THE

NAUTILUS

A MONTHLY JOURNAL
DEVOTED TO THE INTERESTS OF
CONCHOLOGISTS

VOL. XIX.

MAY, 1905, to APRIL, 1906.

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THE NAUTILUS.

VOL. XIX. MAY, 1905. No. 1.

NOTES ON SOME FRESH-WATER SHELLS FROM THE YUKON TERRITORY.

BY J. F. WHITEAVES.

Among the zoölogical collections in the Museum of the Geological Survey of Canada, there are a few fresh-water shells from the Yukon Territory, which have not yet been reported upon, though they are by no means devoid of interest to the student of the geographical distribution of the mollusca.

Most of these shells were collected by the late Dr. G. M. Dawson, in 1887, at four localities, viz., from Frances Lake, at the head of the Liard River; from Finlayson Lake, between Frances Lake and the Pally River; at the Lewes River; and from Lake Marsh or "Mud Lake," one of the tributaries of the Lewes River. The remainder were collected by Mr. Joseph Keele in 1904, from the Stewart River, near Mayo River.

The Cycladidæ in these collections have been kindly determined by Dr. V. Sterki, and most of the Gasteropoda by Dr. W. H. Dall. The species represented in them are apparently as follows:

PELECYPODA.

Sphærium Walkeri Sterki.

Frances Lake, one valve; and Finlayson Lake, two perfect specimens. In 1904 Mr. W. McInnes collected a few living shells, which were referred to this species by Dr. Sterki, from the Atta-

wapiskat River, Keewatin. The type of *S. Walkeri* are from Lake Michigan.

Pisidium Idahoense Roper.

Stewart River, near Mayo River; one dead but perfect specimen and an odd valve. Dr. Sterki writes that the "anterior part of the hinge of the former is reversed."

Pisidium compressum Prime.

Stewart River, near Mayo River; one specimen. Mr. McInnes has recently collected specimens of this species at Ozhiski Lake, Attawapiskat River, at Kawinogans River (a branch of the Attawapiskat) and at the Winisk River, Keewatin.

Pisidium variabile Prime, var.

Stewart River, near Mayo River; two specimens. Mr. McInnes has recently collected three specimens on the Kawinogans River, which Dr. Sterki has identified with this species.

Pisidium scutellatum Sterki.

Frances Lake; fry only, one specimen. Dr. Sterki has recognized a few specimens of *P. scutellatum* in collections made by Mr. McInnes last year at Ozhiski Lake and the Kawinogans River, Keewatin.

GASTEROPODA.

Valvata mergella Westerlund.

Stewart River, near Mayo River, two specimens.

Valvata Lewisii Currier.

Valvata sincera of Haldeman, C. B. Adams, Dekay; W. G. Binney, and many subsequent American writers, but, according to Dall, not *V. sincera* of Say.

Valvata striata of Lewis, but not of Philippi.

Frances Lake, ten specimens, and Finlayson Lake, two specimens. Presumably similar specimens were previously recorded by W. G. Binney, in 1865, under the name *V. sincera*, as having been collected by Major Kennicott from the Peace River, Upper Mackenzie, and Great Slave Lake. Frances and Finlayson Lakes both belong to the Upper Mackenzie drainage system.

Elsewhere in Canada, *V. Lewisii*, as recently identified by Dall, is now known to occur at many localities from Gaspé to Alberta, and as far to the northeastward as Fort Chimo, Ungava.

A few specimens, in the museum of the Canadian Survey, which Dall thinks are "probably the true *V. sincera* of Say, or a variety of it," were collected on the island of Anticosti by Professor Macoun in 1884, and on the Attawapiskat and Kawinogans Rivers by Mr. McInnes in 1904. Those from the Kawinogans River have the outer half of the last volution free and partially uncoiled.

Limnæa stagnalis appressa Say.

Stewart River, near Mayo River; two specimens.

Limnæa Randolphii Baker.

Frances Lake, eleven fine and large specimens; Finlayson Lake, eleven specimens, mostly immature; Lewes River, one small specimen; and Lake Marsh, Lewis River, seventeen fine and mostly adult shells.

Limnæa palustris Muller.

Frances Lake, two specimens.

Limnæa Vahlii Beck. (Dall.)

Frances Lake, nine specimens; Finlayson Lake, twelve specimens.

Limnæa arctica Lea. (Dall.)

= *Limnæa Pingeli* Beck, var.; (Dall.)

Stewart River, near Mayo River, two specimens.

Planorbis trivolvis Say.

Stewart River, near Mayo River; seven specimens of a rather large, depressed and thin-shelled form of this species, with the spiral angulation obsolete.

Segmentina armigera (Say).

Stewart River, near Mayo River; one specimen.

Physa sp. indet.

Finlayson Lake; one very immature specimen.

Ottawa, April 5, 1905.

LISTS OF A FEW SPECIES OF LAND AND FRESH-WATER SHELLS FROM THE IMMEDIATE VICINITY OF JAMES BAY, HUDSON BAY.

BY J. F. WHITEAVES.

The shells referred to in the following lists were collected by Messrs. O. O'Sullivan and W. Spreadborough, at three localities near James Bay, on behalf of the Geological Survey of Canada, and are now in its Museum :

1. From two miles above the mouth of the Harricanaw River, Hannah Bay, collected July 1, 1904.

(A. *Land Shells.*)

Cochlicopa lubrica (Muller). Several specimens.
Vitrina limpida Gould. Eight specimens.
Zonitoides arboreus (Say). Two specimens.
Pyramidula striatella (Anthony). Four specimens.
Succinea retusa Lea (*S. ovalis* Gould non Say). Several specimens.

(B. *Fresh-water Shells.*)

Limnæa stagnalis appressa. Ten specimens.
Limnæa Vahlii Beck (teste Dall). Eleven specimens.
Limnæa truncatula Muller (teste Dall). Several specimens.
Bulinus hypnorum (L.). Eight specimens.
Planorbis trivolvis Say. Two specimens.

