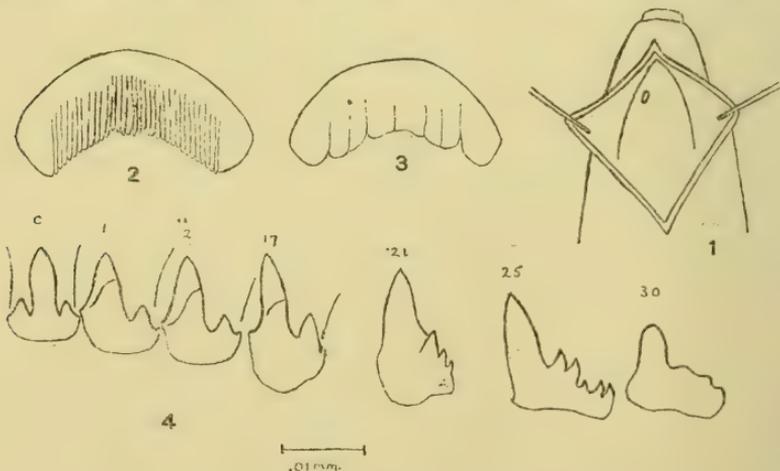
BY WILLIAM F. CLAPP.

Through the kindness of Mr. J. Henry Blake I recently received a specimen of *Philomycus carolinianus* (Bosc.), from Munsonville, N. H., to examine for internal parasites. On laying open the mantle preparatory to removing the stomach and intestine, I discovered a rudimentary shell. When first noticed, it was not attached, either to the mantle or to the inner membrane which covers the viscera, but was floating free in the liquid in which the dissection was made. From its position I believed it to have been dislodged from some portion of the posterior fourth of the animal, between the mantle and the inner membrane. Losing immediately all interest in possible internal parasites, I gave my attention entirely to the problem of the shell, in an endeavour to ascertain its exact position, and also to discover whether it is to be considered a constant, or merely an occasional character in this species.

From Dr. R. C. Rush, of Hudson, Ohio, I received fifty specimens (M. C. Z. 48211) of living *Philomycus* in excellent condition. The specimens in this lot show slight variation in color, the majority being of the typical pattern, of a yellowish-white ground color, variegated with brownish and blackish clouds and spots, forming three ill-defined longitudinal bands, one on the center of the back, and one on each flank. There are, however, three specimens easily separated from the rest because of the reddish tinge in the brownish clouds and spots. In these specimens (M. C. Z. 48211 H) the lateral bands are

lacking entirely, there being one broad dorsal band of darker reddish brown, bounded on each side by a narrow row of more or less connected black spots.

In the eighteen specimens of this lot examined, all possessed a rudimentary shell. In many cases, in spite of the greatest care in making the incision in the mantle, the shell had become dislodged from its normal position. In eight specimens it remained attached to the animal when found. In all of these specimens it was adherent to the outer surface of the inner membrane or peritoneum, and not connected in any way to the inner surface of the mantle. It also, in the specimens in which it remained fastened, was always in the posterior quarter of the animal, and over some portion of the liver. In two of the eight specimens it occurred on the left side, in two directly on top, and in four on the right side of the liver. The diagram (fig. 1) was made from a specimen (M. C. Z. 48211 H) measuring 40 mm. in length in a considerably contracted condition. On opening the mantle, the position of the shell was found to be 5 mm. from the posterior extremity of the animal and on



Figs. 1, 2, 3, *Philomyces carolinianus* (Bosc), Hudson, Ohio.

Fig. 4, *P. rushi*, n. sp.

the right side. It is of a light horn color, transparent, very iridescent, thin, delicate, wrinkled. It measures .5 mm. in length and .25 mm. in width. In appearance it greatly re-

sembles the periostracum of the shell of a *Limax maximus* which remains when the shell has been decalcified in weak acid.

In some of the shells extracted from specimens from Hudson, Ohio, a portion of the delicate membrane contains a few granules of what appear to be calcareous crystals. In outline the rudimentary shell is irregular, the membrane becoming very thin, delicate and transparent at the edge. In some specimens it was folded on itself, but the general tendency is for it to be oblong rather than oval, and in outline, not unlike the shell of *Limax maximus*. Specimens from the following localities were examined, in all but one of which the rudimentary shell was found.

Spec's.	M. C. Z. No.	Locality.	Received from.
1	18540	Isle au Haute, Me.	M. C. Z.
1	48207	Munsonville, N. H.	J. Henry Blake.
1	48217	Mt. Monadnock, N. H.	Dr. W. H. Dall.
2	42145	Duxbury, Mass.	M. C. Z. (shell not found in one).
1	48212	Tannersville, N. Y.	Dr. H. A. Pilsbry.
18	48211	Hudson, Ohio.	Dr. R. C. Rush.
2	48214	York Furnace, Pa.	Dr. H. A. Pilsbry.
2	48213	York Co., Pa.	Dr. H. A. Pilsbry.
4	48215	Wyoming Co., Pa.	Dr. H. A. Pilsbry.

This species was originally described as *Limax carolinianus* (Bosc, Hist. Nat. des Vers, suites à Buffon, ed Deterville, 1, p. 80, pl. 3, f. 1, 1802. Rafinesque (Annals of Nature, p. 10, 1820) gave the name of *Philomycus* to species which differed from *Limax*, principally, in being entirely destitute of a mantle. Rafinesque, however, made no mention of *Limax carolinianus* in this paper and it remained for Ferussac (Tab. Syst., p. 15, 1821) to place the species, which he spells *caroliniensis*, in Rafinesque's genus *Philomycus*. Binney (Bost. Journ. Nat. Hist., 4, p. 163, 1842), recognizing the fact that *carolinianus* Bosc. possessed a mantle covering the entire upper surface of the animal, removed the species from Rafinesque's genus *Philomycus*, where Ferussac had placed it, and made it the type of a new genus,

Tebennophorus, signifying "wearing a cloak". In diagnosing the genus, Binney states that it is "without testaceous rudiment". Wyman (Bost. Journ. Nat. Hist., 4, p. 411, 1844) and Leidy (Terr. Moll. U. S., 1, p. 250, pl. 3, 1851) in describing the anatomy of *Tebennophorus*, did not mention finding a rudimentary shell. W. G. Binney (Terr. Moll. U. S., 5, p. 179, 1878) specifies that *Tebennophorus* has no external or internal shell, and adds (p. 180) that "the internal, rudimentary, nail like shell, described by Dr. Gray, has not been noticed by any American author". Dr. Gray's description (Cat. Pulmon. Brit. Mus., part 1, p. 158, 1855) of the genus *Philomycus*, includes the statement, "Shell minute, nail like, concealed in the front part of the mantle". Yet (p. 155) in describing the tribe *Philomycina*, in which he places the genus *Philomycus*, he states, "Shell none". From Dr. Gray's description of the shell as being "nail-like", and "concealed in the front part of the mantle", I doubt that he had the shell of *Philomycus carolinianus*.

An examination of the jaw and radula of each of the specimens in which a shell was found, disclosed the fact that the jaw varies considerably in specimens apparently otherwise identical. In the fifteen specimens from Hudson, Ohio (M. C. Z. 48211), which I consider typical *carolinianus* (Bosc), as described by Binney, thirteen possessed a smooth jaw, with very faint longitudinal and transverse striae showing only when highly magnified. The remaining two were strongly plaited (figs. 2, 3). Of the three specimens (M. C. Z. 48211 H) separated from the others because of the reddish tinge of the mantle, the jaw of one was similar to fig. 2, the others were smooth. This plaiting of the jaw, although it may be felt with a fine needle, is not to be confused with the ribbing of the jaw as seen in *Pallifera dorsalis* Binney (Morse, Journ. Port. Soc. Nat. Hist., 1, p. 8, f. 5, 1864). That portion of the mouth which carries the jaw in *Philomycus carolinianus*, is always deeply furrowed, and it appears that these furrows may, or may not leave their impression upon the jaw. It is possible that the presence or absence of plaiting in the jaw may be entirely a question of age. In all of the specimens examined none of the other char-

acters showed noteworthy variation, and I have considered them all *P. carolinianus*.

It is worthy of record that the specimens which were sent to me in such excellent condition by Dr. R. C. Rush, were shipped in a small wooden box filled with damp, absolutely clean moss. Every specimen was alive. The slightest amount of dirt or dust in the material in which the specimens are packed is fatal. From one of Dr. Rush's letters I take the liberty of quoting some interesting notes regarding the habits of the species.

"It is very easy to collect specimens of this species, but very difficult to send them any considerable distance and have them live. If kept too moist they suffocate, and if allowed too much air they dry up. I have had five-inch specimens die in twenty minutes in strong sunlight. To keep specimens alive, place them on the under side of an old piece of bark on the basement floor, making certain that they are absolutely in the dark. Feed them with any fungi and they will live for months. Curiously the large specimens of this species are not found in damp places in northern Ohio. They are found here in high, dry, hard-maple and beech forests, on stumps and logs which have not decayed much, in pockets under the bark. They feed at night and go back to the same nest every morning. Very rarely one will find them feeding on the under side of fungi in daylight. It will interest you to know that nine of the specimens I am sending came from a crack in a log, seven inches long by two inches wide, and I left seven behind. They were packed in like sardines."

Philomycus rushi, sp. nov.

In alcohol, mantle smooth, drab gray above (Ridgway, Color Standards and Nomenclature, pl. 46, 1912), lighter on the sides, eye peduncles dark gray, eye spots black, tentacles, situated beneath and very slightly outside the eye peduncles, short, gray. Body terminating posteriorly in a sharp point. Foot narrow, half the width of the body, cream-white below, excepting at the anterior end, where it is dark red, fading at the posterior end. The separation of the foot from the body well defined. The body, showing at the sides between the foot

and the mantle, only as a narrow ridge at the posterior end, but broadening at the anterior, is also stained with red, darker at the anterior end. Respiratory orifice, small, on the right side, 2.5 mm. behind the anterior edge of the mantle, in the center of the narrow mantle furrow which curves upward and backward from the mantle edge. Total length 15 mm., width 3 mm.

Internal rudimentary shell large, similar to that of *P. carolinianus* (Bosc), 6 mm. from the posterior extremity, and fastened to that portion of the peritoneum directly above the ovotestis. Approximately 2 mm. in diameter.

The jaw is similar to that of *P. carolinianus* in shape, and in being but very slightly plicate.

The radula, fig. 4, consists of about 150 rows of teeth having a formula of 38-1-38.

The one specimen received in sufficiently good condition to examine the internal organs, was infested with two stages of parasitic Trematoda. Twenty of these were found in the vicinity of the lung, one beneath the shell, and one in the penis near the retractor muscle. Therefore the reproductive organs in this specimen may be in an abnormal condition, and on this account I refrain from figuring them. One of the most noticeable differences is the complete absence of any glandular portion to the cloaca, a large and constant character in *P. carolinianus*. The ovotestis is nearly black, in sharp contrast to the light-colored liver and other organs in the posterior portion of the animal.

Type M. C. Z. 48220. Hudson, Ohio, collected by Dr. R. C. Rush.

I have connected Dr. Rush's name with this species as a slight recognition of the care and perseverance he has exercised for many years in studying the life history of the land shells of Ohio.

Dr. Sterki (Proc. Ohio State Acad. Sci., 4, p. 377) describes a closely related species as "*Philomycus* sp. *pennsylvanicus* Pils.?" Dr. Sterki's species is similar to *P. rushi* in that it possesses a "sole tinged with blood red" but differs in being twice as large (30 mm. long), and in the jaw having "a num-

ber of rib-like irregular ridges". *P. pennsylvanicus* Pils. (Proc. Acad. Nat. Sci. Phil., p. 22, 1894) is described as being "smaller and less distinctly marked than *P. carolinensis*" and "having the jaw strongly ribbed", a description which could not be applied to *P. rushi*.

CLIMATIC CONDITIONS AS INDICATED BY LAND SHELLS ON THE
ISLAND OF OAHU.

BY J. J. GOUVEIA.¹

Since the early part of 1913 the writer and his brother A. Gouveia have been engaged in making a collection of Hawaiian land shells, both ground and tree. We have accumulated specimens of shells from nearly all valleys and ridges on the island of Oahu. We have complete data as to the exact locality and habits, so it can be seen that the writer has a good proof, from his series, of Gulick's theories of segregation or isolation. This idea has been written and followed out by many other collectors and students until it is well known in the scientific world. One of the best examples of this is seen in Dr. Cooke's paper on *Achatinella multizona*.

DISTRIBUTION OF *Achatinella cestus* FROM MANOA-PALOLO RIDGE TO WAILUPE-NIU RIDGE.—*Achatinella cestus* (Newcomb) is found mostly on lehua or one of its related plants having a rather large dark green and glossy leaf, on Ieie, Opiko and Lantana, and nearly always under leaves, with the exception of the Wailupe-Niu locality where they are found mostly on Lantana stems. They are nearly always found sealed. The only time they are found extended is when they are disturbed by wind or rain or accidentally brushed off, so they must be nocturnal as Dr. Cooke surmises (1).

They are very variable in color from white to very dark brown. They are lighter on the western part of the range and become darker towards the eastern part. The greater part of these shells have a white border band (2).

¹Contribution from the Gulick Natural History Club.

The writer has specimens from five different localities. Four of these localities are on ridges and the other in a valley. First locality, Manoa-Palolo Ridge: Fossil specimens in collection as catalogued, Cat. No. 487, four sinistral and No. 492 three sinistral, making a total of seven sinistral specimens.

Second locality, Palolo-Waialae Nui ridge: Fossil and living specimens, Catalogue No. 61 nine dextral, No. 382 two dextral and two dextral fossil specimens not catalogued. Total, eleven dextral live specimens and two dextral fossil specimens.

Third locality, Waialae-Nui valley: Catalogue No. 38 seven dextral specimens, No. 383 one dextral specimen, No. 39 seven dextral specimens. Total, fifteen dextral specimens.

Fourth locality, Waialae Iki-Wailupe ridge: Catalogue No. 28, fifty-two sinistral specimens.

Fifth locality, Wailupe-Niu ridge: Catalogue No. 14, two hundred and twenty-two sinistral specimens.

Summary.

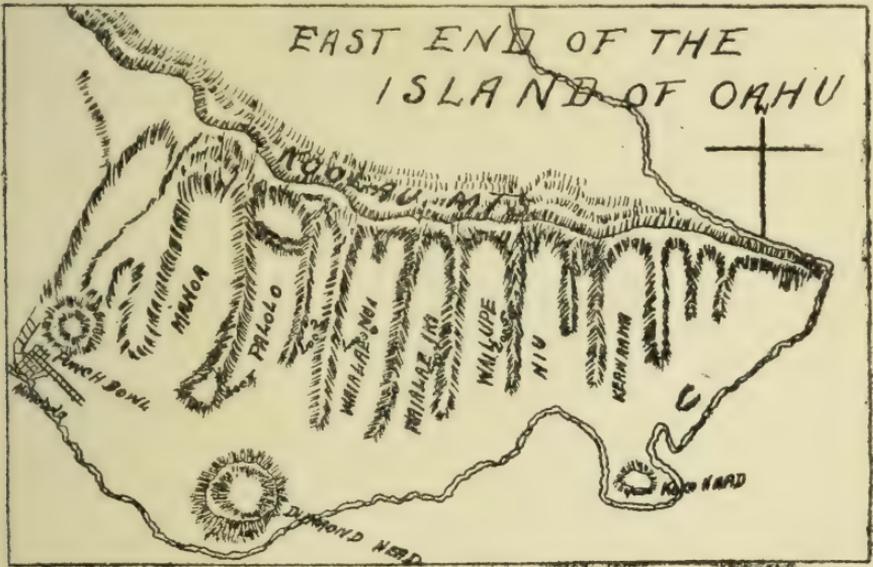
	Fossil.		Live.	
	Dextral.	Sinistral.	Dextral.	Sinistral.
1st locality . . .	—	7	—	—
2nd " . . .	2	—	11	—
3rd " . . .	—	—	15	—
4th " . . .	—	—	52	—
5th " . . .	—	—	—	222
	—	—	—	—
Totals. . .	2	7	78	222

Thus it can be seen from the above given data the specimens increase in number from west to east, the first ridge having no live specimens and the last having the most. What does this signify? Does not this signify that since Diamond Head and Punchbowl came into eruption, climatic conditions have changed which resulted in the elimination of *cestus* from the neighborhood of the two now extinct volcanoes?