2. From the mouth of the Moose River, about a mile below Moose Factory, collected July 15, 1904.

Lampsilis luteolus (Lamarck). Two specimens.
Anodonta marginata, Say (= *A. fragilis*, Lamarck). Three specimens.

3. From the mouth of the Albany River, about a mile below Fort Albany, collected July 25, 1904.

Planorbis albus, Muller (= *P. hirsutus*, Gould). Several specimens.

Ottawa, April 8, 1905.

A SECOND CONTRIBUTION TO WEST COAST CONCHOLOGY—I.

BY HENRY HEMPHILL.

This may be considered a continuation of the article published in the three closing numbers of Vol. XIV (1901) of the NAUTILUS, entitled, "A Contribution to West Coast Conchology."

Since the publication of that article I have devoted the greater part of three years or more to further exploration of the islands off the coast of southern California, and a large part of a narrow strip of the mainland directly along the coast opposite to the islands, extending from San Pedro, at the south, to San Simeon Point, at the north, the latter point being about one hundred miles, more or less, north of San Miguel Island, the most northerly island of the group.

The new material secured during this exploration is so variable in every respect and yet so closely connected by intermediate forms, and adds so much to our knowledge, not only of the land shells of this region, but to the subject of variation generally, that I offer the following notes and descriptions for the consideration of those interested in the study of our land shells.

These islands and the narrow strip of the mainland referred to above constitute a very small portion of a large zoölogical province that has its southern line at San Diego, and its northern limits at Juan de Fuca Strait, and which may be or is known as the Californian Province, as most of the forms of molluscan life found within these limits have their metropolis, I believe, within the borders of the State of California. These limits, however, like all other attempts to define boundaries in nature, are more or less arbitrarily drawn, and serve only in a general way for the purposes of study, as dividing lines. Quite a number of genera and species that live in this province pass beyond these limits, while a few from the more northern region and even some circumpolar forms, disguised as species, range across the California Province far down into the more southern regions.

On account of their isolation or separation from the mainland and peculiar conditions in the environment, both the fauna and flora of the islands possess unusual attractions for those interested in the study of the problems of life. I shall go somewhat into the particulars and details of the conditions existing on these islands as I have

seen and observed them, and picture them as best I can for the readers of the NAUTILUS. A bit of history in this connection may be of interest.

Historians and others tell us that these islands after several unsuccessful expeditions were discovered in the year 1852, by Juan Rodrigues Cabrillo, a Portuguese navigator in the service of Spain.

COAST LINE AND ISLANDS OF SOUTHERN CALIFORNIA.

"Cabrillo," Prof. Holder tells us in his very interesting little booklet on Santa Catalina Island, "named the islands we call to-day San Clemente and Santa Catalina after his ships, the former 'La Vittoria' and the latter 'San Salvador.'"

In May, 1602, sixty years later, another expedition under Sebastain Vizcaino visited these islands in the following month of December. Vizcaino ignored Cabrillo's names and renamed them San Clemente and Santa Catalina, under which false names they have been called ever since. According to modern conchological rules, these later names fall into the synonomy of Cabrillo's earlier ones, but it seems a shame to "knock out" one saint's name with another,

if I am allowed to use a pugilistic phrase in connection with such a saintly subject.

Prof. Holder continues to tell us that the historian of Vizcaino was Father Torquemada, a member of the party, who has left a description of a temple on Santa Catalina. "It consisted of a large circular place decorated with feathers, in the centre of which was an idol bearing upon its sides representations of the sun and moon. To this object the natives sacrificed birds, yet when the Spaniards shot the ravens the natives raised many lamentations." "I believe," says Father Torquemada, "that the devil was in those crows, and spoke through them, for they were regarded with great respect and veneration. The birds were so tame that they would snatch fish from the hands of the native women who did not dare to retaliate." Torquemada considered the natives of Santa Catalina a superior race and in advance of the natives of the mainland in every way. The women were attractive, had fine eyes, and were modest and decorous, while the children were described as "white and ruddy."

When Cabrillo discovered Southern California, Santa Catalina had a large and vigorous population. To-day (1901), three hundred and fifty-two years later, this is represented by a pitiful handful of natives who are scattered about the foothills of the missions, by graveyards despoiled, and by the quaint stone implements plowed up by the modern ranchers.

I am indebted to the U. S. Coast Pilot for the following information in regard to the size, distances and elevations on these islands:

"The general trend of these islands is southeast and northwest," or about parallel with the general trend of the coast line of the mainland south of Point Conception, which point is a little north of San Miguel, the most northerly island of the group.

"Santa Catalina lies about 18 miles southward from Point Fermin. It is about 18 miles long in an east and west direction, with a greatest width of about 7 miles. About 6 miles from the western end is a deep cut in a north and south direction that almost severs it (this is known as the isthmus). The highest peak, 2100 feet high, lies about the middle of the island."

In February, 1897, the California Academy of Sciences issued a Bulletin on the Geology of Santa Catalina Island, written by William Sidney Tangier Smith, which goes largely into the details and analysis of the rocks of the island. As the rocks form the basis of all

the clays and soils, and in connection with the internal heat and moisture and external atmospheric conditions, form the basis of all organic life, including man, Mr. Smith's list and arrangement may be desirable to those who take a broad view and are seeking a solution of the great problems of life. His list and arrangement follows:

A—Eruptive Rocks.
1. Diorite.
2. Porphyrite.
3. Rhyolite.
4. Andesite.

B—Tuff and Diatomaceous Earth.
1. Tuff.
2. Shale.

C—Sedimentary Deposits.

D—Breccia.

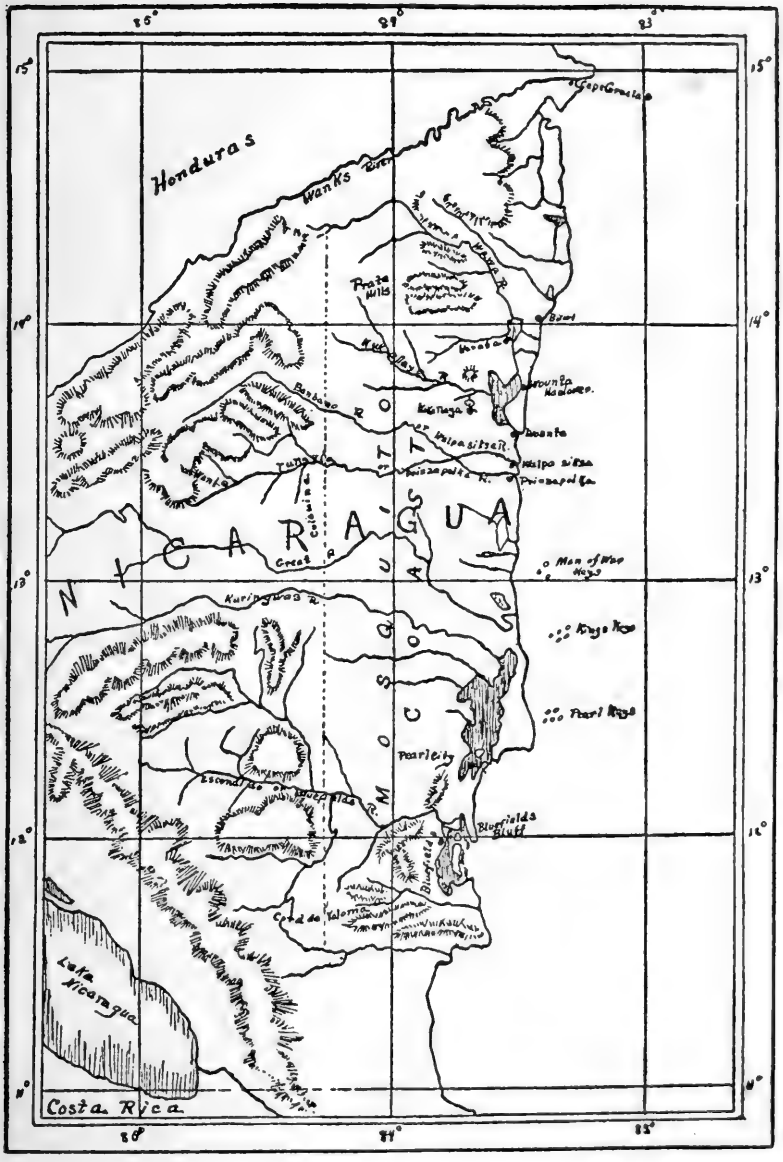
E—Basement Series.
1. Quartzite.
2. Actinolite.
3. Serpentine.
4. Talc Shists.
5. Garnet Amphibolite.

(*To be Continued.*)

SHELL-COLLECTING ON THE MOSQUITO COAST OF NICARAGUA.

That part of the Central American coast stretching from the Caribean Sea inland for about 40 or 50 miles and from the Wawa River and Sisin Creek on the north to the Rama River on the south has, until very recently, been known as the Mosquito Coast. In former times it was one of the regular haunts of those historic gentlemen whose lives have given us some thrilling tales of the old Spanish Main, and who had so much regard for the things of others that they soon became their own. The well-primed flint-lock and the handy machette were sometimes brought into play and made said transfers of property more expeditious.

Bluefields, the metropolis of the Mosquito Coast, with its cosmopolitan, variegated population and babel of tongues, owes its name to Blauveldt, one of those old sea-dogs. From 1655 to 1850 this land enjoyed autonomy under Great Britain, being ruled by native kings. But in 1850 under the terms of the Clayton-Bulwer treaty and of the treaty of Managua of 1860 the suzerainty was transferred to Nicaragua. The Indians enjoyed practical independence under their native king until 1895, when Nicaragua troops took actual possession


Honduras
Wanks River
Prata Hills
Bluefields
Bluefields Bluff
Pearl City
Pearl Keys
Kings Key
Man of War Keys
Escondido R.
Lake Nicaragua
Costa Rica
NICARAGUA
MOSQUITO
15°
14°
13°
12°
11°
10°
86°
85°
84°
83°

and the last vestige of native rule disappeared. The United States no doubt welcomed the final act, but England has never yet given full assent to it. The political change has not been beneficial to the native population.

A little gold in the rivers, some exports of mahogany and rubber support a small foreign population, who import considerable foreign food and manufactured goods. All this making the imposition of duty possible, the Nicaraguan government was naturally attracted, for the main function of government in many of our naughty little sister republics is to grab the pennies.

The white people comprise the foreign traders and the missionaries. The Nicaraguans in Bluefields are mostly mixed; as to the rest of the population it is made up of native Indians, except for the West Indian negroes who have settled in Bluefields and at Pearl Lagoon.

Of the Indian tribes the Moskos, whom the Spaniards called Mosquitos, are the most numerous and inhabit the seacoast. On Rama Key, in the Bluefields Lagoon, and on the mainland as far as Monkey Point, live a few hundred Rama Indians. Near Pearl Lagoon and near Wauks River or the Rio Coco dwell some remnants of black Caribs. Near the headwaters of streams west of Bluefields are to be found some Woolwas, while the Sumus inhabit the country along the headwaters of streams to the north of the Kuringwas River. All these interesting tribes and the Sumus especially, the most interesting of them all, are fast dying out or mixing. The ethnologist had better hurry or a field of research will be gone forever.

In Vol. 5, p. 151, of "The American Journal of Conchology," Mr. Ralph Tate, who collected in the Chonatales province, says: "A low mountain chain trends in a northwest and southeast direction through the central part of the country. . . . This region *extends to the Atlantic seaboard.*" The italics are mine, and it is to this latter remark I want to call attention, for I have had inquiries from conchologists concerning shells they thought lived on the Mosquito Coast which could not possibly have existed in its swamps.