Now, in relation to the fossils found on location one, this is the nearest locality to Diamond Head; the second locality a little further away; the third still further; and the fourth and

fifth, the furthest of all, say about seven miles comparing with about two and one-half miles, locality one.

The fossils were found lower than the live specimens on the ridges, and as we go east the live specimens are found higher up on the ridges or further away from the lower limits as indicated by the fossils.



In 1916 while the Honolulu Water Works were digging a ditch for a pipe line, fossils of *Achatinella montaguei* and *buddi* were found by A. Gouveia buried about four feet deep in Manoa valley near Manoa tennis court. The *montaguei* is now extinct and the *buddi* nearly so in other localities. They are however extinct in the above given locality. These shells thrived very low once, and owing to the climatic changes the forest has disappeared, thus explaining the present distribution.

The strongest evidence yet is indicated by fossil ground shells, catalogue numbers 932 to 942 inclusive, *Leptachatina oryza* and a few other unnamed varieties which were collected on the western slope of Diamond Head, also catalogue Nos. 859 to 869 inclusive. *Amastrea transversalis* also *Endodonta* and *Leptachatina*, Nos. 972 to 975 inclusive, collected on the town side of

Punchbowl. These shells are frequent in occurrence and now extinct. Dr. C. H. Hitchcock gives a very good account of the geological occurrence or position of these shells on Diamond Head and Punchbowl (3).

We have also collected *Amastra* fossils from Kahuku, Moku-leia and Kwaihapai.

The cause of recent disappearance is the destruction of the forest, collecting by people, and ravages of cattle and goats. An example of this is found on Olomana where Dr. Gulick collected in or about 1850. In the fifties this peak was covered with forest which has disappeared. *Achatinella phæozona* was found on Olomana where it is not now found owing to the disappearance of the forest.

Papers referred to.

1. Cooke, C. Montague.—Distribution and Variation of *Achatinella multizonata* from Nuuanu Valley. Occasional Papers, Bernice Pauahi Bishop Museum, Vol. II, No. 1-5, pp. 65-76.

2. Thwing, E. W.—Occasional Papers of the Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History, Vol. III, No. 1, 1907, pp. 13. Original Descriptions of *Achatinella*.

3. Hitchcock, C. H., and Dall, W. H.—Geology of Oahu, Bulletin of the Geological Society of America, Vol. II, pp. 15 to 60, February, 1900. Notes of Fossil Land Shells on pp. 54-55.

A NEW CYPRAEA FROM HAWAII.

BY J. M. OSTERGAARD.¹

CYPRAEA PACIFICA, n. sp. Plate 2, lower five figs.

Whitish to cream color, richly ornamented with chestnut-brown spots, evenly sprinkled over the dorsal surface; base, aperture and teeth, white; resembles *C. cernica* Sowb. in form, having in common with that species elevated and pitted mar-

¹ Contribution from the Gulick Nat. Hist. Club.

gins, though less pronounced; teeth small and delicately cut, not confined to aperture, all extending evenly over a narrow zone of the base.

The largest and the smallest of five specimens, dredged from Honolulu harbor channel in 1915, measure in length 20 and 14 mm. respectively. The shells were all dead, but in a good state of preservation.

Type, one specimen in the author's collection.

REVIEW OF THE THYSANOPHORA PLAGIOPTYCHA GROUP.

BY H. A. PILSBRY.

In the course of identifying specimens of this group from Mexico and Panama it became necessary to examine all of the material in the collection of the Academy, some 46 lots of from one to several hundred specimens each. As some synonymy is involved, it may be well to put the results on record.

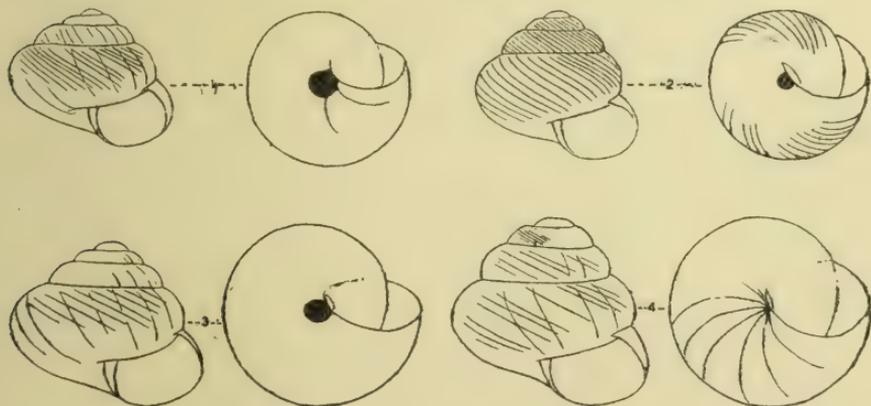


Fig. 1. *Thysanophora fuscula* (C. B. Ad.), Jamaica. Fig. 2, *T. plagioptycha* (Shuttl.), Humacao, Porto Rico. Fig. 3, *T. plagioptycha*, Fikahatchee Key, Florida. Fig. 4, *T. cæcooides* (Tate), Panama City.

These forms were considered to belong to the genus *Acanthinula* by Strebel and some other authors. The sculpture, however, is only superficially like that genus, but exactly like such

typical *Thysanophoras* as *T. conspurcatella* and *hornii*. There are also species intermediate in shape, such as *T. fuscula* and *T. intonsa*, leading from the depressed to the conic forms. It would be easy to tell absolutely where these snails belong if specimens containing the animal were available.

Though not strictly germane to the subject of this paper, it may be mentioned that *Trichodiscina crinita* Fulton, Proc. Malac. Soc., London, XII, 240, from Colombia, is a species of *Thysanophora*. Some allied forms are known from Venezuela as well as from Mexico. It has about the shape of *T. conspurcatella* or *hornii*. The latter, when perfectly preserved, also has hairs.

THYSANOPHORA FUSCULA (C. B. Adams). Fig. 1.

Helix fuscula C. B. Ad., Contrib. to Conch. no. 2, 1849, p. 35.

Thysanophora fischeri Pilsbry, Proc. A. N. S. Phila. 1903, p. 763, pl. 49, fig. 6, 6a.

This Jamaican species has a wider umbilicus than others of the group, contained about 6.4 times in the diameter of shell. The figures are from a specimen from Adams, measuring: Alt. 2.15, diam. 2.55 mm., umbilicus 0.4 mm.

The sculpture of rather coarse growth wrinkles and minute, oblique, retractive cuticular threads, does not differ materially from that of *T. plagiptycha*.

I can see no material difference between the Jamaican shells and those taken near Victoria, Tamaulipas by S. N. Rhoads, and in the region of Tampico by A. A. Hinkley, and which I described as *T. fischeri*. In these the umbilicus is contained about 7 times in the diameter. When describing this form I did not think to compare with the Jamaican snail. Like some other minute species of the region, it will probably be found to be more widely spread than now known.

THYSANOPHORA PLAGIPTYCHA (Shuttleworth). Fig. 2.

Helix plagiptycha Shuttl., Mittheil. der Naturforschenden Gesellschaft in Bern, 1854, p. 37 (Porto Rico and Vièque).

Helix ierensis Guppy, Proc. Scient. Asso. Trinidad, 1869, p. 242; Amer. Journ. of Conch. VI, 1871, p. 307, pl. 17, fig. 4. Pfeiffer, Mon. Hel. Viv. VII, p. 549.

A specimen from Humacao, Porto Rico, which may be taken as type locality, is figured. It scarcely shows growth striae, but the oblique cuticular threads are very well developed, extending upon the base. The umbilicus is contained between 10 and 11 times in the diameter. Alt. 2.25, diam. 2.5 mm., umbilicus 0.23 mm.; $4\frac{1}{2}$ whorls.

The specimens from Florida (fig. 3, Fikahatchee Key) are often larger, diam. 3 to 3.2 mm., with the umbilicus slightly larger, $7\frac{1}{2}$ to 8 times in the diameter. The sculpture is rarely so perfectly developed (or preserved) as in the Porto Rico shells. It is a common species on the keys and in some places on the mainland, as at Miami and Osprey.

A single small example from Brownsville, Texas, has the umbilicus remarkably small, contained about 14 times in the diameter. It is more depressed than *T. cæcoides*. It may represent a distinct race, but further material is needed.

Guppy has recorded the species (as *Helix ierensis*) from Trinidad. Specimens are at hand from St. Lucia (Tate), Cariaco, Venezuela (F. R. Cocking) and the U. S. of Colombia (R. Swift coll.). All of these are rather openly umbilicate, like the most widely umbilicate Florida shells, but not as open as *T. fuscula*.

The late Mr. E. A. Smith, in his excellent paper on Trinidad shells (Journ. of Conch. VIII, p. 239), considered *plagiptycha* and *ierensis* synonyms of *fuscula* Ad., but while the difference is not great, I have been unable to trace a real transition in the size of the umbilicus, and for the present it seems best to recognize the distinction. I have seen but three Jamaican specimens, however.

THYSANOPHORA CÆCOIDES (Tate). Fig. 4.

Helix cæcoides Tate, Amer. Journ. of Conch. V, p. 153, Feb., 1870.

Helix guatemalensis Crosse et Fischer, Journ. de Conchyl. XX, p. 222, 1872; XXI, p. 274, pl. 9, fig. 3, 1873; Miss. Sci. Mex., Moll., II, p. 664, pl. 71, figs. 9-9b (Guatemala, Sarg.).

Acanthinula granum Strebel, Beitrag Mex. IV, 1880, p. 31, pl. 4, f. 13 (Plantage Mirador).

Yucatan: Progreso (Heilprin Exped. 1890). Guatemala:

Quirigua (W. P. Cockerell, 1912). Nicaragua: Chontales forest, in moss on trees (Tate, type of *H. cæcoides*). Rep. de Panama: Boco del Toro (Tate, in A. N. S. P.); City of Panama (James Zetek).

This species differs very little from *T. plagiptycha* or *fuscula* in size, general shape and sculpture, but is readily distinguished by the very small, partly covered umbilical perforation. The umbilicus, while small, is much larger in the other species.

Part of the type lot of *T. cæcoides* is in the collection of the Academy, No. 12159, received from Prof. Tate. The original figures of *H. guatemalensis* are hardly recognizable, but those in the Mexican monograph are fairly good. I am not quite sure that the East Mexican *Acanthinula granum* Strebel (1880) belongs to this species, but the photographic figure shows only a very small umbilicus as in *cæcoides*. This may be taken up when topotypes are available.

The locality records are all for specimens in the collection of the Academy. Specimens from Costa Rica are still wanting.

LAND SHELLS OF MAINE.

BY E. G. VANATTA.

While botanizing in Maine in 1916 Mr. Bayard Long collected leaf mould containing land shells at numerous localities. A list of these stations with brief statement of the conditions and the dates is given below, the locality being condensed to a single word in the following list of species.

While most of the species have been known from Maine, it is hoped that the list will have interest to those who may study the details of distribution in the State.

York Co.—In moist woods bordering the salt marsh at Kittery, viii, 11; in moist woods at York, viii, 9; at the edge of a spring rill on the border of the salt marsh at Wells, viii, 8; in moist thickets along a small stream at Limington, viii, 29.

Cumberland Co.—In a moist wooded gully near Steep Falls in Baldwin, viii, 28; around Sand Pond, Baldwin, viii, 30; Douglas Hill in Sebago, viii, 30.

Sagadahoc Co.—Back River Creek, Woolwich, ix, 15; near a marsh at Bowdoinham, ix, 9 and ix, 14.

Hancock Co.—In a deciduous woods near Green Pond, viii, 18.

Kennebec Co.—On wooded terraces along Kennebec River at Sidney, viii, 18.

Somerset Co.—On wooded terraces along Kennebec River at Fairfield, vii, 24.

Piscataquis Co.—Under logs and boards along the Piscataquis River at Abbott, viii, 15.

Penobscot Co.—On the wooded gravel terrace along Souadabcook Stream at Hampden, ix, 8 and ix, 11; from the wooded rocky ledge along the Penobscot River near Hampden Corner in Hampden, ix, 8; near the Penobscot River at Veazie, viii, 4; Orono, viii, 3 and viii, 24; in alluvial woods along the Penobscot River at Old Town, vii, 27; Otter Chain Pond at Milford, viii, 25; in moist river shore thickets at Winn, viii, 10.

Aroostook Co.—In rich woods near Maduxnekeag River at Monticello, vii, 12; in rich woods at Houlton, viii, 13, 1916.

Polygyra fraterna cava P. & V. Sebago, Sidney, Fairfield, Hampden, and Hampden Corner.

Strobilops labyrinthica Say. Kittery, Green Pond, Sidney, Fairfield, Abbott, Hampden, Winn, and Monticello.

Strobilops affinis Pils. Sebago.

Gastrocopta pentodon Say. Sidney, Abbott, Hampden Corner, and Winn.

Gastrocopta pentodon tappaniana Ad. Old Town.

Vertigo ventricosa Morse. Kittery, Green Pond, Fairfield, Orono, and Winn.

Vallonia excentrica St. Kittery and Orono.

Acanthinula harpa Say. Fairfield.

Columella edentula Drap. Sidney and Monticello.

Cochlicopa lubrica Müll. Bowdoinham, Sidney, Abbott, Fairfield, Hampden, Hampden Corner, and Orono.

Circinaria concava Say. Bowdoinham, Sidney, and Fairfield.

Vitrina limpida Gld. Kittery, Old Town, and Winn.

Polita hammonis Strom. York, Limington, Bowdoinham, Green Pond, Sidney, Fairfield, Abbott, Hampden, Orono, Old Town, Winn, and Monticello.

Polita binneyana Morse. Sebago, Sidney, Abbott, and Hampden.

Polita indentata Say. York, Green Pond, and Fairfield.

Paravitrea lamellidens Pils. Green Pond, Sidney, and Abbott.

Euconulus chersinus Say. Abbott.

Euconulus fulvus Müll. Sebago, Bowdoinham, Hampden Corner, and Winn.

Zonitoides arborea Say. Kittery, Sebago, Bowdoinham, Green Pond, Sidney, Fairfield, Abbott, Hampden Corner, Orono, and Monticello.

Zonitoides minuscula Binn. Sidney.

Striatura ferrea Mrse. York, Steep Falls, Green Pond, Sidney, and Houlton.

Striatura exigua Stm. Steep Falls, Sebago, Green Pond, Fairfield, Abbott, Old Town, Winn, Milford, and Monticello.

Striatura milium Mrse. York, Baldwin, Green Pond, Sidney, Abbott, Hampden, Old Town, and Winn.

Agriolimax campestris Binn. Orono.

Agriolimax agrestis L. Orono.

Arion circumscriptus Jhn. Orono.

Pyramidula alternata Say. Sidney, Fairfield, Hampden, and Hampden Corners.

Pyramidula c. anthonyi Pils. Kittery, Sidney, Fairfield, Abbott, Hampden, Orono, and Winn.

Pyramidula c. catskillensis Pils. York, Limington, Sebago, Fairfield, Abbott, Hampden Corner, Winn, and Monticello.

Pyramidula (Planogyra) asteriscus Mrse. Winn.

Helicodiscus parallelus Say. York, Steep Falls, Green Pond, Sidney, Abbott, Fairfield, Hampden Corner, Orono, Old Town, Milford, and Monticello.

Punctum pygmaeum Drap. York, Green Pond, Sidney, Fairfield, Abbott, Hampden Corner, and Winn.

Succinea retusa Lea. Bowdoinham and Fairfield.

Succinea ovalis Say. Kittery, Limington, Woolwich, Bowdoinham, Sidney, Fairfield, Abbott, Hampden, Hampden Corner, Veazie, Orono, Old Town, Milford, Winn, and Monticello.

Succinea arava Say. Limington, Bowdoinham, and Veazie.

Succinea aurea Lea. Wells.

Carychium exile canadense Cl. Sidney, Fairfield, Abbott, and Monticello.

Carychium exiguum Say. Bowdoinham, Old Town, and Winn.

ANCYLUS OBSCURUS HALDEMAN AND SPECIES REFERRED TO IT.

BY BRYANT WALKER.

I.

The available information down to 1903 in regard to Halde-
man's species was summarized in my paper in the NAUTILUS,
XVII, p. 25. The re-discovery of *A. obscurus* by Goodrich in
1913 (NAUT., XXVII, p. 92) in the South Fork of the Powell
River at Big Stone Gap, Wise Co., Va., has enabled the specific
standing of that species to be definitely determined and given
a basis for comparison with other forms that have been referred
to it.