With the exception of the low, isolated Pratta Hills to the northwest of Karata, a single isolated cone, known as Lappan, just west of Wounta Haulover; a solitary ridge near Pearl Lagoon, and some spurs of Cord. de Yoloma south of Bluefields, the entire Mosquito

Coast, together with much of the country beyond its limits, especially up the Kuringwas and the Avultara (Rio Grande) is low, swampy, savanna land. For twenty miles back from the sea, except in the rainy season, the rivers, creeks and lakes are salty. A glance at the map will show that the sea has invaded the land along the whole coast. The Indians say the coast is settling. Trees planted 80 years ago, high and dry and back from the sea, were at the high-tide line, being washed away in 1903. Lagoons once separated by a strip of forest or connected by a very narrow tingui (channel) are now united as one. Banks that once sloped to the water's edge are now being submerged.

Dense forest covers the country along all the streams and lagoons. Near the sea is the ubiquitous mangrove. Between the rivers are large savannas on which roam the cattle of the Indians, as well as deer. With few exceptions, the villages are along the rivers and lagoons, and consist of wattled and thatched huts. The entire population cannot exceed 15,000. The country is a paradise for naturalists, although I never met any there. It *abounds* in insects, birds, fish and interesting quadrupeds, such as tapirs, peccary, jaguars, pumas and ocelots, besides lizards, alligators, turtles and manatees. I also observed at least three kinds of monkeys. Last, and of course not least, there are molluscs.

Along the seashore the country is sandy, and one is reminded of the Jersey beach. There are, however, three isolated spots on the coast which form exceptions. At the entrance to the harbor at Bluefields there is a strong "Bluff" standing high above the surrounding low stretches of country. At Walfa Siksa, the meaning of which is black stone, are to be found on the north side of the river mouth some black igneous rocks. They are also found under the river bed and crop out back of the village, which stands back from the sea, on the south bank of the river. This outcrop forms quite a conical knoll of rocks, having remarkable, square-like cavity structures. It is hidden in the "bush," and few white men know that the hill exists. To the north of the Wawa river there are some high banks of clay and stones along the sea, and the place is known as Bragman's Bluff.

The sand of the sea-beach extends back only a short distance—from a few feet to a few hundred yards, where clay and igneous-looking earth takes its place. Back twenty or thirty miles the river

banks get high enough to prevent overflow, and then the country begins to be stony. Rapids and falls are found on nearly all the rivers along the western border of the old reserve, and doubtless indicate an ancient seacoast.

From the shore line seaward there extends a very gradually sloping continental shelf, making shallow water and calm seas.

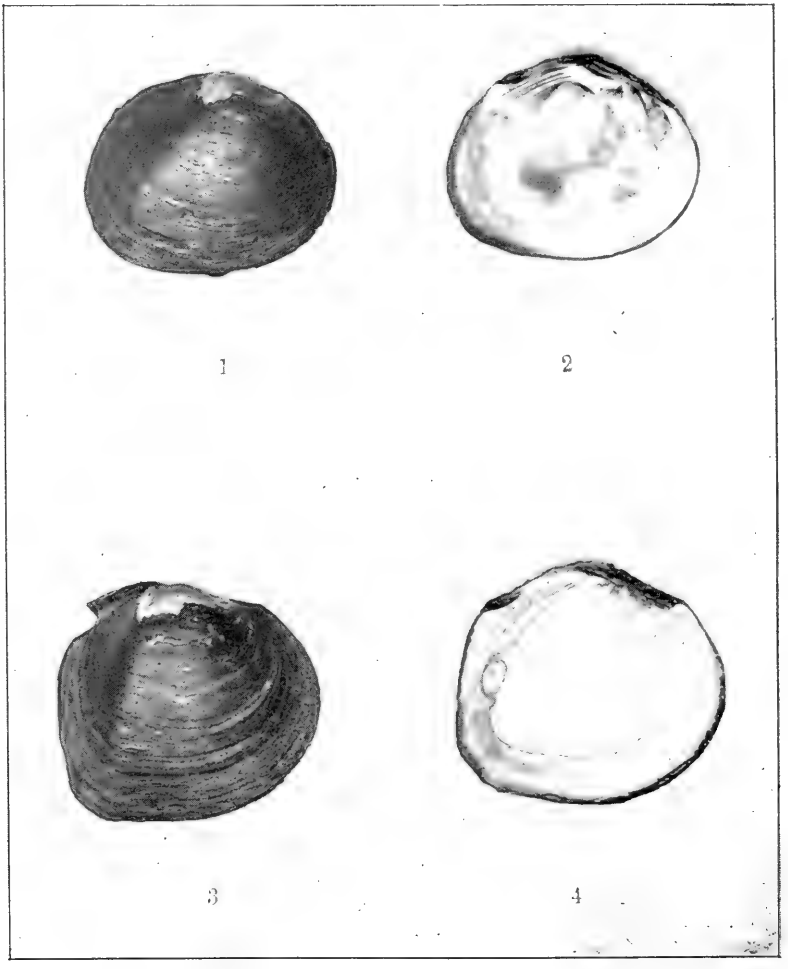
From three to forty miles out there are keys of various sizes, the largest being (Great) Corn Island. Some are treeless, while others are covered with mangroves and cocoanut palms.

From 1899 to 1903 it was my privilege to live at Wounta Haulover, a little Indian village of wattled and thatched huts. Being the only white man within twenty miles in any direction, loneliness sometimes drove me out into the forest, along the rivers or down by the sea—to collect shells. Although my time was fully occupied with professional duties, I succeeded in getting together a nice cabinet of specimens. In another paper I shall name them and append some notes.

NOTES.

Cypræa xanthodon Gray.—Dr. T. H. May, Government Health and Medical Officer of the Port of Bundaberg, Queensland, Australia, has sent me three beautiful specimens of *Cypræa xanthodon* Gray, which he says his children picked up last Christmas when at his seaside cottage. The shells were alive when taken and were found under rocks at low water. This species has been supposed to have a deep-water habitat.—S. Raymond Roberts.