Through the courtesy of Miss Crystal Thompson, the Curator
of the Amherst College Museum, I have been able to examine
all of the *Ancylidæ* in the C. B. Adams collection. This
material with some other in my own collection obtained from
different sources has enabled me to come to conclusions, more
or less definite, in regard to the recorded citations of Halde-
man's species in Florida and the West Indies.

The doubt expressed by Bourguignat, Tryon and Clessin as
to the correctness of the West-Indian citations proves to be
fully justified.

In the Adams collection are two lots labeled "*A. obscurus?*
Hald." These contain three very distinct species, none of
which is *obscurus*. They will be considered separately.

One of these, however, is identical with a set in my own col-
lection received as "*A. obscurus?*" from Sowerby and Fulton
and these again are the same as a set in the MacAndrew collec-
tion labeled "*A. chittyi* Ads." from Guadeloupe. The original

label is with these specimens, but I have not been able to identify the handwriting. It is quite possible that they came from Marie as MacAndrew had considerable material from the Marie collection. These shells do not at all agree with Adams' description of *chittyi* nor with the figure of that species given by Bourguignat in the J. de Con., IV, 1853, p. 172, pl. VI, fig. 10. Unfortunately Bourguignat does not state whether his figure was drawn from the unique type in the Chitty collection or not. It seems possible that the citation of *obscurus* from Guadeloupe by Fischer in 1853, which Mazé in 1883 states had not been verified to his knowledge, may have been based on similar specimens. Curiously enough, however, I have a specimen of this same species received from Geret of Paris as from the Crosse collection, which has no specific name attached whatever.

The citation of *A. obscurus* from St. Thomas rests entirely upon Shuttleworth's citation in his "Catalogue of the Terrestrial and Fluvial Shells of St. Thomas" (Ann. Lyc. Nat. Hist., N. Y., VI, 1854, p. 72) and repeated in his paper on "The Land and Fresh-water Shells of Porto Rico" (Diag. Neuer Moll., No. 6, 1854, p. 99). Shuttleworth expressly states that he relied on Adams' identification for the name. In the Adams collection is an unidentified set of a small *Ancylus* from St. Thomas received from Bland and, no doubt, collected by him on his visit to that island in 1852, which is entirely different from Haldeman's species. Bland in his notes to Shuttleworth's paper (1. c. p. 68) states that he had sent to Shuttleworth specimens of all the species that he had collected on St. Thomas and, though it is possible that Shuttleworth's specimens were received from his own collector, Blauner, it is probable, especially as he relied on Adams' identification, that were received from Bland and, if so, were, no doubt, part of the same lot in the Adams collection.

As suspected at the time and intimated in my paper (1. c. 26) the Floridan species referred to *obscurus* by Dall is quite different also.

I have not been able to obtain any additional information in regard to the species from Porto Rico referred to *obscurus* by

Shuttleworth (1. c. p. 98). But it is very improbable that it is really Haldeman's species.

All this leads to the very definite conclusion that *A. obscurus* Hald. is restricted to the head-waters of the Tennessee system in Virginia and Tennessee and does not occur in Florida or the West Indies.

Clessin (Con. Cab., *Ancylus*, p. 14) designated *A. obscurus* as the type of his group, *Haldemania*. As both the genuine *obscurus* and the species that he took for it are *Lævapices* it is immaterial which should be considered to be his type. *Haldemania* having been preoccupied by Tryon (1862), Clessin's name can not be used and must fall into the synonymy of *Lævapex*.

. II.

FERRISSIA (LÆVAPEX) OBSCURA (Hald.).*

Ancylus obscurus Haldeman, Mon., 1844, p. 9, pl. I, fig. 5; W. G. Binney, L. and F.-W. Shells, Pt. II, 1865, p. 139, fig. 232.

Haldeman's unique type came from the Nolachucky River, below Greeneville, Tenn. It measured: Length 5, width 3.5, alt. 1.5 mm. I have before me three specimens (Coll. Walker, No. 36292) collected by Goodrich in the South Fork of the Powell River at Big Stone Gap, Wise Co., Va. They measure respectively: Length 6.5, width 5, alt. 2.5 mm.; length 6.3, width 4.5, alt. 2 mm.; length 5.3, width 4, alt. 1.5 mm.

It will be noticed that the dimensions of the smallest specimen agree quite exactly with those of Haldeman's type. It also agrees in other particulars with his description and I have no doubt but that it is the same species. If so, the type was not fully matured and the largest specimen given above and to be figured hereafter represents the fully matured form. As shown by the figures it is an obovate shell, broadly rounded anteriorly and regularly, though more narrowly, rounded posteriorly, the lateral margins being about equally curved; the

* The species will be figured in connection with the concluding part of this paper.

anterior slope is nearly straight; the posterior slope slightly concave; the left lateral slope nearly straight or only slightly convex and the right lateral slope concave; the apex is obtuse, smooth except for concentric wrinkles, situated nearly on the median line, slightly turned toward the right and at about one-third of the length; the lines of growth are fine, but distinct and regular, the surface is somewhat obsoletely wrinkled towards the margins, but there are no indications of radial striæ; the color is a yellowish horn-color, slightly tinged with green.

Compared with *F. diaphana* (Hald.) and *F. kirklandi* (Walk.) to which it is most nearly related, it is less circular in outline, the apex is more prominent, the lateral and posterior slopes are unlike and the color is different from the former, and it is less elongated and has the apex more obtuse and less excentric than the latter.

So far as appears from the small series examined, it would seem to be clearly entitled to specific distinction.

III.

FERRISSIA (LÆVAPEX) DALLI, n. sp.

? *Ancylus obscurus* Clessin, Con. Cab., *Ancylus*, 1882, p. 19, pl. VI, fig. 4.

Ancylus obscurus? Walker, NAUT., XIII, 1903, p. 26, pl. I, figs. 16-18.

Type locality, Lake Helena, Volusia Co., Fla.

Type No. 25521 Coll. Walker. Cotypes in the collection of A. A. Hinkley.

The doubt expressed in my paper of 1903 (l. c.) as to the identity of the Floridan species referred to *obscurus* Hald. by Dall proves to have been well taken. As shown by a comparison of the description and figures given in 1903 as cited above and those of the genuine *obscurus* herein, the Floridan species is entirely different and is more closely related to *F. peninsulæ* (P. and J.) than it is to *obscurus*.

I have already (l. c.) called attention to the resemblance of the shell described and figured by Clessin as *A. obscurus* to this form. He gives no information as to the history of the speci-

men figured, but it is so different from the genuine *obscurus*, that I have but little hesitancy in referring it to this species.

As the Floridan form is a well-marked and distinct species, it must be recognized and I take pleasure in associating with it the name of Dr. Dall, who first called attention to its occurrence in Florida.

(*To be continued.*)

A NEW SPECIES OF MITRA FROM CALIFORNIA.

BY WM. HEALEY DALL.

MITRA ORCUTTI, new species.

Shell small, white, mottled with yellow brown, with five whorls of which the white smooth blunt nucleus comprises one; suture distinct, whorls moderately convex; spiral sculpture of (between the sutures four, on the last whorl about a dozen) strong rounded close-set cords closely undulated behind the periphery by numerous low narrow axial riblets with about equal interspaces; the cords in front of the periphery are not undulated, but extend to the end of the canal; there are also very fine axial striae in the interspaces; aperture narrow, simple, the pillar with two plaits, the canal hardly differentiated. Height of shell 5.6; of last whorl 2.6; diameter 2.7 mm. U. S. N. Mus. Cat. No. 334567. La Jolla, near San Diego, Cal.; C. R. Orcutt.

CHANGES IN WESTERN MOLLUSCAN FAUNAS.

BY JUNIUS HENDERSON.

In 1889 Professor T. D. A. Cockerell (Jour. Conch., VI, 61) reported the following species as obtained by Mr. Charles T. Simpson in Lodgepole Creek, Northeastern Colorado:

Lampsilis anodontoides (Lea).

Lampsilis ventricosa (Barnes).

Lampsilis luteola (Lam.).

Anodonta grandis gigantea Lea.

Except the *Anodonta* these species have not yet been recorded anywhere else in Colorado, though we have in the University of Colorado Museum unreported specimens of the *Anodontoides* from Julesburg, Denver and Boulder. Possibly *Lampsilis* no longer lives in the State. In 1912, in company with Dr. Max M. Ellis, I visited Lodgepole Creek and searched the stream from the northern state boundary to its junction with South Platte River. We found no Unionidae except some dead shells of *Anodontoides*. Perhaps that species was still living in a deep pool a few rods south of the state boundary, though in seining it for fishes we found none. A rancher near by told us there were "clams" in the pool. The rest of the stream was shallow and so narrow one could step or jump over it in most places. Probably later in the summer of dry, hot seasons, when the natural flow was diminished and the demand for irrigation water is great, it may entirely dry up in its lower course. I wrote to Mr. Simpson, calling his attention to present conditions and the evident disappearance of the *Lampsilis*, and asking what the conditions were when he was there. He replied that as he recalled it the creek was then from 6 to 10 feet wide, but that the taking of water from the South Platte for irrigation had caused the river to go dry at Julesburg during his three years residence, and suggesting that the same thing had likely since happened in the creek. This seems exceedingly probable. Mr. Simpson also added: "The *Unio anodontoides* is probably *Lampsilis fallaciosus*, not then recognized." My intention in 1912 was to publish an account of our experience, but it was side-tracked and finally passed out of mind. It has recently been brought forward by finding in the report of the Fremont Expedition, 1845, p. 25, the statement that on July 6, 1842, Lodgepole Creek was a "clear, handsome stream" (hence at low water stage), with a "uniform breadth of twenty-two feet and six inches in depth." This confirms the supposed diminution of water in the stream in recent times.

In 1906 the bed of the lower portion of Crow Creek, east and northeast of Greeley, Colorado, was dry, except just after storms, the water percolating through the deep sand in the channel, a characteristic of many western streams. Up stream, just above

where the water disappeared, was a series of clear, rather deep pools, called "water holes," connected by a tiny, clear rivulet. In one of these pools was collected that year the type lot of *Sphaerium hendersoni* Sterki. Then came the "boom" in dry lands in Eastern Colorado. Scores of small tracts of prairie sod, many of them on steep slopes, were broken by the settler's plow. The dry soil, no longer held together by the sod, was carried into the valley by summer storms, filling many of the pools and depositing a thick coat of mud over the whole stream bed. In June, 1912, I revisited the locality, and found no clear water at all, and not a single mollusk of any species. The sluggish stream carried a heavy load of silt so fine it would not settle. Probably the *Sphaerium* is extinct at the type locality.

It is likely that innumerable changes in the faunas of the West are occurring as a result of the settlement of the country and consequent changes in environment. This is known to be true of birds and mammals. For this reason it is desirable that biological work in this vast region be pushed as rapidly as possible, to provide data for future estimates of biological changes.

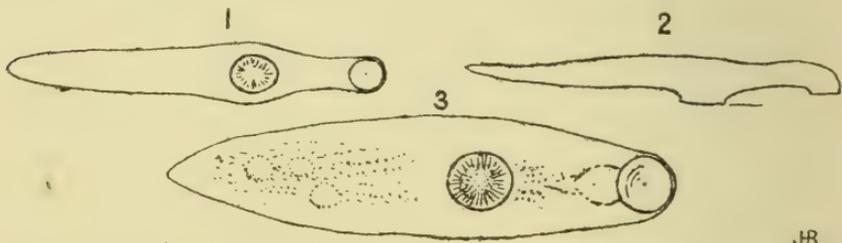
NOTES.

HODGSON COLLECTION. I have just secured the collection of the late Chas. S. Hodgson, containing some 2500 to 3000 species, a few fossils and books. Besides his work in Illinois he did considerable collecting in other places and added to the collection by exchange and purchase.—A. A. HINKLEY.

DR. G. DALLAS HANNA, who for eight years has been an assistant in the United States Bureau of Fisheries, has been appointed curator of invertebrate paleontology in the California Academy of Sciences. Dr. Hanna has for seven seasons been engaged in scientific work on the Pribilof Islands, Alaska, having taken the census of the fur seal herd for five consecutive years. He brings to the museum of the Academy his collection of mollusks which numbers about 100,000 specimens.

FLUKE IN PHILOMYCUS. It may be of interest to the readers

of the NAUTILUS to record the fluke found in *Philomyces carolinianus* collected at Munsonville, N. H., July 7, 1919. So little is known regarding this interesting and important microscopic animal and its destructive nature to sheep, cows and even man, I think it is well worth recording. As far as I know this is the first instance of the fluke being found in *Philomyces*. The life history of the fluke is so meagre it is impossible for me to determine the species, but the accompanying enlarged figures will give an idea of their appearance. They were transparent and without pigment spots.—J. H. BLAKE.



Figs. 1, 2 from life; fig. 3 camera drawing, under cover glass.

PUBLICATIONS RECEIVED.

DESCRIPTIONS OF NEW SPECIES OF MOLLUSCA FROM THE NORTH PACIFIC OCEAN IN THE COLLECTION OF THE UNITED STATES NATIONAL MUSEUM. By William H. Dall (Proc. U. S. Nat. Mus., vol. 56, pp. 293-371, 1919). In this paper 222 new forms are described. The standing of the genus *Neptunea* Bolten, is discussed, the name restricted to the boreal Trophons and Sars' *Boreotrophon* relegated to the synonymy.

NEW SPECIES OF AMNICOLA FROM GUATEMALA. By Bryant Walker (Univ. Mich., Occasional PAPERS, Mus. Zool., No. 73, Sept. 30, 1919). Four new species are described and figured. They were collected by Mr. A. A. Hinkley.

NOTES ON NORTH AMERICAN NAIADES II. By Bryant Walker (Univ. Mich., Occasional PAPERS, Mus. Zool., No. 74, Sept. 30, 1919). The *Unio tenerus* Ravenel, and the *Lampsilis modioliformis* Lea, are both thoroughly reviewed and figured.

ONCHIDIUM AND THE QUESTION OF ADAPTIVE COLORATION. By W. J. Crozier and L. B. Arey (Amer. Nat., vol. 53, pp. 415-430, Sept.-Oct., 1919).

FAUNA OF THE CHILKA LAKE, MOLLUSCA, GASTEROPODA AND LAMELLIBRANCHIATA by N. Annandale and S. Kemp. ANATOMY OF SOLEN? FONESI by E. Ghosh. NUDIBRANCHIATA by Sir Charles Eliot (Mem. India Mus., vol. 5, No. 4, pp. 327-379, pls. 14-16). The occurrence of *Ostrea virginica* in the warm waters of India seem very remarkable or problematic.

THE INDIAN VARIETIES AND RACES OF THE GENUS TURBINELLA. By J. Hornell, WITH NOTE ON THE GEOLOGICAL HISTORY OF TURBINELLA IN INDIA. By E. Vredenburg (Memoirs Indian Museum, vol. 6, No. 2, pp. 109-125, pls. 10-12). An exhaustive study of the variation of the Chank shell (*Turbinella pyrum* Linn.). Four new varieties are recognized, *obtusa*, *acuta*, *globosa* and *comoriensis*. The author's ideas of the rule of priority seem somewhat vague as he makes *rapa* Gmelin a form of his new var. *obtusa*.

FRESH-WATER MUSSELS AND MUSSEL INDUSTRIES OF THE UNITED STATES. By Robert E. Coker (Bull. Bureau of Fisheries, Oct., 1919, vol. 36, pp. 13-89, pls. 1-46 and map). A most interesting account of a great industry. Part I, describes and figures the species of economic value, about 41 in number. Part 2, the value and extent of the fishery, apparatus, methods, etc. Part 3, the manufacture of pearl buttons, with numerous illustrations.—C. W. J.

PROCEEDINGS OF THE MALACOLOGICAL SOCIETY OF LONDON, VOL. 13, PTS. 5 AND 6, OCT., 1919.

Description of two new species and a new sub-genus of land shells from China. By G. K. Gude, pp. 118, 119. A new *Trochomorpha* (*T. lancasteri*) and a new sub-genus and species of *Cathaica*, *C. (Trichocathaica) lyonsae*, are described and figured.

Notes on Hygromia limbata (Drap.). By Hugh Watson, pp. 120-132, pls. 2 and 3. A full description of its anatomy, etc.

On Helix revelata Britt. Anctt. (non *Férussac*, nec *Michaud*), and the Validity of *Bellamy's* name of *Helix subvirescens* in lieu of it for the British Mollusc. By A. S. Kennard and B. B. Woodward, pp. 133-136.

On the generic names for two British Ellobiidae [olim Auriculidae]. Myosotis, Draparnaud, (= denticulatus Montagu) and bidentatus, Montagu. By A. S. Kennard and B. B. Woodward, pp. 136-139.

E. Forbes's notes in his copy of S. Lovén's Index Molluscorum Scandinaviae occidentalia habitantium. By A. Reynell, pp. 140-141.

On Opeas strigile (M. & P.) and its allies. By M. Connolly, pp. 142-144, 4 figs.

Addendum to remarks on the recent species of Morum, Bolten. By J. C. Melvill, p. 145.

Notes on the non-marine Mollusca observed in East Ross and the Orkney and Shetland Islands. By K. H. Jones and A. S. Kennard, pp. 146-152.

Description of Ampullaria mermodi, n. sp. By G. B. Sowerby, pp. 152-153, with fig.

On Ammonites navicularis Mantell. By the late G. C. Crick, pp. 154-160, pl. 4.

On a Sandstone cast of Aturia aturi (Basterot), from the miocene of Western Australia. By R. B. Newton, pp. 160-167, pls. 5, 6.

The Mollusca of Marsascirocco Harbor, Malta. By G. Despott, pp. 168-183, with map.

THE JOURNAL OF CONCHOLOGY, VOL. 16, No. 2, AUGUST, 1919.

Brachypodella oropouchensis, nov. sp. from Trinidad, W. I. By Geo. C. Spence, pp. 42-43, pl. 1.

Tropidophora standeni, nov. sp. from Madagascar. By Geo. C. Spence, p. 43, pl. 1.

Field Notes on Helicodonta obvoluta Müll. By H. Beeston, pp. 44-50.

Spirula peroni Lamarck in North Devon. By Alan Gardiner, p. 50.

Occurrence of Hartmannia septemspiralis and H. patula in England. By H. C. Huggins, pp. 51-52.

Genitalia of Azeca tridens and Cochlicopa lubrica. By A. E. Boycott, pp. 53, 54, figs.

Parthenogenesis in Paludestrina jenkinsi. By A. E. Boycott, p. 54.

Sinistral Limnaea pereger Müll. and its progeny. By J. H. Hargreaves, pp. 55-57.

Notes on Limnaea pereger m. sinistrorsum. By W. H. Hutton, pp. 58, 59.

On a colony of Cochlicopa lubrica Müll. By S. S. Pearce, p. 59.

Note on the reproduction of Obeliscus obeliscus. By Geo. C. Spence, p. 67.

THE NAUTILUS, XXXIII.



NAVAJO MOUNTAIN
Arizona-Utah line

From American Botanist, Phot. U. S. Geol. Survey

THE NAUTILUS.

Vol. XXXIII

APRIL, 1920.

No. 4.

THE NAVAJO NATION.

BY JAS. H. FERRISS.

Sixty miles west of the corner post of Arizona, New Mexico, Colorado and Utah, the 1919 summer class in archæology, Arizona University, encamped at the foot of Navajo Mountain. Here is the greatest number of ancient cliff cities and villages and the greatest of known natural bridges. In scenery, colors, heroic size and architecture, it is Grand Canyon in character. Navajo Mountain astraddle the Arizona-Utah line stands on the south rim of the Grand Canyon, a short distance above Marble Canyon and Lee's Ferry.

In reality the region from the Mesa Verde National Park, Colorado, on the east, to the Zion National Park, Virgin River, Arizona, on the west, it is something of a wonder-spot of the world, and all of it astonishing. The greater cliff ruins, Mesa Verde, Keet Seel, Betatakin and many others as interesting; the Monument Park, a plateau of natural pinnacles and steeples, and the Chinle and Canyon de Chelly valleys are along the eastern border. Then westward lie the painted deserts, petrified forests, the Grand Canyon, the Kaibab forest, underground lakes of Kanab, lava cones of Mount Trumbull, Hurricane Fault, Grand Wash, canyons of Virgin River, plains of wild horses and the largest Indian population in the United States still living in the Indian way. Except to the explorers, archæologists, geologists and mineralogists it is the great unknown of America, and the farthest from a railway.

Dr. Byron Cummings, dean of archæology, Arizona Univer-

sity, and his explorer-companion, John Wetherill, post-trader and postmaster at Kayenta, Ariz., have explored and studied conditions here at this eastern border for more than twenty years, and by right of discovery (as in conchology) should have their names attached to the greater number of ruins and bridges, for they have been the first discoverers, scientifically. Herbert E. Gregory¹ for the government has made a thorough geologic survey of this eastern section covering the Navajo nation, some 22,725 miles. Others before Gregory have written and surveyed, but he is the latest and best authority. Col. Roosevelt and his boys, Zane Grey, the Kolb Brothers and other strenuous persons have visited the Rainbow Bridge but not over 150 white people all told have made the journey. Thus to the students in botany, archæology, conchology, entomology and the reptile hunters, it is a field of great promise. The health seeker and tourist will soon follow, and with profit.

The Indian population of the Navajo country as estimated in 1912 was 32,000, of which 30,016 were Navajo, 2,272 Hopis ("Moquoi" is a Navajo nickname for the Hopis), and 200 Piutes and 521 white Indian agents, teachers and traders. North of the San Juan River in Utah and Colorado adjoining is another large reservation of Utes.

From a high elevation this country appears to be and it is a plateau formation. The average elevation is about 5,500 feet above the sea. The mountains rise above and the canyons fall below this level. To the traveler negotiating the sand dunes, diving into water-worn gulches, and sliding over the wind-swept bed rocks, the plateau definition may seem a gross exaggeration. However it is a plateau, 32 per cent. from 6,000 to 7,000 feet, and 10 per cent. from 7,000 to 9,000 feet above sea level. The water of the Colorado River is but 3,400 feet at this point, and in a distance of eight miles to the peak of Navajo Mountain, 10,416 feet, a horizontal difference of 4,016 feet.

The mean annual rainfall at eight stations in and around the

¹ Geology of the Navajo Country, Arizona, New Mexico and Utah. By Herbert E. Gregory, 1917, U. S. Professional Paper, 93. Also by the same author, The San Juan Oil Field, Bul. 431.

Nation runs from 5 to 13 inches, but the variation by months or years shows a wide range, varying from one-half to twice the average. Over one-third of the rainfall may be credited to July, August and September ; about 12 per cent. to April, May and June.

(To be continued)

ON THE MARINE MOLLUSCA OF STATEN ISLAND, N. Y.

BY ARTHUR JACOT.

During the past summer I was enabled to continue a study of the shells to be found along the southeast shore of Staten Island working beyond the region reported upon in the January (1919) number of "THE NAUTILUS."

A week was spent at Great Kills Bay and vicinity. This bay was formed by a sand-spit dropped by the lower New York Bay waters as they struck the current of the Kills which flow out at this point. Though half a mile narrower than its width (one mile), the bay is very shallow; the upper section, enclosed by high grasses except at the base of the sand-spit, is but two feet deep at low tide and covered with eel-grass, while the lower section is lined on the land side with cottages, hotels, piers, etc., is free from eel-grass, averages six to seven feet deep at low tide and is choked with launches and oyster boats. Throughout its extent, the bottom is formed of a soft, sticky clay, which mixes readily with the water. Due to this clay, the number of gasoline boats, and possibly the sewers near the entrance, the molluscan fauna consists of the hardiest species only.

Although we diluted and strained clay for hours at a time at the stations indicated, we found very few species. At one locality, dug-up clay mixed with a little sand yielded shells which from their leached-out appearance might be considered fossil. These fossil shells were much more numerous than those found above them on the surface. *Barnea truncata*, whose valves I have found in abundance lying on the bottom of the upper part of the bay a year and a half before, was not noticed.

Alectrion obsoleta was everywhere very abundant, the shell reaching a length of an inch, and occasionally having the surface largely eaten away. One was found with a prominent, biangulate carina just above the center of the body whorl so that it appears immediately above the suture on the penultimate whorl, becoming obsolete half way around that whorl. The other shells found, not including the countless fragments, were:

Macoma balthica (Linné) few, mostly young.

Mya arenaria Linné few, mostly young,

Odostomia impressa (Say) few.

Odostomia trifida (Totten) fairly common.

Odostomia bisturalis (Say) few.

Crepidula fornicata Linné occasional.

Paludestrina minuta (Totten) rare.

Lacuna vineta fusca Gould one.

The fossil shells include:

Mya arenaria (Linné) few.

Crepidula fornicata Linné few.

Crepidula glauca convexa Say few.

Crepidula plana Say rare.

Bittium alternatum (Say) The only specimen found measures 7.25 mm. in length by 2.5 mm. in width and has eight closely crowded spiral bands on each of the last two whorls.

Alectrion obsoleta (Say) abundant.

Alectrion trivittata (Say) few.

Urosalpinx cinerea (Say) occasional.

At the base of the sand-spit there is a small influx of sand where the waters of the bay have been cutting across during the last two or three years, and a new fauna is being introduced consisting of:

Venus mercenaria Linné young.

Gemma gemma purpurea (H. C. Lea) abundant.

Mya arenaria (Linné) few.

Ensis directus (Conrad) few.

Crepidula fornicata Linné few.

Alectrion obsoleta (Say) occasional.

Alectrion trivittata (Say) common.

Eupleura caudata (Say) few.

Urosalpinx cinerea (Say) occasional.

The sod-bank or *Modiolus demissus* association was to be found on any clay or hard-mud bank exposed between tides. This association consists principally of *Modiolus demissus plicatulus* packed tight one against the other or separated by *Mytilus edulis* packed just as closely, over both of which crawl *Litorina littorea* and *L. rudis*. *Modiolus demissus demissus* is found very thinly scattered among the individuals of the northern form. That the southern variety was once the predominant form over this area is evident from the fact that the sod banks on which *plicatulus* is now living contain the dead valves of the southern form exclusively, in large numbers and buried to a depth of 8 or 10 inches below the surface in company with *Mya arenaria*. I do not think the two forms interbreed.

Half a mile southeast of the bay where there is a stone jetty running out into water four to five feet deep at low tide, the rocks and bottom were searched but with very discouraging results. The water all along this section of the island is heavily laden with fine mud from the red dirt characteristic of that part of the island. This we believe to be the reason for the scarcity of mollusca along the beaches southeastward. A shattered but uneroded and still united pair of valves of *Modiolus modiolus* (Linné) were found at Seaside Beach.

Our survey of the island showed the north and northeast shore of the island to be rocky and built over by commercial interests. From Fort Wadsworth to Prince's Bay (the southeast coast) there are sandy beaches interrupted by sod-banks. As one progresses southeastward these beaches become more and more rocky to Prince's Bay, from which point and around the southern end of the island the shore is characteristically rocky. The remaining (western) coast line is lost in a maze of salt marsh. Thus there are but two places along the southeast coast of Staten Island where Mollusca are of special interest, namely, the sand flats between South and Midland Beaches and the complex about the base of the Great Kills Bay spit. The southern end of the island was not studied.

In connection with this work I have endeavored to learn what work has already been done on the Mollusca of Staten Island. The literature is as follows:

Wheatley, Charles M., Catalogue of the Shells of the United States and their Localities, 12 pp., 1842 & 1845.

Eleven species are here listed as coming from S. I., of which *Periploma leanum*, *Pandora gouldiana*, *Lyonsia hyalina* and *Astarte castanea* are mentioned as fairly common or abundant. The last one I have not as yet found on the island although it is found on the Long Island ocean beaches in increasing abundance with distance from the city.

DeKay, James E., Nat. Hist. of N. Y., Zoölogy of N. Y., Mollusca, 271 pp., 40 pls., 1843.

Pandora gouldiana, *Pholas truncata*, *Odostomia trifida*, *Columbella avara* and *C. lunata* are recorded from the island on the authority of Wheatley.

Hubbard, Eber¹ Ward & Smith, Sanderson, Catalogue of the Mollusca of Staten Island, Annals of the Lyceum of Nat. Hist. of N. Y., vol. 7, pp. 151-154, 1865.

This paper is revised in:

Smith, S., Catalogue of the Mollusca of S. I., Nat. Sci. Ass. of S. I., Proc., vol. 1, p. 35, 1886 and p. 50, 1887.

Of the 78 species listed, *Solemya velum*, *Yoldia limatula*, *Nucula proxima*, *Venericardia borealis*, *Rocheportia planulata*, *Cardium mortoni*, *Cumingia tellinoides*, *Siliqua costata*, *Zirfaea crispata*, *Epitonium lineata*, *E. humphreysii*, *Triphoris perversa nigrocincta*, *Cerithiopsis greenii*, *Bittium alternatum*, *Columbella avara*, *Mangilia cerina* (*M. plicata* not mentioned), and *Acteon punctostriata* are the rarer species listed. *Anomia aculeata*, *Pholas costata*, *Martesia smithii*, *Litorina irrorata*, *Natica pusilla*, *Alectrion vibex* and *Haminea solitaria* are of special rarity. I do not know of their having been again reported from the vicinity of the city. *Astarte castanea* is included on authority of Wheatley. The list is largely based on dredgings made about the southern end of the island by Hubbard whose collection was later sold to Croke, whose collection now forms part of the American Museum col-

¹The "J" in the literature is an error.

lection. Of these rarest species *Martesia smithii* [*Martesia caribaea*] is the only one now in the Am. Mus. (local) collection.

Davis, W. T., Variations of *Mya arenaria* on the shores of S. I., Nat. Sci. Ass. of S. I., Proc., vol. 1, p. 20, 1885.

On rocky ground the valves are of moderate size, the ends often broken and the exterior corrugated; in sandy ground the valves are very thin, of even growth, the markings complete, they are beautiful in form and color and of largest size; in peat the valves are very much deformed and much rounded.

On the distribution of *Litorina littoralis*, idem., vol. 1, p. 61, 1888 and vol. 3, p. 50, 1893.

It was first noticed by Mr. Hollick at the Narrows in 1888.

Smith, S., & Prime, Temple, Report on the Mollusca of L. I, and its Dependencies, Ann. Lyc. Nat. Hist. N. Y., vol. 9, pp. 377-417, 1870.

Herein *Odostomia trifida*, *O. bisuturalis*, *Polinices triseriata*, *Paludestrina minuta*, *Litorina rudis*, *L. littoralis* and *Lacuna vineta* are recorded as having their southern limit at S. I. This is certainly not the case with the first four species.

From these records one is struck by the decrease in the fauna accompanying the expansion of the city. One of the important factors in the extermination of the less hardy species is the crowding of the beaches for miles beyond the city limits with cottages and bungalos and the accompanying gasoline boats. This evil is obviated by the purchase of the land for large private estates and clubs.

VITREA (PARAVITREA) MULTIDENTATA AND LAMELLIDENS.

BY GEO. H. CLAPP.

Having recently received a specimen of *V. lamellidens* from Norway, Me., I have gone over my collection with the idea of trying to find if *lamellidens* as it occurs in the north is really the same as the typical form from the Great Smoky Mountains or, as Dr. Pilsbry suggests in Proc. Acad. Nat. Sci., 1903, p. 209, merely "accelerated individuals (of *multidentata*), sporadically occurring."

The figures on Pl. III are from camera-lucida drawings all magnified 10 diameters. The shells were selected for size only, that is as near the same size as possible from material at hand, and from localities as near together as I had them in my collection. Figs. 13 to 16 are large shells of each species.