Wholesale Pearl Fishing.—A great pearl fishery will take place at Marichchikkaddi, in the Island of Ceylon, on or about February 20, 1905. The banks to be fished are the southwest Cheval Paar, which is estimated to contain 3,500,000 oysters, sufficient to employ 200 boats for two days; the mid-east Cheval Paar, estimated to contain 13,750,000 oysters, sufficient to employ 200 boats for seven days; the north and south Moderagam, with 25,700,000 oysters, sufficient to employ 200 boats for thirteen days; the south Cheval Paar, estimated to contain 40,220,000 oysters, sufficient to employ 200 boats for twenty days, each boat being fully manned with divers.—*London Globe.*



FRIERSON: NEW UNIONIDÆ.

THE NAUTILUS.

VOL. XIX. JUNE, 1905. No. 2.

NEW UNIONIDÆ FROM ALABAMA.

BY L. S. FRIERSON.

Quadrula archeri n. sp. Plate I, figs. 1, 2.

Shell small, thin, lenticular, somewhat quadrate, smooth. Anterior margin rounded, basal margin slightly curved, dorsal margin somewhat bent midway, posterior margin rounded or bluntly pointed, umbones low and flattened. Sides compressed, raised slightly at the posterior angle, which is nearly obsolete; posterior slope wide, and somewhat elevated; epidermis smooth, light brown, sometimes inclining to orange, two or three concentric bands of green or black mark the earlier lines of growth.

Teeth of the left valve double, anterior cardinal high, thin and wedge-shaped, the posterior cardinal triangular, low and small, laterals thin, rather short and nearly straight.

In the right valve the cardinals are divided by a deep cleft, extending nearly to the bottom of the anterior adductor scar, the posterior tooth being much the smaller. The dorsal plate is quite wide for so small a shell. The shell cavity is quite capacious; the beak cavities deep and compressed. Nacre white, with brown splotches, and very iridescent. The nacre is probably also salmon-colored in some individuals. The pallial line in the specimens before me is nearly imperceptible in the posterior part of shell, where the nacre is *very thin.* One specimen shows in the upper part of the shell cavity, 20 or 30 almost microscopic muscle-scars extending from the beak cavities half way to the pallial line. Long. 34, alt. 28, diam. 14 mm. Habitat: Tallapoosa River, at Tallassee, Ala.

This shell is not closely allied to any shell with which I am acquainted. On the one hand it resembles some of the *Pleurobemas* of the group typified by *P. fassinans*, Lea, and on the other hand it bears some resemblance to a young and thin *Q. aurea*, Lea. In the concentric coloring of the lines of growth, it reminds one of *Q. asperata*, Lea. Its deep and compressed beak cavities place it in the genus *Quadrula*, while its resemblances to the latter two species is too slight to cause any error in their direction. Four specimens were found in the Tallapoosa River, Ala., by Mr. A. A. Hinkley, who has kindly allowed me to retain the specimen figured.

Quadrula rubidula n. sp. Plate I, figs. 3. 4.

Shell small, heavy, somewhat triangular; base emarginate, dorsum arched, posterior angle biangulate; ligament elevated, light red. Beaks not very high, umbones inflated, sides flattened, epidermis brown, rough, obsoletely rayed, and showing traces of a greenish tint.

Cardinals stout, short, rough, inclined to be double in both valves; laterals rather short, heavy, rough, and slightly curved; cavity of shell very irregular, excavated from beak to posterior margin; beak cavity deep and compressed, nacre white, sometimes pinkish, not very iridescent. Long. 36, alt. 32, diam. 22 mm.

The shell is close to *Q. rubida*, Lea, and some forms resemble some of the depauperated specimens of *Q. trigona*, Lea. From either of these species it may be differentiated by its small size, and by the biangulated posterior angle. Some 30 or 40 specimens from the Mulberry River; 20 or 30 from the Black Warrior, and a single specimen from the North River, Alabama, show a remarkable constancy in size and other characters. Examples may be seen in the cabinets of most of the collectors of Unionidæ in America, contributed by Mr. A. A. Hinkley, of Dubois, Illinois.

TWO UNDESCRIBED CALIFORNIAN SHELLS.

BY WILLIAM HEALEY DALL.

Murex (*Phyllonotus*) *santarosana* n. sp.

Shell small for the subgenus, with about six whorls, each bearing from five to seven strong, low, reflexed varices, with a prominent,

short, reflexed and inflexed grooved spine at the shoulder of the whorl; nuclear whorls one-and-a-half, smooth, minute; nepionic whorls two-and-a-half, with the whorls tabulate, two strong spiral cords at the shoulder, the varices thin, irregular laminæ low and obscure; subsequent whorls, with five (increasing in the adult to seven) strong, anteriorly crispate, amber-brown varices, under which the whorls are tabulate, the intervarical spaces whitish, nearly smooth or with very obscure revolving lines or threads; base of the whorls somewhat constricted with a short grooved spine on each varix where it crosses the concavity; aperture obovate, small, with the inner lip smooth, the outer one more or less denticulate on the edge, the enamel whitish; canal long, anteriorly attenuated, the margins adjacent but not adherent. Height of adult 45.0; max. diameter 28.0; max. diameter of aperture 10.5 mm.

Types, U. S. Nat. Museum, 130628 and 133945.

Dredged by U. S. F. C. Str. Albatross off Santa Rosa Island, in 82 fathoms sand, also found off San Pedro and Catalina Island by various collectors.

Specimens were named and distributed in 1895, but by some inadvertence the descriptions, both of this and the following species, seem to have remained unpublished.

Alaba oldroydi n. sp.

Shell small, polished, pale rufescent brown, with seven whorls, the protoconch smooth, swollen, globose, the following whorl smooth and rather inflated, the subsequent whorls sharply spirally grooved with wider interspaces, crossed especially the earlier ones with a few irregular, low, half obsolete wrinkles, the whorls are flattish and sometimes slightly constricted in front of the suture; the aperture patulous, recalling that of *Rissoina*, the base rounded with no umbilicus. Length 5.25; max. diam. 2.0; length of last whorl 2.5 mm.