1— <i>lamellidens</i> Thunderhead, Gt. Smoky Mts.	Diam. 2.70 mm.,	Umbilicus .29 mm.	}
2— <i>multidentata</i> Oakdale, Morgan Co., Tenn	" 2.70 "	" .52 "	
3— <i>lamellidens</i> Anderson, Franklin Co., Tenn	" 1.96 "	" .29 "	}
4— <i>multidentata</i> Sherwood, Franklin Co., Tenn	" 2.19 "	" .35 "	
5— <i>lamellidens</i> Banners Elk, Wautauga Co., N. C.	" 2.40 "	" .29 "	}
6— <i>multidentata</i> Cranberry, Mitchell Co., N. C.	" 2.65 "	" .46 "	
7— <i>lamellidens</i> Litchfield, N. Y.	" 2.40 "	" .29 "	}
8— <i>multidentata</i> Litchfield, N. Y.	" 2.53 "	" .46 "	
9— <i>lamellidens</i> Deering, N. H.	" 2.13 "	" .20 "	}
10— <i>multidentata</i> Hoosic, N. Y.	" 2.53 "	" .46 "	
11— <i>lamellidens</i> Norway, Me.	" 2.08 "	" .23 "	}
12— <i>multidentata</i> Quebec, Can.	" 2.70 "	" .40 "	
13— <i>lamellidens</i> No. 1, large shell	" 3.90 "	" .46 "	}
14— <i>multidentata</i> Stevenson, Ala., large	" 3.11 "	" .69 "	
15— <i>lamellidens</i> No. 1 same size as No. 14	" 3.11 "	" .35 "	}
16— <i>multidentata</i> largest Quebec	" 3.07 "	" .63 "	
17— <i>lamellidens</i> No. 1 same size as 7, 9 and 11.	" 2.21 "	" .29 "	}
18— <i>lamellidens</i> No. 1 same size as 7, 9 and 11.	" 2.27 "	" .29 "	

From the measurements given above it will be seen that in shells of approximately the same diameter the umbilicus in *lamellidens* is about three-fifths of the diameter of that of *multidentata*, the single marked exception being Nos. 3 and 4.

In figures 13, 14, 15 and 16, mature shells, it will be noticed that in *multidentata* the umbilicus widens rapidly in the last whorl while in *lamellidens* it does not. This can also be seen in the other figures, but it is not so pronounced.

A series of 76 *multidentata* from 13 localities and 45 *lamellidens* from 8 localities were measured. Where I had only a few from a given locality all were measured, but in the case of large series a few were picked out at random. These shells ran from 1.85 to 3.28 mm. diameter in *multidentata*, 9 of them being 3.00 mm. diam. and over, and from 1.55 to 4.03 mm. diameter in *lamellidens*, 23 of them being 3.00 mm. and over.

42 *multidentata* and 28 *lamellidens*, 2.50 mm. diameter and over, gave the following averages:

V. multidentata av. diam. 2.79 mm., diam. umbilicus 0.51 mm.

V. lamellidens av. diam. 3.39 mm., diam. umbilicus 0.39 mm.

These averages show that the umbilicus is contained 5.5 times in the diameter of the shell in *multidentata* and 8.7 times in *lamellidens*.

Another difference which is well shown in the figures is the angle made by the teeth and lamellæ to lines drawn parallel to the lip and at right angles to it.

The rows of teeth and the lamellæ were counted in all of the 121 shells measured and were found to vary from 1 to 4 in *multidentata* and from 0 to 3 in *lamellidens*. In both species there is a tendency to complete absorption in the fully adult shell and in my largest *lamellidens*, 4.03 mm. diam. from Thunderhead, Gt. Smoky Mts., I cannot distinguish a trace of the lamellæ. A *lamellidens* from Thunderhead has 4 lamellæ, one of the apparently 3 being double.

The largest *multidentata* have from 6 to 6.25 whorls while the largest *lamellidens* have 6.5 to 7.

V. multidentata when adult has a well-defined callus connecting the end of the lip which is entirely absent in *lamellidens*. In both species the lip is slightly thickened when adult while in immature shells it is very thin and generally broken in cabinet specimens which accounts for the apparent difference in the shape of the aperture of the shells figured, as it was very hard to trace.

I believe that the figures and data given above prove that the two species are distinct and that the northern shells, though smaller, are the same as typical *lamellidens* from the southern mountains. Compare Figs. 17 and 18, from the type locality,

with Figs. 7, 9 and 11 northern shells. An examination of the youngest shells that I have seen would seem to indicate that *lamellidens* may be the ancestral form as in very young *multi-dentata* the teeth are generally fused, so much so in fact that in one of two cases I had separated them as *lamellidens*; but careful focusing of the microscope brought out the fused teeth, and measurements showed the relatively larger umbilicus.

THE NOMENCLATURE AND SYSTEMATIC POSITIONS OF SOME NORTH AMERICAN FOSSILS AND RECENT MOLLUSKS. II.

BY JUNIUS HENDERSON.

Planorbis cirrus White, 1879, from the Tertiary of Wyoming, was the next year cited by the same author as though it were spelled *cirratus*. Since then the latter name has been universally, but improperly, used instead of *cirrus*.

Physa bullata White, 1886 (U. S. Geol. Surv., Bull. 36), from the Eocene of Utah, is preoccupied by *P. bullata* P. and M., 1838, and *P. bullata* Gould, 1855. However, on page 12 of his bulletin, and in the legend of plate 3, White used the name *bullatula* for the same species, the use of *bullata* on page 22, where it was described, perhaps being unintentional. Hence White's species should be known as *Physa bullatula*. Whether Gould's species should be renamed depends upon whether it is a valid form or a synonym of some other form, which I am now unable to determine.

Physa carletoni Meek, 1872, from the Cretaceous of Utah, is incorrectly referred to as *P. carltoni* by Grabau and Shimer, 1900. Such a mistake is easily made, but unfortunately there is a prior use of *carltoni* in this genus by Lea, 1869. Though confusing, I suppose the names are sufficiently distinct so that Meek's name may stand. His species has been so frequently mentioned in various reports that it would be a shame to disturb the name unless required by the rules.

Acella haldemani White (= *Tortacella haldemani*, in Auriculidae), from the Cretaceous of Wyoming, is preoccupied by *Lymnaea haldemani* Deshayes, 1867 (= *Acella haldemani*, accord-

ing to Baker). White's species may hereafter be known as *Tortacella wyomingensis*. To disturb a name so well known is regrettable.

Paludina subglobosa Emmons, 1858, from the Tertiary of North Carolina, is preoccupied by *P. subglobosa* Say, 1825. The type of Emmons' species is lost and the figure too poor for definite generic reference. Indeed, it may even be marine. However, it may sometime be recovered, and as there is no way of eliminating it from the published literature and it must be included in any complete list of described species, it should perhaps have a name. It may be known as *Vivipara? emmonsii*. Conrad identified it with *V. glabra*, which is very doubtful.

Dall, (Contrib. Tert. Fauna Fla., 1892, p. 277) says *Compsopleura trinodosa* Conrad=*Scalaria trigemmata* Conrad, "which is a *Goniobasis*." Harris (Bull. Amer. Paleont., III, No. 11, p. 71) places *trigemmata* in *Melania*, says probably related to "*Terebra*" *plicifera* (the quotation marks are Harris's), and omits *trinodosa* from the synonymy. I have not at hand the means for determining whether *trigemmata* is a *Melania* or a *Goniobasis*, if, indeed, it can be determined. If Dall is correct in referring it to *Goniobasis*, and if Harris is correct in supposing that it is related to *T. plicifera* Heilp., a Tertiary fossil, then it would follow that the latter is also a *Goniobasis*, in which case its specific name would be preoccupied by *Melania*=*Goniobasis plicifera* Lea, a recent species, unless the latter should be removed to some other genus, as Hannibal has done. The easiest way out of the dilemma is to leave *trigemmata* in *Melania*, where Harris placed it. I pass the puzzle on to the next fellow, with these clues as a starter.

Limnaea (Polyrhytis) kingii Meek, 1877, was described from beds designated as "probably Miocene," in Cache Valley, Utah. I had supposed these beds to be Pleistocene, and Hannibal has suggested the same thing, but Dr. T. W. Stanton writes me that they are now generally considered Pliocene, or at least older than the Lake Bonneville beds, because they are more disturbed, though I believe Lake Bonneville extended into Cache Valley during its greatest expansion. I believe that *Radix ampla* var. *utahensis* Call, 1884, is a synonym of *Limnaea*

kingi Meek. It occurs in Utah Lake and Bear Lake, both draining into Great Salt Lake, one from the south and one from the north. Obviously it could not pass from one river system to the other through Great Salt Lake as that body of water now is. Its distribution suggests that it may have passed through during the Pleistocene expansion, when its waters were freshened by overflow to the north. It probably has had a long history in the region, and there is no reason to doubt that it occurred during Pliocene time and so was contemporaneous with *kingi*, if not identical with it. As the lake at its maximum overflowed to the north, it may occur now in Port Neuf River drainage also, though Daniels and I did not find it there during a brief visit. Dr. Dall writes:

“I think your identification of the *Lymnaea* is correct. However it is to be borne in mind that the plications which led Meek to propose a genus for his species are pathological and not specific characters. They are directly due to the increase in alkaline salts in the water inhabited by the mollusks and have been imposed upon various gastropods in the same situation.”

Cyrena californica Gabb, 1869, described from the Pliocene of California, is preoccupied by *C. californica* Prime, 1865, which is itself a synonym of *C. californiensis* Prime. Prime's species was described by Deshayes in 1854 as *Cyrena subquadrata*. That name being preoccupied, Prime changed it to *californiensis* in 1860, without description, but citing Deshayes' publication. In 1865 Prime described it as *Cyrena californica*, citing *subquadrata* Deshayes and *californiensis* Prime as synonyms. The name of Prime's species must therefore stand as *californiensis*. Dall in 1903 transferred Gabb's species to the genus *Corbicula*, subgenus *Cyanocyclas*. Under the circumstances it is unfortunate that Gabb's name should have to be displaced. I propose that it be called *Corbicula gabbiana*.

Cyrena obliqua Deshayes, 1824, from the Tertiary of Europe, has been placed in *Corbicula* by Vincent (Ann. Soc. Roy. Malac. Belgique, XXI, 1886, p. 136) and Taylor (Monog. L. and F.—W. Moll. Brit. Isles, No. 7, 1900, p. 413). Newton (Brit. Olig. and Eoc. Moll. in Brit. Mus., 1891, p. 57) left it in the

genus *Cyrena*. If correctly referred to *Corbicula*, it would have priority over *Corbicula obliqua* Whiteaves, 1885, from the Cretaceous of Canada. Not having access to the literature necessary for the determination of this question, I wrote to Dr. T. W. Stanton about it. He referred it to Dr. W. H. Dall, who replied as follows:

“Deshayes in his revision left *obliqua* in *Cyrena*. *Cossmann* puts it in *Corbicula*. The lateral teeth are smooth as in *Cyrena* but long as in *Corbicula*. It belongs to a small group of ovoid species which is neither typical *Cyrena* nor true *Corbicula*. Of the two attributions I regard Deshayes' as the most nearly correct, but I should include these small oval species in a distinct group from either. However, as the species has been referred at various times to *Corbicula* it would probably be best to regard the combination as preoccupying Whiteaves' name if it was made before 1885, but not otherwise.”

I have no citation indicating that the combination referred to was made before 1885. Under the circumstances I feel that Deshayes' species should be left in *Cyrena* or placed in a distinct genus, and *Whiteaves'* name retained for the Cretaceous species. If anyone thinks the latter should be renamed, then it would be quite fitting to name it in honor of Whiteaves, a name that has not been used for any species of *Corbicula* as far as I can ascertain.

Some of the fossil Mollusca described by Hall in the report of the Fremont Expedition, 1845, are exceedingly troublesome. Though all assigned by Hall to marine genera, he stated that he would have considered several of them fluviatile shells except for the occurrence of *Nucula impressa* and *Cerithium fremonti* “in the same association.” White, in his Review of North American Fossil Non-marine Mollusca, says they probably belong to a fresh-water fauna, and several have been definitely transferred to fresh-water genera, being now well known. Following is the list of Hall's species under discussion:

Nucula impressa=*Yoldia impressa*.

Mya tellinoidea=*Unio tellinoides*.

Cytherea parvula.

Cerithium fremonti.

Cerithium tenerus=*Goniobasis tenera*.

Turbo paludinaeformis=*Vivipara paludinaeformis*.

Turritella bilineata.

Natica? *occidentalis*.

Pleurotoma uniangulata.

I have been unable to locate the types of any of these species. They do not appear to be at Albany, New York, Washington or Philadelphia. The last hope seems to be the Hall material at the University of Chicago, which has not been unpacked. The latitude given for the *Mya*, *Nucula*, *Pleurotomaria*, *Cerithium tenerum*, and *C. fremonti* (Lat. 40), is incorrect, as they are definitely reported to have come from where Fremont crossed the mountains from Muddy River, which flows eastward to Muddy Creek, which flows westward into Bear River. This would be in southwestern Wyoming, above Lat. 41, probably not far from the locality of the *Turbo* and *Cerithium paludinaeformis*, which is given as Lat. 41½, instead of being 115 miles to the southward, as stated by Hall. It is not certain that these were all from the same formation or the same past locality. The *Cytherea*, *Natica* and *Turritella* are said to be from Lat. 43 N., Long. 115 W., which would place them in the Snake River Valley of southwestern Idaho, in a region occupied by freshwater Tertiary Rocks, according to Dr. Stanton.

Nucula impressa Hall is a *Yoldia*, and has priority over *Nucula impressa* Conrad, 1848, from the Tertiary of Oregon, which, as Dr. Dall informs me, is a *Portlandia*, and both are preoccupied by *Nucula impressa* Sowerby (Min. Conch., V, 1825), a Cretaceous shell of Europe. Hall's species may be known as *Yoldia fremonti*, and Conrad's species may be known as *Yoldia (Portlandia) astoriana*.

Natica? *occidentalis* Hall, a "delicate shell," is said to be based upon one "perfect specimen," the mouth of which is not entire but shows that the lip was somewhat expanded, and several casts. Hall was in doubt as to its systematic position, and if the locality given is correct, it is probably not a naticoid shell. However, the name has priority over *Natica occidentalis* Meek and Hayden, 1856, from the Cretaceous of South Dakota, for which I propose the specific name *dakotensis*.

A NEW PLANORBIS FROM ILLINOIS.*

BY FRANK C. BAKER.

While making a study of the larger *Planorbis* of the Big Vermilion River, Illinois, for a paper on the distribution of the mollusks of that stream, it became apparent that two forms were included under *trivolvis* which were quite separable. One of these is the large, wide form to which Say gave the name *trivolvis*. The other is a narrower form which the writer and others have been calling *glabratus* (see Baker, Cat. Ill. Moll., p. 106) but which is not the true *glabratus* of Say, which, according to Walker (Synopsis, p. 99), does not range outside of the State of Florida. Say credited his original specimens to Charleston, S. C. The new Illinois form may be characterized as follows:

Planorbis pseudotrivolvis n. sp.

Shell sinistral, whorls 5; body whorl rounded above and below, the inner whorls carinated on both spire and umbilical region; the spire whorls are very flat and slightly concave; the earlier whorls are coiled so that they form a union with the carina of the preceding whorl but the last whorl gradually divides from this line, leaving a V-shaped depression between the dorsal carina and the body whorl; this condition is uniform for the dozen or so specimens examined; the base or umbilical region exhibits three full whorls to the umbilicus; aperture somewhat lenticular, rounded above and below, sometimes a trifle expanded, and bordered with red; color of shell yellowish or corneous inclining to brown; surface notably shining.

Height, 9; greatest diameter, 20.5; aperture height, 8; breadth, 9 mm. Holotype.

Height, 9; greatest diameter, 19; aperture height, 8; breadth, 9 mm. Paratype, 5 whorls.

Height, 6; greatest diameter, 11.5; aperture height, 5; breadth, 5 mm. Immature, 4 whorls.

* Contribution from the Museum of Natural History, University of Illinois, No. 8.

Height, 5; greatest diameter, 5; aperture height, 5; breadth, 2.5 mm. Young, 3 whorls.

(Collection Mus. Nat. Hist., U. of I., No. Z11393A.)

This *Planorbis* differs from typical *trivolvis* in being less high in comparison with its diameter, in the separation of the last whorl, above, from the carina of the preceding whorl leaving a V-shaped trough, which is not present in *trivolvis*, and in showing three full whorls on the umbilical side while in *trivolvis* there are but two full whorls. The sculpture is also more regular than in *trivolvis*, the rib-striæ being more clear cut with wider interstices. The carina on the upper whorls in *pseudotrivolvis* is also sharper and forms a raised keel bordering the spire whorls.

This *Planorbis* has perplexed Illinois conchologists for many years, being uncertainly referred to Say's *glabratus* as figured by Haldeman in the Monograph, plate 2. Whether all of the shells listed under this name in the Illinois Catalogue (p. 106) are referable to the new form is not known, specimens from these localities not being available for examination. The same *Planorbis* occurs in Pleistocene deposits in and about Chicago and has been referred to *trivolvis* in papers and references (cf. Trans. Ill. State Acad. Sci., iv, p. 112). The fossil specimens referred to this species occur at the following places (see the writer's Life of the Pleistocene, now in press by the University of Illinois, for the data concerning these and other sedimentary strata in the Chicago region):

200 feet north Dempster Street, station 47, stratum ix, silt.

200 feet south Dempster Street, station 45, stratum iv, silt.

200 feet north Oakton Avenue, station 42, stratum vii, silt.

Lemont, Lincoln Park extension office, Santa Fé R. R., stratum ii, silt.

Two fossil specimens measure as follows:

Height, 8; greatest diameter, 23; aperture height, 8; breadth, 8 mm. No. P396 (Chicago).

Height, 9; greatest diameter, 21; aperture height, 9; breadth, 9 mm. No. P401 (Lemont).

Pseudotrivolvis is not found in the earlier deposits in Wilmette Bay, Chicago, the *Planorbis* there being true *trivolvis*, while in

the later deposits the new form is the only large *Planorbis* found, an interesting case of distribution in point of time in the same locality.

Whether the new *Planorbis* is to be considered a variety of *trivolis* or a distinct species the writer is not prepared to decide at the present time. In the material examined, both fossil and recent, there are no intermediate specimens. Until more is known it had better be considered a separate species.

**A NEW FORM OF AMNICOLA FROM THE OHIO PLEISTOCENE DEPOSITS
WITH NOTES ON A PHYSA FROM THE SAME FORMATION.***

BY FRANK C. BAKER.

Recently, Dr. M. M. Leighton, of the Department of Geology of the University of Illinois, placed in my hands for study a large collection of Pleistocene fossil mollusks from a marl deposit near Rush Lake, Logan County, Ohio. One of the species represented appears to be a new race of a recent species. The deposit is in the older Wisconsin drift. A paper is in preparation describing the fauna of this deposit as well as that of a possibly older deposit in Bartholomew County, Indiana, in both of which a number of interesting cases of distribution occur. I am indebted to Dr. H. A. Pilsbry and Dr. Bryant Walker for assistance in determining the affinities of the species discussed in this paper.

AMNICOLA WINKLEYI LEIGHTONI n. var.

Shell differing from *A. winkleyi* in being larger, heavier, wider in proportion to its height, the body whorl being more globose than in the typical form; there are $4\frac{1}{2}$ whorls, the upper part of which is somewhat flat-sided just below the suture; this is especially marked on the last whorl of some individuals; the spire whorls are rounded and the sutures deeply impressed; the first whorl is flatter than in *winkleyi*; the umbilicus is wider and deeper and the aperture is wider in proportion to its height than in *winkleyi*.

* Contribution from the Museum of Natural History, University of Illinois, No. 10.

Length, 5.0; diameter, 3.7; length of aperture, 2.5; width, 2.0 mm. Topotype.

Length, 4.5; diameter, 3.9; length of aperture, 2.4; width, 2.0 mm. Paratype.

Length, 4.0; diameter, 3.0; length of aperture, 2.0; width, 1.5 mm. Paratype.

Specimens of *A. winkleyi* measure:

Length, 4.8; diameter, 3.1; length of aperture, 2.2. Nautilus, Type.

Length, 4.8; diameter, 3.0; length of aperture, 1.8; width, 1.5 mm. Topotype.

Winkleyi is a species of the New England States, its original locality being Saco, Maine, and that a form of this *Amnicola* should be found in Ohio, and in a Pleistocene deposit, is surprising. It is not unlikely, however, that *winkleyi* may occur in recent collections in the central States. The Ohio specimens seem to depart varietally from the typical form as described by Pilsbry (NAUTILUS, XXVI, p. 1, pl. 1, figs. 9-10). Some thousands of specimens from this Pleistocene deposit show little departure from the race as described above. Occasional globose forms occurring with *winkleyi* show the relationship of the form, although none have as wide a body whorl as the fossil race. It is possible that this race may occur in other Pleistocene marl deposits.

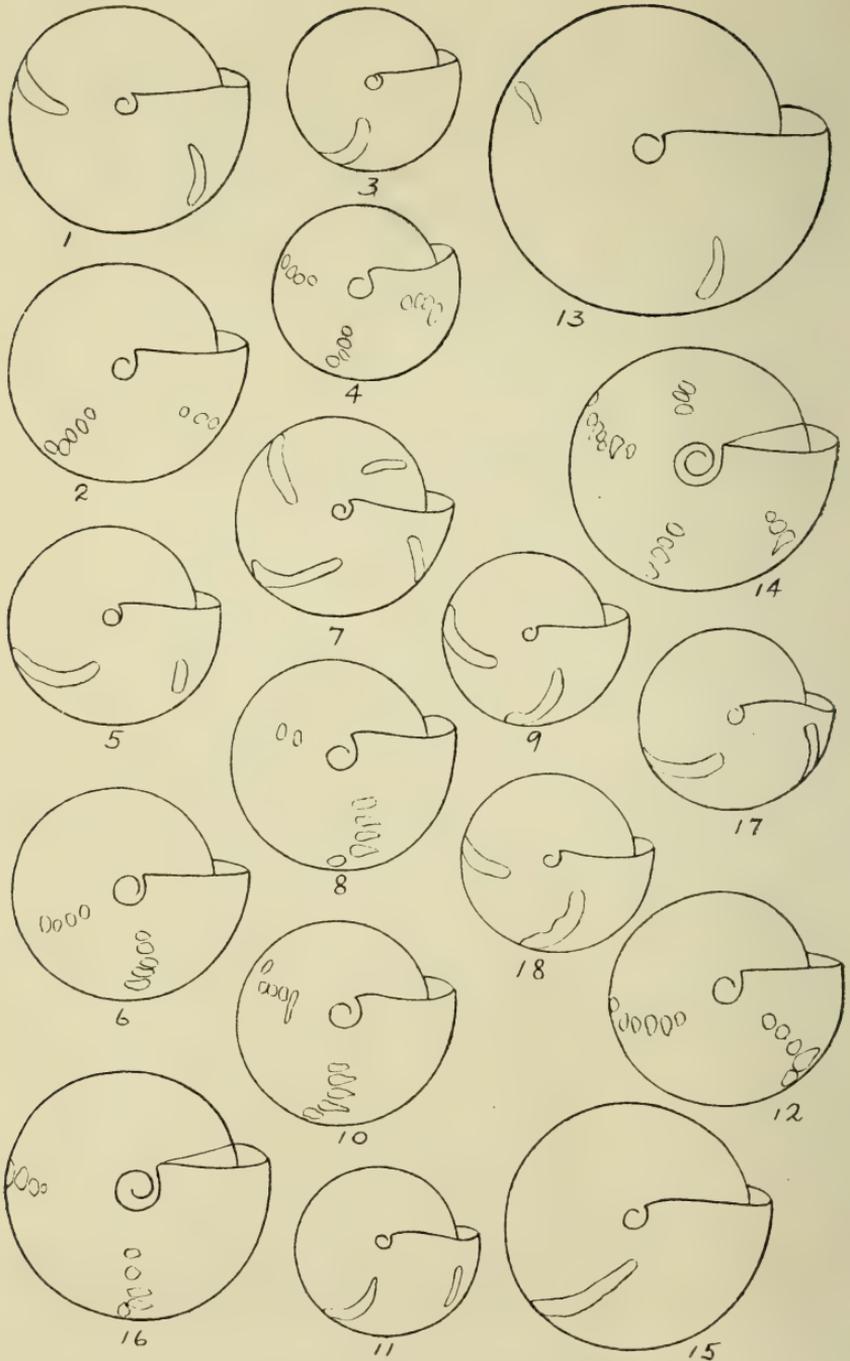
PHYSA ANATINA Lea.

A large *Physa* occurring in the Rush Lake deposits differs slightly from *anatina* in being larger with shallower sutures and more flat-sided spire whorls; the body whorl is wider as is also the aperture; the spire is very sharply pointed and the columella has a distinct plait. Characteristic specimens measure as follows:

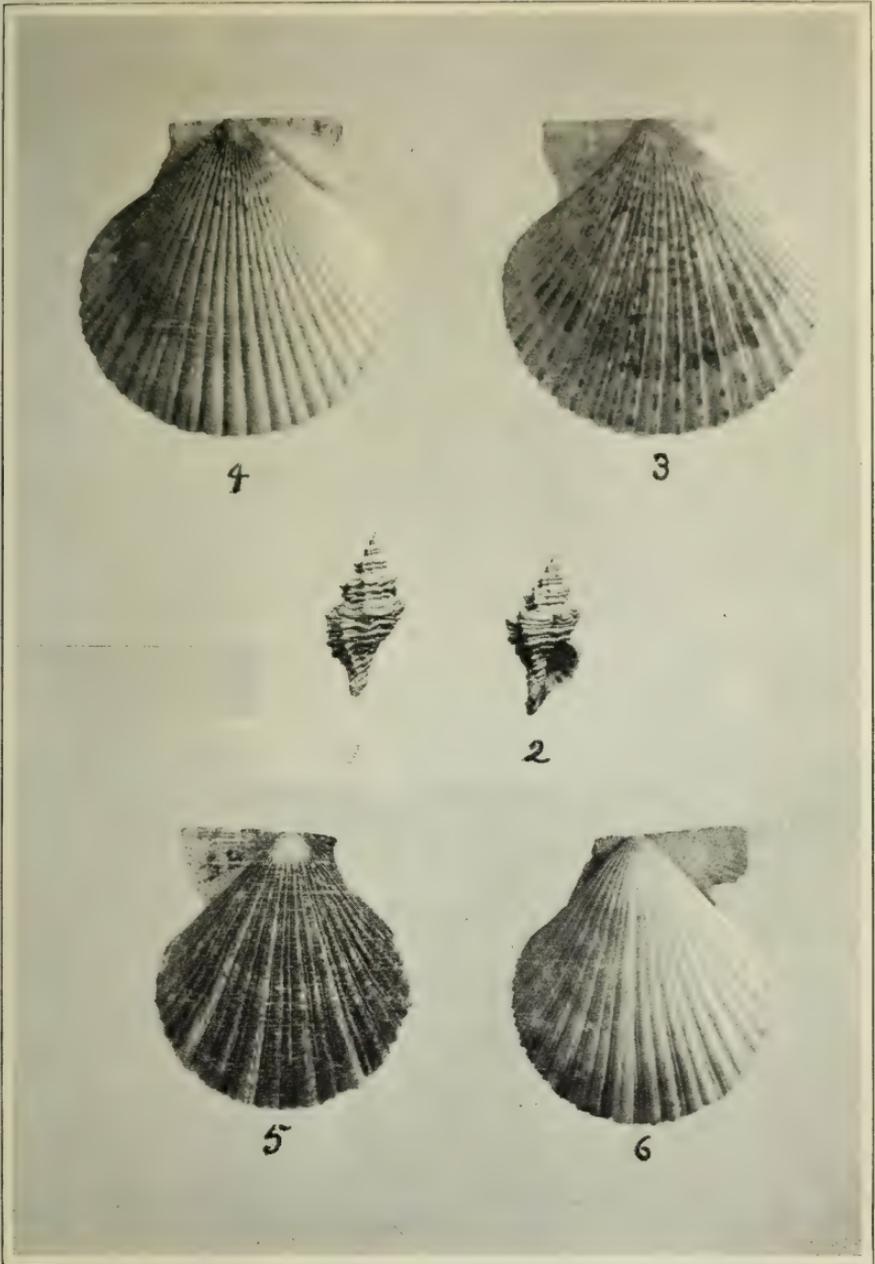
Length, 16.5; width, 9.0; aperture length, 11.5; width, 5.0 mm. Fossil.

Length, 17.5; width, 10.0; aperture length, 13.0; width, 5.5 mm. Fossil.

Length, 12.0; width, 7.0; aperture length, 8.5; width, 3.7 mm. Fossil.



CLAPP: VITREA MULTIDENTATA AND V. LAMELLIDENS



OLDROYD: WEST COAST SHELLS

Length, 12.0; width, 6.0. Lea's specimen.

This *Physa* is related to *Physa anatina* which is so common in the States west of the Mississippi River. The occurrence of this species so far east of its usually recorded range (it is said by Walker to extend clear across southern Michigan, however) is as surprising as is the presence of the race of the New England *Amnicola winkleyi*. It was at first thought to be a recognizable race of *anatina* but the presence of narrow individuals indicates its relation to Lea's species. It differs from *Physa walkeri* in having flat-sided whorls, *walkeri* having rounded whorls and deeply impressed sutures. Many of the Pleistocene mollusca differ somewhat from their living representatives but in most cases this difference is not enough to cause their separation as new species or varieties. Among the *Physas*, also, the range of variation in the different species is known for but a few species; when this important characteristic is more generally known it will be safer to describe new species in this polymorphic genus.

LASMIGONA VIRIDIS, RAFINESQUE, 1820.

BY L. G. FRIERSON.

The adoption of the above as the correct specific name of the old *Unio pressus* Lea having been urged by the writer (NAUTILUS, XXIX, Sept., 1915), Mr. Bryant Walker filed an "interference" (NAUTILUS, XXIX, Nov., 1915) for the purpose he stated "of suspending the general adoption of the proposed change until such time as certain important and probably conclusive facts can be obtained."

As the current year will round out a century since Rafinesque published his *viridis* the acquisition of any new facts concerning the case would seem rather remote; and as silence might be construed as consent, and the proposed "suspension" become permanent, the writer, with the consent of NAUTILUS, makes bold to again appear in court.

Rafinesque ascribed to his species the following characters:

Shell inequilateral, elliptical, obliquely truncate posteriorly.

A little convex; hardly thick.

Smooth, olive green; sometimes radiate with pale yellow; others are olive-brown. The beaks are seldom eroded, being thickened there by flexuous wrinkles—remarkable because the rest of the shell is smooth.

Nacre bluish. The cardinal tooth is compressed, and *decurrent in shape*.

Being thin, it is crenulate instead of being furrowed (other members of the subgenus have them furrowed); truncature oblique, convex.

Lateral tooth thin. Muscle scars lightly impressed, confluent behind.

A small species, at most one and a half inches in altitude.

(The members of the sub-genus described just previously by Rafinesque are among the largest of the Ohio Naiades.)

Altitude $\frac{5}{8}$ of length; diameter $\frac{7}{16}$.

Rare in the Ohio, but common in the Kentucky and adjacent "*petites rivieres*."

While to the writer the above description can be mistaken for nothing else than the *Symphynota compressa* Lea, further evidence seems necessary, as Lea quotes one of his friends to the effect that "it equally applies to iris."

Luckily there remains further evidence which we may adduce. Rafinesque, as is well known, divided the Naiades into numerous *Genera*. These divisions being founded upon the more evident features of the shell, it follows therefore that the contained species of any Genus would naturally sustain a general outward resemblance to each other.

Rafinesque described this species under the name of *Unio* (*Elliptio*) *viridis*. The *Elliptio* contained the *Unio nigra*; *Unio purpureus*, Say; *Unio crassa*, Say, and a few other shells, all having a general outward similitude, and in such an assemblage the *Symphynota compressa* finds congenial associates.

Rafinesque moreover mentions the fact that the "*Unio* (*Elliptio*) *leptodon* and *Unio* (*Elliptio*) *fragilis*" also "resemble" the *viridis* (with some others). The reader can easily select specimens of the two species mentioned, which resemble the *Symphynota compressa* to a remarkable extent—differing, however (as Rafinesque observes), in their teeth.

Finally, we observe that Rafinesque in his description of a variety of "*alasmidonta*" wrote that the latter is *so much like Unio viridis, as to be easily mistaken for it*—for which cause he named the shell *Alasmidonta viridis*.

This statement may be compared with an observation made by Mr. C. T. Simpson, who wrote that the "Unio pressus Lea, and the Margaritana rugosa Barnes sometimes resemble each other so much that one is labeled with the name of the other by competent students."

An Ohio shell, of subsolid texture, elliptical in shape, with an oblique posterior truncature; green, sometimes brownish, sometimes rayed with yellow; having its beaks crowned with flexuous wrinkles; a cardinal tooth thin, compressed and *decurrent*, bearing an outward similitude to the old *Unio gracilis Barnes*, and a still more striking likeness to an "*alasmidonta*" can but be, the writer thinks, the *Symphynota compressa Lea*.