Type, U. S. Nat. Mus., No. 158,771. San Pedro, 10 fathoms. Collected by Mrs. Oldroyd, Mr. Roper, Mr. Lowe, and others near San Pedro.

None of the specimens retain the operculum. The form of the shell, and especially of the aperture, recalls *Rissoina*, but the irregular varices, sculpture and apex are more like *Alaba*. A certain amount of doubt as to its true zoological position must remain until the operculum is known.

SHELL-COLLECTING ON THE MOSQUITO COAST OF NICARAGUA—II.

BY W. H. FLUCK.

I wish to acknowledge my indebtedness to several naturalists who have helped me in naming and verifying my shells, especially Messrs. Pilsbry, Johnson, Dall, Schick, Shackleford, Hodgson and Ancey. Without their generous help a solitary student like myself would be like the old woman who lived in the shoe, with one difference, trouble about shells, not children.

The localities mentioned in this and in subsequent papers may be found by referring to my map, page 9 of this volume. The names are somewhat blurred owing to rough paper and the reduction of the drawing, but it answers the principal reason for its publication, the location of Wounta Haulover, Wounta, Walfa Siksa, the Keys and Wani.

Spirula peronii Lam.

Wounta Haulover, and everywhere along the coast. No living specimens were found, but perfect shells of this cephalopod, immaculate and beautiful, were taken in quantity. I nearly always found it on the upper reaches of the beach among the dead algae and trash cast up by the sea.

Murex brevifrons Lam.

Wounta Haulover. A specimen is found now and again on the beach, but the shell is not plentiful.

Murex bellus Rve.

Same locality. One dead but perfect shell.

Sistrum nodulosum C. B. Ads.

King's Keys. One shell.

Purpura trinitatensis Guppy.

Man of War Keys.

Cymatium pileare Lam.

Walfa Siksa. On the rocks and sand reaches at this place there is good collecting, especially for bivalves.

Purpura floridana Con.

This is the shell known as *P. hæmastoma* L., var. *floridana* Con. Dr. Dall considers *floridana* of specific value. My shells are very variable in form and marking. Some are smooth-whorled and the color of beach sand; others are studded with one or two rows of

more or less prominent processes, especially on the body whorls, and are more marked than the smooth variety. Found on the beach on logs that were a-wash at high tide. In the dry season, when little fresh water from the Walpa Siksa river enters the sea, these shells are sometimes found on the rocks near the Indian village of the same name nearby.

Purpura patula L.

King's Keys. Man of War Keys. Up to 3 inches long and very beautiful. In the larger specimens the processes and other sculpture are often more or less obliterated. An old and reliable Indian told me that in former times the natives made dye for their loin-cloths—the name of which in their tongue is *palpura*, strange to say—out of molluscs from the keys.

Fasciolaria tulipa L.

Man of War Keys, and abundant on all the others as well, where they are sought after by the natives as an article of food.

Drillia fuscescens Gray.

A single dead shell at Wounta Haulover.

Drillia sp.

Dr. Dall says this is near *D. harfordiana* Rve., perhaps a variety of it. King's Keys.

Latirus cinguliferus Lam.

Man of War Keys.

Melongena melongena L.

Man of War Keys. Also on rocks at Walpa Siksa alive, as well as hundreds of dead shells as hermit-crab houses in the shallow water inside the bar.

Phos? d'orbignyi Payr.

King's Keys. Two specimens.

Pisania pusio L.

Man of War Keys. Numerous. I got eight specimens.

Nassa vibex Say.

Wounta Haulover, and everywhere, in favorable places. In the quiet September sea, when the beach is low, it can be found alive or containing hermit crabs.

Voluta virescens Sol.

In four years I found only four dead shells at Wounta Haulover.

Marginella apicina Mke.

Wounta Haulover. In September and March, especially in the former month, the N. E. trade wind dies away entirely, and instead, the wind blows from the S. or S. E. across South America. By the time it reaches the Caribbean it is the gentlest of zephyrs. The sea becomes as blue as the sky and as calm as a mill-pond on a hot August day. Under such conditions the shallow sea along the shore swarms with small forms of mollusca, and the littoral and laminarian collector is enabled to get forms not obtainable at any other time except by dredging. *M. apicina* is found at this time in quantity.

Marginella guttata Dillw.

Also found at the same place and under similar conditions, but is not as plentiful as the former.

Oliva (*Agaronia*) *testacea* Lam.

This little mollusk seems to be absolutely at home in the sand at the bottom of the shallow sea at Wounta Haulover. I think I am safe in saying that this is the commonest *laminarian* univalve on the Caribbean coast of Nicaragua. It is rarely cast up dead. I have taken them alive in quantity whenever the sea was calm enough to feel for them. With the Indian boys of my village I had a standing bargain to purchase all the small forms they brought me. That was before I found my first Olive. I was in bathing one day, when my foot, which soon became a good sub-marine shell-collector, accidently touched something that got away. I went for it quicker than it takes to write about it, and soon landed my first Olive. It was a prize I was proud of. I schemed out a little plan to get more, and confidentially let my house-boy in on the ground floor. I agreed to pay him 5 cents (silver) for every similar shell. He smiled hopefully, but still I was not suspicious. My hope was to get two or three sets for my friends. The boy soon disappeared, and quietly marshalled the boys of the village, who immediately invaded the sea. In less than an hour this little army confronted me with double handfuls of these Olives. They enjoyed their corner in the Olive market, and began unloading on me at 5 cents per. They allowed me, after an explanation, to make a selection of several dozen at less money. The rest went back into the sea. I kept a few alive in a jar of water and sand for a long time. My observations were of little interest, as the molluscs burrowed in the sand, and seemed to want to go deeper. The foot is large and violet-colored, and with it they dig rapidly.

Columbella mercatoria L.

A few shells from Man of War Keys. On the mainland nothing but fragments were ever found.

Columbella (*Anachis*) *varia* Sowb.

Columbella (*Anachis*) *lyrata* Sowb.

Both these forms can be found in large quantities at Wounta Haulover, but always, so far as I remember, as hermit-crab shell. I do not recall ever getting any alive, possibly because I never dredged for them. Every September, for 4 years, my boys and I collected hundreds of them. There is no doubt in my mind that both forms can be had alive not far from the Wounta Haulover beach. If I had known at the time that this was a new locality for *C. varia*, I would have made an effort to secure living specimens.

Engina turbinella Kiener.

Man of War Keys. Two specimens.

Cancellaria reticulata L. Wounta Haulover.

Have also seen it from the keys.

Terebra cinerea Gmel. Wounta Haulover.

Abundant, especially in September, when the sea is calm. At such times it seems to burrow nearer the surface of the sand. It is easily kept in a jar of sea-water and is quite active. Those I had in confinement spent much time creeping about on the sides of the jar like *Limnæas*, displaying their round, disk-like foot.

Terebra hastata Gmel. Same locality.

Rare. Only 3 specimens in 4 years. It probably inhabits deeper water than *T. cinerea*.

(*To be Continued.*)

A SECOND CONTRIBUTION TO WEST COAST CONCHOLOGY—II.

BY HENRY HEMPHILL.*

I have seen it stated several times by writers on conchology, that in regions where limestone predominates in the geological formation, and consequently becomes the principal element of the soil, that snail shells were or are more abundant (and hence a greater amount

* By typographical error the date of discovery of the islands was given as 1852 on p. 6 of last number, 5th line from top. It should read 1542.

of that form of organic life exists) than in regions where limestone was absent.

I am not prepared to confirm or deny such statements, for I have found land shells, both large and small, white and almost black, banded and bandless, with all the intermediate states and conditions, abundant and rare in limestone regions, and equally as abundant, rare and variable where limestone was apparently absent. There is undoubtedly a very close relationship between organic life, its form, and the elements composing the soil, which all creatures eat as food in a more refined state, and the elements composing the atmosphere that we breathe into our lungs and blood and which becomes a part of our body and being, and both of which are absolutely necessary to the existence of all forms of life, including man.

I think, therefore, we must seek for a solution of the problem of the origin of organic life, and the great diversity of form and action it presents for our study and consideration, in the chemical combination of the elements, for it is certainly true as Tyndall tells us, that "all matter is alive." In fact matter is the home of life, it is found nowhere else. Both are necessary to a demonstration of any kind, inseparable and truly immortal twins.

In his Essay on Man, the greatest of all philosophical poems, Pope expresses this thought in these inspired words:

> "See matter next with various life endued,
> Press to one centre still the general good.
> See dying vegetables life sustain;
> See life dissolving vegetate again:
> All forms that perish other forms supply
> (By turns we catch the vital breath and die).
> Like bubbles on the sea of matter born,
> They rise, they break, and to that sea return.
> Nothing is foreign; parts relate to whole.
> One all-extending, all-preserving soul
> Connects each being the greatest with the least.
> Made beast in aid of man, and man of beast,
> All served, all serving, nothing stands alone.
> The chain holds good where it ends unknown."

For all of the above reasons Mr. Smith's arrangement and analysis of the rocks of Santa Catalina Island, as given in our preceding paper, may be useful to those interested in this phase of the study of life.

The topography of Santa Catalina Island is bold and rugged. In many or most places the bluffs rise abruptly out of the sea in perpendicular masses several hundred feet in height; occasionally they are lower and assume the form of wall-like buttresses or small rounded headlands jutting out more or less into the sea, back of which the land rises in steep, abrupt elevations more or less broken, to the general level of the main bluff. The summits of the bluffs are sometimes jagged and rough, occasionally rounded off more or less smooth or level, intersected by small gulches, and a few deep canyons. The surface of the interior back of the bluffs gradually rises and is diversified as all mountainous regions are, and stretches off to the foot of "Black Jack," a cone with its peak 2,000 feet high, and "Orizaba" or "Brush Mt.," ridge-like in form with its highest elevation 2,100 feet above the level of the sea. These two peaks are the highest on the island, and are located about its centre. They are a mile or more apart and stand dome-like on the main ridge, which has an average elevation above the sea of about 1,400 feet.

The main canyons, which are few in number, are narrow and deep. The beds of these great washouts rise but a few feet above sea level for a mile or two inland, where they divide into smaller gulches that rise rapidly into and drain the higher slopes of the main ridge or backbone of the island.

At the mouth of Silver Canyon, which is really the only washout I saw on the island worthy of the name canyon, there is an immense and grand bluff of volcanic rock that rises perpendicular to almost or quite the level of the main ridge of the island, and crowds the mouth of the canyon into a narrow gorge but a few feet in width, forming a grand mass of "lava flow" for study and contemplation. This canyon is located on the south side of the main ridge about 7 miles from Avalon. The bluff stands on the east side of the canyon, extends a short distance inland, where it becomes broken into steep rocky declivities and abrupt slopes, covered with a thin coating of soil, and overrun by scrubby bushes, cactus and other plants, all mingled together in wild confusion, barring out in most places the foot of man. The smaller or side gulches that drain into and intersect the main canyons are numerous, generally short, and sometimes quite deep and canyon-like, with steep sides, and separated by sharp, narrow, barren, rocky ridges that run off in every direction like the arms of an octopus, joining the main ridge higher up and near the

middle of the island. On these rocky ridges, which are generally free from brush and chaparral, one may find rough trails, or get along by some rough climbing in his search for specimens, if he has a pair of stout legs and strong hob-nailed brogans under him. The only wild creatures that inhabit these islands to-day, so far as my knowledge goes, are wild goats (introduced with sheep), wild hogs (introduced and found to-day only on Santa Cruz and Santa Rosa Islands), foxes, mice, birds, lizards, snakes (rare), snails and insects. I have no evidence to show that any other animals except the Indians ever did inhabit them; but there are reports of the discovery of the bones of some large creature on Santa Rosa Island some years ago by Dr. Yates.