The main objections offered by Mr. Walker for his "interference" arose from the failure of his records to show that the *compressa Lea* ever occurs in the Ohio River—the shell, Mr. Walker informs us, being "*most emphatically a creek or small river species.*"

Mr. Walker's records however might be profitably amended by the inclusion of the interesting circumstance that the type locality of Lea's Symphynota compressa is the Ohio River at Cincinnati (Index Obs. Genus Unio).

Mr. Walker's "reason No. 4" is a slight variant of a statement made by Dr. Lea (Rectification, P. 35).

If Conrad and Say radically differed as to what an identical valve was (which it *is said was seen by both*) the writer fails to see how their disagreement should be chargeable to Rafinesque's diagnosis of the *Unio viridis*.

Walker's "reason No. 5" need be discussed no longer, as it was categorically rejected by Dr. Lea long ago (Rectification, P. 34) with whom the writer is heartily in accord.

The writer has seen it stated that the ratio which the altitude bears to the length, given by Rafinesque for *viridis* (5 to 9) does not agree with specimens of *Symphynota compressa*.

Mr. C. T. Simpson (*Catalogue, 1914*) gives dimensions of three examples of the *compressa*. The writer takes it, that the

average of these three, given by such an authority, should satisfy the most exacting.

The average of the examples given by Simpson, gives a percentage of .556. The percentage which Rafinesque gives for *viridis* (5 to 9) is .555.

A closer agreement is not to be found in the history of the Naiades!

Note—The translation of Poulson contains many errors.

1. The dimensions, one and a half inch is that of the *altitude*, not as in Poulson.

2. The lateral tooth is *thin*, not slender.

3. The cardinal tooth is not *divergent*, but is *decurrent*—quite a different thing!

TURRITIDAE VS. TURRIDAE.

BY S. STILLMAN BERRY.

The unfortunate rehabilitation of the nondescript names of the Museum Boltenianum has brought about as one direct consequence the overturning of the time-honored generic name *Pleurotoma* Lamarck in favor of Bolten's *Turris*. Accepting the change as most seem to have been impelled to do, it thereupon follows that since *Pleurotoma* was the typical genus of its family, a change in the generic name necessitates a similar alteration in the family name to conform. The reigning regulation in Article 4 of the International Code of Zoological Nomenclature is ostensibly so explicit regarding such matters as the formation of family names that at first thought one would not anticipate much disagreement among students in its specific application. In the instance under consideration, however, two opposing views have found their way into print.¹ Both cannot be equally correct, and since the family is an abundant one and frequently referred to, while a general principle of orthography is likewise involved, it becomes a matter of some importance to determine which of the two, as we may adopt the spelling *Turritidae* or *Turridae*, is strictly the proper form to use. Curiously enough

¹ NAUTILUS, v, 23, pp. 131, 144.

each variant appears to date back to the brothers Henry and Arthur Adams, who, although using the genus *Turris* as of Humphrey rather than Bolten, wrote the family name *Turritidae* in the first volume of their great review of molluscan genera,¹ and then later corrected it to *Turridae*.² Their more mature judgment is therefore plainly in favor of the simpler spelling. It is mainly very recently that the insertion of the extra syllable has been revived.

The essential facts of the case are believed to be fairly stated thus:

1. "The name of a family is formed by adding the ending *idae*, the name of a subfamily by adding *inae* to the stem of the name of its type genus."³

2. The name of the type genus of the particular family in question is *Turris*, presumably an exact transcription of the Latin noun *turris*, meaning in English, "tower."

3. The name of the family in question is variously spelled *Turridae* and *Turritidae* in the literature. The spelling *Turriidae* has also been suggested for consideration.

4. In Latin grammars (*e. g.*, Allen and Greenough), *turris* is often given as the example *par excellence* of an i-stem noun, the stem therefore ostensibly *turri-*.

5. A recent proponent of the spelling *Turritidae* writes that he "submitted the question of '*Turridae versus Turritidae*' to two expert Latinists, who, after due consideration of all the data, concluded that, while either was correct, the latter term under the circumstances was to be preferred. Here the matter now appears to rest.

Now the writer has been one of those adhering to the spelling *Turridae*, and being still unconvinced of his error, yet eager to arrive once for all at a correct and therefore permanent usage, he submitted the case essentially as outlined above to a friend, a well-known student of Latin, Professor B. O. Foster of Stanford University, adding thereto the following specific queries:

¹ Genera of Recent Mollusca, v. 1, p. 87.

² *Op. cit.*, v. 2, p. 614.

³ International Rules of Zoological Nomenclature, Article 4 (Smallwood edition, p. 4).

(1) What is the stem of *Turris*? (2) Is it possible to insert a *t* in the second syllable of this stem without changing the nature of the word itself? (3) In view of the facts as stated, and in strict adherence to Article 4 of the International Rules, what do you consider to be the preferred orthography for the family name based on this genus? (4) Do you consider any alternative spellings permissible?

Professor Foster's reply is so detailed and withal so interesting that with his kind permission I am reproducing the major portion of it here, especially since it seems conclusive regarding the points at issue.

"The stem of *turris* is *turri*; and the ending *ides* would give us *turriides*. But it is a rule of word-formation that 'the final vowel of a stem is lost before the initial vowel of a suffix, e. g., *aur-eus* ('golden') from *auro-* (*aurum*).' (Hale and Buck, Latin Grammar, 205.2.) Therefore we may at once rule out *Turriidae* as a possible derivative, in favor of *Turridae* (I give the plural, as this seems to be what you want; the singular would be *turrides*).

"The ending in question is really a Greek suffix, used to denote that the name in question means the son (or descendant) of the person designated by the simple noun. Thus *Turrides* would mean 'son of a Tower,' and *Turridae*, 'the sons of a Tower,' or 'the Tower family.' When I say that it is Greek, I do not mean that it is not found in Latin; it is found frequently, but always, I think, in Greek patronymics (or Latin patronymics consciously formed in imitation of the Greek ones), which the Latin writer (usually a poet) has occasion to introduce into his text. Examples would be: *Pelides* 'son of Peleus,' *Philyrides* 'son of Philyra.'

"As to the form *Turritidae*, it is obviously meant as a derivative from the adjective *turritus*. The stem of this adjective is *turrito*, but, as above, the final short vowel would be dropped before the initial vowel of the ending *-idae*, and *Turritidae* is therefore correctly formed. But it is to be observed that the suffix, or ending in question is employed in Latin authors only in composition with the names of persons, nouns substantive, and that *Turritidae* would therefore be decidedly anomalous.

We might translate it 'family of a the-turreted,' but the fact remains that the Latin authors would not have said anything like that. . . . Unless there exists some zoological reason for preferring a word that would mean 'members of the family of the thing that is provided with towers' to one meaning 'members of the Tower family,' I should much prefer the shorter and more Latin (or may I say less *un*-Latin?) *Turridae*."

The facts therefore seem decisive that *Turritidae* is an impossible construction as a direct derivative of *Turris*, and that *Turridae* is correct and should be used. The spelling *Turrinae* for the typical subfamily logically follows by the same reasoning.

REDLANDS, CALIFORNIA, December 29, 1919.

ON CERTAIN OF LINK'S NAMES IN THE MITRIDAE.

BY J. R. LE B. TOMLIN.

The rarity of Link's work entitled *Beschreib. Nat. Samml. Univ. Rostock* (1807) is doubtless the reason why his specific names are but little known. Coming as it does before Lamarck or Dillwyn began to make their extensive contributions to nomenclature, it will, I believe, eventually be found to have anticipated these two authors in many cases. Link in the above work lists 20 Mitras, of which the following are noteworthy:

Pt. iii, p. 127. *Voluta stictica* Link; *V. papalis* B. Gmel., 3459; Mart. iv, 147, 1356.

It is curious that this shell was not differentiated by any 18th century author. Most of them considered it a var. of *papalis*; Bolten confused it with *cardinalis*. The synonymy is:

1807. *V. stictica* Link.

1811 (early in). *Mitra abbotis* Perry.

July, 1811. *Mitra pontificalis* Lamarck.

p. 127. *Voluta digitalis* Link; *V. pertusa* J. Gmel. 3458; Chem. x, 151, 1432, 1433.

This specific is generally ascribed to Dillwyn. Synonymy as follows:

1807. *V. digitalis* Link.

July, 1811. *Mitra millepora* Lamarck.

1817. *Voluta digitalis* Dillwyn.

p. 127. *Voluta papilio* Link. No fig. quoted, but the excellent description enables one to recognize this as a synonym of *sphærulata* Mart.

p. 127. *Voluta clathrata* Link. No fig. quoted, and the description is not determinable. It is said to be like *pertusa* Gmel. but not coronate, cancellate, deeply punctured in the furrows. The name *clathrata* Gmel. is already in use in *Mitra* and therefore *clathrata* Link may conveniently be dropped.

p. 127. *Voluta elegans* Link; *V. plicaria* B. Gmel. 3452; Chem. x, 151 (by error 157), 1444, 1445.

This is a much earlier name for the *Mitra* universally known as *regina* Sow., which dates from 1828; but Link's name cannot be used as it is preoccupied by Gmelin.

Mitra elegans Reeve, Conch. Ic. pl. 29, f. 233, may be called *buriasensis*, and *M. elegans* H. C. Lea, Am. Journ. Sci. & Arts, 40.102, *alabamensis*.

p. 128. *Voluta ornata* Link. No fig. quoted, but I do not think that there can be any doubt that the description is a clear and accurate one of *taeniata* Lamarck as now understood. *Mitra ornata* will therefore supersede *M. taeniata*.

M. ornata A. Ad., P. Z. S. 1851, 135, may be renamed *M. adornata*.

M. ornata Kien. = *M. rossiae* Rve.

M. ornata Schubert and Wagner never seems to have been subsequently recognized.

p. 128. *Voluta variabilis* Link. Mart. iv, 148, 1364.

This is a synonym of *Mitra rugosa* (Gmel.) = *corrugata* Lam.

M. variabilis Rve., Conch. Ic., pl. 13, f. 95, is thus preoccupied and I rename it *polymorpha*.

p. 128. *Voluta schröteri* Link; Schröter's Einl. I, 221, pl. i, f. 13. Dillwyn quite independently founded a *Voluta schroeteri* on the same figure, which has been considered by Martens and E. A. Smith to = *Mitra picta* Rve. (cf. Ann. Natal Govt. Mus. I, pt. i, 32). It seems impossible to identify with certainty.

NEW SPECIES OF WEST COAST SHELLS.

BY MRS. IDA S. OLDROYD, STANFORD UNIVERSITY, CAL.

Tritonalia fraseri n. sp. Plate IV, figs. 1 and 2.

Shell of medium size, very elongate, narrow; whorls including the nucleus, which is present on nearly all the specimens collected, suture distinct and deep, whorls strongly shouldered, with six strong ribs spinose at the shoulder; body whorl with nine strong spiral cords and with incremental ones between. The shoulder is very strongly rugose, and has from one to two spiral cords, the second whorl has four strong spiral cords and three incremental ones; the third has three strong spiral cords and no incremental ones; aperture elongate-oval, interior yellowish to purple-brown, columella thickened and nearly straight, canal long, straight and closed in the adult. It differs from the typical form in the very elongate form, and the absence of the basket-like sculpture in some specimens on the fifth and sixth whorl the basket sculpture shows faintly.

Type locality is Brandon Island, Departure Bay, Vancouver Island.

It is named in honor of Dr. C. Melan Fraser, of the Dominion Station, through whose help we were given every facility possible for collecting while at the Station in May, 1919. The type is in the Oldroyd Collection, Stanford University. Cotypes are at Dominion Station and U. S. N. M.

Pecten kincaidi n. sp. Plate IV, figs. 3, 4.

Shell subcircular, the height and length being nearly equal; equivalve, both valves slightly convex; ears as in *P. islandicus*; base evenly rounded; color yellowish-white with reddish-brown markings. Left valve with 28 narrow round-topped imbricated ribs, and very faint intercalaries, the interspaces wider. Right valve with 25 broader flat-topped ribs, some of which are divided toward the margin. Anterior ear (the larger) with 7 ribs, the posterior ear with 5 ribs. This species resembles *P. jordani* Arnold, but the valves do not tend to contract suddenly at the basal margin as in *P. jordani*, and the right ear is larger.

The ribs on the right valve of *jordani* are all divided from near the umbones.

One fine specimen (the type) living was obtained in July, 1919, and one was taken in July, 1918, but is much thicker shell, a little larger than the type. Named in honor of Prof. Trevor Kincaid, of the Univ. of Washington, to whom we owe so much good material. Type is in Oldroyd Coll., Stanford University, No. 89.

Pecten islandicus pugetensis n. var. Plate IV, figs, 5, 6.

Shell much smaller than the typical, sculpture coarser in proportion to the size. Shell more elongate and the ribs spinose. Ribs 17 with a very fine one in the interspaces.

The type is in the Oldroyd Collection, Stanford University. Type locality off San Juan Island, Puget Sound. 12 specimens were obtained, two from the dredge, and ten from rocks on shore.

HERBERT HUNTINGTON SMITH.¹

BY GEORGE H. CLAPP.

The sudden death of Herbert Huntington Smith on March 22nd last, at University, Alabama, meant more, perhaps, to the conchologists of the United States than we now realize, although the collecting and serious study of shells was the work of the later years of his life.

Born at Manlius, New York, on January 21, 1851, and graduated at Cornell University in 1872, he early in life became interested in natural history, and made some collections in different branches. Mr. Smith told me that his first real work was on fossils; and he later became interested in insects. When he began to collect the mollusca, I do not know; but when he joined the Carnegie Museum of Pittsburgh, he had quite an extensive general collection. Between the years 1870 and 1886 he made several trips to Brazil and altogether spent about eight

¹ A portrait of Mr. Smith was published in the number for July, 1919.

years in exploring and collecting. He collected such shells as he saw, but did not specialize on them.

In answer to my inquiry Mrs. Smith wrote:

"In Brazil I only remember a few odd lots of land shells until we got to Corumbá on our way home; it was rich in land shells, but Mr. Smith said that the mosquitoes were 'frightful.' In order to do a morning's work of collecting, he had to tie his sleeves tight at the wrist, do the same thing with his ankles; tie a bandana around his neck; fill his pockets with cigarettes and matches; put a cigar in his mouth, 'grit his teeth,' and start. All the collecting there was almost a torture, so I imagine shell collecting was quite a cursory affair."

The number of shells collected on that trip was very large, although the species were not numerous; but a number of them were new to science. These shells were widely distributed, probably by Dr. Newcomb, and when we see the locality "Corumbá, Brazil," we may feel pretty sure that we are looking at Smith's shells.

During the time he was in the West Indies, for the Royal Society, and in Mexico, for Mr. F. D. Godman, he collected "everything," and naturally shells proved to be no small part of his "catch."

When he went to Colombia, in 1898, I arranged to take all of his land shells, but he got so interested in collecting mammals, birds and plants that the return in shells was not very large, except in some of the larger and more conspicuous species. There he again ran into the "insect pests," and at one place, near the coast at Santa Marta, he said the "sand flies" poisoned him so that the skin even peeled off the palms of his hands. His final breakdown in 1902, he always attributed to the poison of sand flies, gnats, mosquitoes, and the thousand-and-one other curses of the tropics.

In 1903 his health still being poor, he gave up the fight, and resolved to go to the South to live. He settled at Wetumpka, Ala., and at once started after shells. His first collecting there, so different from work in the tropics, was rather disheartening, and he wrote that there were no shells in that region. A little later he began to get results, and then he wrote, "I didn't know how to collect," and when the first lot came in, it was seen that

he had struck a remarkably rich region. Then a "Syndicate" was formed of T. H. Aldrich, of Washington, D. C., Mr. Bryant Walker, of Detroit, Dr. H. A. Pilsbry, of the Academy of Natural Sciences, Philadelphia, Pa., and the writer, and the work was carried on steadily for over six years. Dr. Pilsbry dropped out in 1906, and he was replaced by Mr. John B. Henderson, of Washington, D. C.

The naming and distribution of the thousands of land shells collected in all parts of Alabama, fell to the part of the writer, and the new species have all been described by him; 13 species and 4 varieties up-to-date, with probably several more to follow, as the material is more carefully studied. After the regular work for the "Syndicate" was stopped, Mr. Smith continued collecting fresh-water shells for Mr. Walker, and land shells for the writer, while collecting Tertiary fossils for the Geological Survey of Alabama, by which he was employed as Curator of the Museum at the University of Alabama. The sorting, naming and distributing of the fresh-water shells, was done by Mr. Walker, and I cannot do better than quote from a letter from him, on this subject:

"I enclose the meager list of n. sp. and vars. that have been described from Mr. Smith's material. But that does not begin to show the enormous amount of work that he did in developing the fauna of Alabama. Besides going the whole length of the Coosa from Gadsden to Wetumpka by boat, he did the Black Warrior thoroughly before it was spoiled by the Government improvements (?) and spent a season on the Mussel Shoals of the Tennessee. Two or three summers were spent on the Connasauga and other head-waters of the Coosa, and in numerous side trips he had covered practically the whole state. Then, too, through local collectors, many of them trained by him, he had reached into many localities that he did not personally visit. By these means he collected an enormous amount of material, practically none of which has been worked up.

"While he worked for the 'Syndicate' he collected everything; but when that arrangement ceased, he specialized in the *Unionidæ* and *Pleuroceridæ*. I have not any very accurate figures on the number of specimens of *Unionidæ* that he collected, but I think that from 40,000 to 50,000 would not be an overestimate. His Black Warrior collection alone he reported as 10,000. No report on this material has ever been made, and a

very large proportion of it still remains to be worked over. This I shall do as rapidly as I have time. I also have on hand many thousands of specimens of *Amnicolidæ* that have not been sorted out. And the same is true of a very large amount of *Ancylidæ* from the Coosa and its tributaries.

“But it was especially in the *Pleuroceridæ* that he put in his best work. He became exceedingly interested in that family and the many perplexing problems that its protean species presented, and it was his expectation to work it up himself. The enormous collection, thousands upon thousands of specimens, and the familiarity that he had acquired in his many years of field work, especially fitted him for the work. But unfortunately the multitude of duties that pressed upon him, as Curator of the State Museum, prevented him from carrying his plan into execution. He had planned to publish a paper on the *Anculosæ* of the Coosa for some time, and expected to write it up this last spring. He had gone so far as to arrange a series of the species in the order that he intended to present them, but his untimely death prevented the completion of the work. Beyond this, and a somewhat similar arrangement of the *Gyrotomas*, nothing has been done and, except the manuscript names attached to many species that he believed to be new, and which he intended to describe, there is absolutely nothing left to show the vast knowledge that he had acquired of that marvelous fauna. He had it all in his brain, and it all perished with him. I do not suppose that any other man ever had such an intimate knowledge of the variation of that family, and to think that it is all gone, is truly pitiful.

“I do not believe that the fauna of any other State in the Union has ever been so thoroughly worked as was that of Alabama, by him.”

I do not know how many new species were collected by Mr. Smith in Brazil, the West Indies and Mexico, but the following is the list from Colombia and Alabama:

COLOMBIA.

Glandina callista Pilsbry and Clapp.	Aperostoma smithi Pilsbry and Clapp.
Circinaria ponsonbyi Pilsbry and Clapp.	Helicina sanctæmarthæ Pilsbry and Clapp.
Circinaria ponsonbyi var. clara Pilsbry and Clapp.	Helicina cacaguelita Pilsbry and Clapp.
Aperostoma sanctæmarthæ Pilsbry and Clapp.	

ALABAMA.

Musculium transversum de- cisum Sterki.	Neoplanorbis umbilicatus Walker.
Pisidium compressum coosa- ense Sterki.	Clappia clappi Walker. Polygyra smithi Clapp.
Pisidium compressum con- trarium Sterki.	Polygyra inflecta approxi- mans Clapp.
Pisidium limatulum Sterki.	Polygyra decepta Clapp.
Pisidium noveboracense ala- bamense Sterki.	Polygyra barbata Clapp. Polygyra brevipila Clapp.
Pisidium atlanticum dispar Sterki.	Polygyra brevipila chero- keensis Clapp.
Pisidium atlanticum albidum Sterki.	Polygyra cohuttensis Clapp. Vertigo alabamensis Clapp.
Rhodacmea cahawbensis Walker.	Vertigo alabamensis conecu- hensis Clapp.
Rhodacmea gwatkiniana Walker.	Vertigo oscariana "Var." (not named.)
Somatogyrus decipiens Walker.	Omphalina pilsbryi Clapp. Vitrea lewisiana Clapp.
Somatogyrus hendersoni Walker.	Vitrea aldrichiana Clapp. Vitrea cumberlandiana Clapp.
Somatogyrus pygmaeus Walker.	Vitrea (Paravitrea) conecu- nensis Clapp.
Neoplanorbis carinatus Walker.	Vitrea (Paravitrea) pilsbry- ana Clapp.
Neoplanorbis smithii Walker.	Carychium nannodes Clapp.

Dr. W. J. Holland, Director of the Carnegie Museum, Pitts-
burgh, has written a very appreciative article on the life and
work of Mr. Smith, in *Science*, N. S. Vol. XLIV, No. 1273,
pages 481-483, May 23, 1919, where other fields of activity are
touched upon; but to cover the whole subject would demand a
volume. It is to be regretted that Mr. Smith was not able to
carry out a plan he long had in mind, of working up his ex-
tensive series of notebooks into a story of his life as a collector,
as it would have been an inspiration to future collectors, and
would, I feel sure, have been worthy to place alongside of the

classic works of Bates and Wallace. He was a remarkably keen observer, as shown by his letters, so his notebooks undoubtedly contained a vast amount of most valuable observations. Even when feeling "down in his luck," he always saw the funny side of life, and had a large stock of humorous stories, which he would frequently insert in his letters, for no other reason, apparently, than that he just happened to think of them.

NOTES.

VERTIGO OVATA AND *V. HEBARDI* IN FLORIDA.—Both *Vertigo ovata* and *V. hebardii* appear to be rare in Florida, as you will see by the list below giving records from my collection. The number found is added for each locality.

Vertigo ovata Say.

Snapper Creek Hammock, south of Miami (2).

Madeira Hammock, southern Florida (1).

Lower Matecumbe Key (5).

Vertigo hebardii Van.

Pumpkin Key (3+fragments).

Big Pine Key (1).

Elliotts Key (2).

Porgy Key (9+fragments).

Little Palo Alto Key (3).

No Name Key (1).

Lignum Vitae Key (1).—GEO. H. CLAPP.

In a most interesting article by W. J. Wintemberg, "Archaeology as an Aid to Zoology" (Canadian Field-Naturalist, Vol. 83, Oct., 1919, pp. 68-72), an error in the distribution of *Litorina irrorata* Say has crept into print, in quoting from G. G. MacCurdy, "The Passing of a Connecticut Rockshelter" (Amer. Jour. Sci., Vol. 38, p. 517, 1914). *L. irrorata* is not confined to Florida, but is found more or less common along the entire coast from New England southward. Vineyard Sound, "sparingly" (Verrill). New Haven, "not at all common" (Perkins). Stratford, Conn., "on high sedges" (Linsley).

Huntington, L. Isl. (*S. Smith*). It is locally common in the marshes along the New Jersey coast.—C. W. JOHNSON.

FASCIOLARIA PAPILLOSA SOWERBY. In regard to my reference to this species in the October NAUTILUS, p. 45, Mr. J. R. LeB. Tomlin says: "I have the Tankerville catalogue before me and on p. xvi of its Appendix I find: 1552, *Fasciolaria papillosa*. F. testa fusiformi, apice papillosa, anfractibus transverse striatis, mediane nodosis; aperturâ intus laevis; caudâ longâ, long. $3\frac{7}{10}$, lat. $1\frac{3}{10}$ unc.

"It is not figured nor is any locality given." It may possibly be a young *F. gigantea* but from the above description it seems unrecognizable.—C. W. JOHNSON.

PHYSA SMITHIANA new name for PHYSA SMITHII.—Dr. Bryant Walker has kindly called my attention to the fact that the name *Physa smithii* used in my paper "Fresh-water Mollusca from Colorado and Alberta" (Bull. Amer. Mus. Nat. Hist., XLI, p. 535) is preoccupied by Clessin (Conch. Cab., Planorbis, p. 294) for a *Physa smithii* from Australia. I therefore change the name to *Physa smithiana*.—FRANK C. BAKER, University of Illinois.

AN AMENDMENT.—In the January number of the NAUTILUS, on page 103, I inadvertently omitted from the list of Simpson's catch of Unionidæ at Lodgepole Creek, *Anodontooides ferussacianus* Lea. The omission makes the next sentence unintelligible or misleading, according to the interpretation placed upon it by the reader.—JUNIUS HENDERSON.

PUBLICATIONS RECEIVED.

EXPERIMENTS IN THE BREEDING OF CERIONS. By Paul Bartsch (Carnegie Institution of Washington, 1920). It is well known that in this genus each colony "presents certain slight characters by which we can distinguish its members from those of other colonies. The question arises, are the forms in the var-

ious colonies fixed forms; that is, will generation after generation yield the same mode in measurements, or will changes in the local environment from season to season affect the developing organisms to such an extent as to produce an unending series of slight variations? These were the problems that called for a solution. The hope of throwing some light upon these questions prompted the breeding experiments which were started in 1912."

Colonies of 200 each of two species from Andros, *Cerion casablancae* and *C. viaregis* Bartsch were originally introduced on certain of the Florida Keys. In 1915, 800 *C. crassilabris* from Porto Rico, and in 1916, 8,317 *C. wa* from Curaçao were planted on Loggerhead Key. The shells were marked by filing. Some of these colonies have now produced a second generation of Florida-grown offspring. The present paper contains records of the results. In the case of *C. viaregis* Dr. Bartsch finds that the variations in the first and second generations are entirely within the range of the species in its original locality; the changed environment "has not affected them in such a way as to produce such differences as one observes between the various colonies in the Bahamas." *C. casablancae* gives practically the same result. The same holds with the first Florida generation of *C. crassilabris*.

On Newfound Harbor Khy *C. viaregis* has hybridized with the native *C. incanum*. The offspring show a remarkable range of variation; forms near typical *C. incanum* and typical *viaregis*, all intermediates between these, but also forms closely resembling the mottled *C. martensi* group of the Bahamas. A state of flux has been produced by cross-breeding. The experiments indicate also an unusual fertility, and the suggestion is made that "crossing has an energizing effect which seems to enable the new product to surpass its associated congeneric forms in the production of offspring."

Dr. Bartsch suggests that during the glacial period, when the low state of water united the numerous Bahaman Keys, extensive crossing took place, this resulting in the efflorescence of new forms which we find to-day.

A valuable section treats of the soft anatomy, which shows

considerable divergence among the species. Other biologic notes and information on the ecologic relations of Cerions are given. 59 plates fully illustrate the material.

Dr. Bartsch's experiments clearly have important bearings upon systematic zoology as well as upon the doctrine of evolution generally.—H. A. P.

MOLLUSCA OF THE CROCKER LAND EXPEDITION TO NORTHWEST GREENLAND AND GRINNELL LAND. By Frank C. Baker (Bull. Amer. Mus. Nat. Hist., Vol. 41, pp. 479-517, pls. 25-27, Dec., 1919). An interesting review of some of the arctic mollusks, especially of the Buccinidae of which *Buccinum tanquaryi* and *B. ekblawi* are described as new.

FRESH-WATER MOLLUSCA FROM COLORADO AND ALBERTA. By Frank C. Baker (Bull. Amer. Mus. Nat. History, Vol. 41, pp. 527-539, Dec., 1919). *Planorbis similaris*, *Physa smithi* and *Galba alberta* are described and figured as new.

NEW SHELLS FROM THE NORTHWEST COAST. By William H. Dall (Proc. Biol. Soc. Wash., Vol. 32, pp. 239-252, Dec., 1919). Ten new species and varieties and a new genus *Pantel-laria* (type *Megerlia monstruosa* Scacchi) are described.

LOCOMOTION IN TWO SPECIES OF THE GASTROPOD GENUS ALECTRION WITH OBSERVATIONS ON THE BEHAVIOR OF PEDAL CILIA. By Manton Copeland (Biol. Bull., Vol. 37, pp. 126-138, 1919).

THE CENTRAL NERVOUS SYSTEM OF NUCULA AND MALLETTIA. By W. A. Hilton (Jour. Ent. and Zool., Vol. 11, pp. 75-78, 1919).

NEW SPECIES OF MOLLUSCA FROM VARIOUS DREDGINGS TAKEN OF THE COAST OF NEW ZEALAND, THE SNARES ISLANDS AND THE BOUNTY ISLANDS. By Miss M. K. Mestayer (Trans. and Proc. N. Zealand Inst., 1919, Vol. 51, pp. 130-135, pl. 8). *Liotia suturi*, *Orbestella hinemoa*, *Crossea cuvieriana*, *Leucosyrinx thomsoni*, *L. cuvierensis* and *Vepecula cooperi* are described as new.

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THE NAUTILUS

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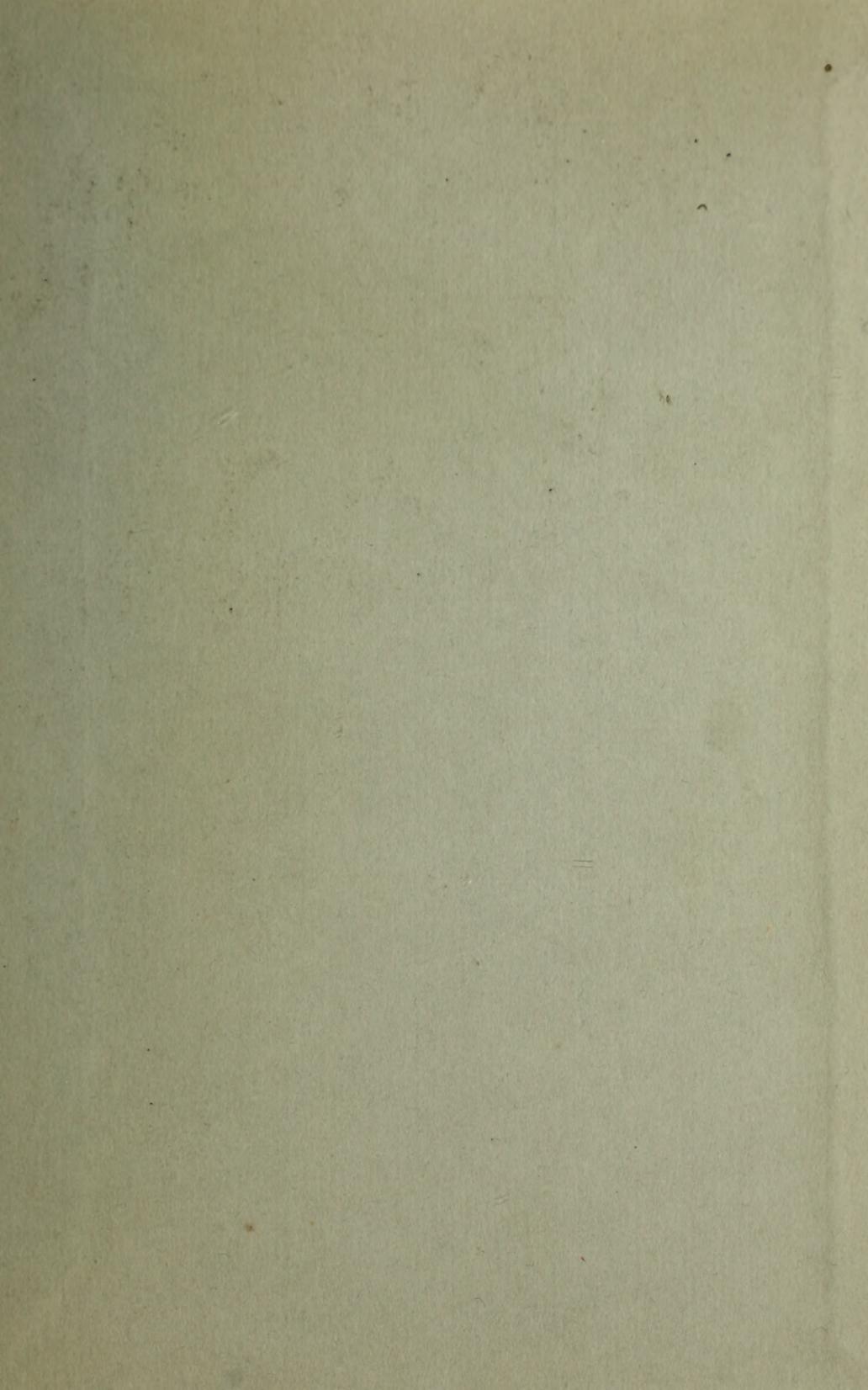
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