The northern and more shaded slopes of these island ridges are for the most part covered with scrub-oak bushes and other chaparral of various kinds, their branches low and reaching the ground, the twigs interwoven in many places so that all travel through this tangled wildwood is shut out except an occasional place where the sheep and goats have browsed off the lower twigs and made narrow openings or rough trails in their search for food during the dry season, or in seeking cool, shady retreats during hot summer days. Cacti have nearly full possession of the south and sunny slopes or exposures of the ridges on the island, and here on Santa Catalina, so far as my experience goes, is the breeding ground and home of the various kinds of snails, while the north and more shaded slopes are destitute or deserted by these children of the mist.

Notwithstanding the thin, scanty soil in most places on the steep slopes and narrow rocky ridges, the cactus secures a tolerably firm hold by sending strong, wiry roots down into the cracks and crevices of the bedrock, and in spite of the long dry weather during the summer they succeed wonderfully in developing their stout, succulent and curious forms.

Sometimes these plants are isolated, but generally they grow in dense patches and frequently take full possession of ridge, hill and slope where they stand in great masses, and apparently the more crowded they are the larger and stouter they grow, and armed as they are, with long, sharp thorns and thousands of fine needle-like "pointers" barbed to the end, one must work among them in his search for specimens with great care, otherwise he may receive some painful stabs and wounds which I have frequently met with in my

eagerness to secure some prize that imagined it was safe when within a "crown of thorns."

A few of the main creeks and sluiceways are shallow, broad and open, and cannot be classed as canyons. Their creek-beds are sometimes bordered by small, narrow flats or slopes, with a background of smooth rolling hills and sunny declivities that become more abrupt, rocky and broken as they rise and join the main ridge. On some of these little flats, directly along the banks of the creek, there are occasional patches of small willows, intermingled with bushes and shrubs of various kinds. On the southern sides of these open creeks or sluiceways the land generally rises more abrupt and rapidly than on the opposite side, is more rugged and is densely clothed with the impenetrable chaparral, mingled frequently with cactus, and presenting rather a strange contrast to the barren, treeless and shrubless slopes on the opposite side of the creeks.

The aspect of these islands during the dry season is dreary enough, and yet, even then, there is a sort of melancholy charm about the scenery, especially to those who want to see and study old mother nature in all her moods, which are about as changeable and fickle as her greatest offspring, the genus Homo.

The brown and sere vegetation, the barren and dried-up soil, ridge and slope strewn with fragments of disintegrating ledges of vari-colored rocks, the dumb waterless streams that sing no song and produce no "speckled beauties" to the great disgust of the enthusiastic "fly-throwers," and the hazy atmosphere that frequently hangs like a veil over hill and mountain, and lends a dim, distant and dreamy appearance to the landscape, are conditions not calculated to excite our enthusiasm, and leaves the imagination about as barren of glow as the landscape is of flowers and green grass. With the advent of the wet or rainy season however, all this dreariness is changed and so quickly that one wonders at the sudden transformation of the landscape from a dreary desert waste to a beautiful blooming garden wrought by the magic chemistry of the rains and dews upon the dry, warm earth.

Perhaps in no other part of our blessed republic is there so sudden and rapid a transition in the growth of vegetation, and hence in the general aspect of the landscape, as occurs in Southern California, after the heavy rains fall and the ground becomes well saturated with moisture. I know of no better fact that illustrates so well the

effect of conditions in the environment, not only on vegetable but on all other forms of life as the application of moisture to the warm dry soil, and I may add right here, that in my opinion the proportions of heat and moisture, especially in the early stages of growth of an organism, is probably the most fruitful source of variation.

The rains of Southern California appear to be brewed in the south, at least they are brought here on the wings of the south wind. When the rains are excessive, the gulches, creeks and canyons on these islands become raging torrents; the thin soil in many places, and especially on the south slopes which receive the full force of the storms, becomes filled with water to the bedrock; then landslides more or less extensive occur, when rock, land and cactus are launched into the raging waters and carried out to sea.

With these destructive occurrences whole colonies of snails are frequently carried away and destroyed, except occasionally a few fortunate individuals that may become stranded with other débris lower down on the sides of the creek or canyon, where if the conditions are favorable a new colony will spring up with such modificationt of the creature and the shell as the combination of the already organized creature and the new conditions in the environment determine.

(*To be Continued.*)

PUBLICATIONS RECEIVED.

THE FOSSIL LAND SHELLS OF BERMUDA. By Addison Gulick (Proc. Acad. Nat. Sci., Phila., 1904, pp. 406–425, plate 36). The shells collected by the author from quarries of the æolian limestone of Bermuda are described and discussed in this valuable paper. Of 17 species of land snails found fossil, 14 are probably peculiar to Bermuda. The recent fauna contains 13 indigenous species, 6 of them peculiar to the island. The most notable of the fossils discovered by Mr. Gulick are new species of *Pœcilozonites*, *Euconulus*, *Zonitoides*, *Vertigo* (2 species), *Carychium* and a *Strobilops* referred to *hubbardi*. "Dr. Pilsbry's conclusion, from the anatomy of *Pœcilozonites*, that the oldest importations to Bermuda came from continental America, is thus confirmed by a large majority of the fossil forms." Some of the commonest species in the modern fauna are wanting in the fossil deposits, such as *Polygyra microdonta* and *Helicina convexa*. Mr. Gulick gives an interesting discussion of the condition of the island at the time the extinct forms flourished, too long for abstract here.—H. A. P.

THE NAUTILUS.

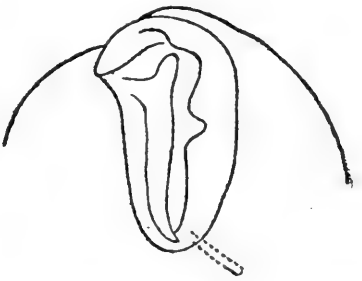
VOL. XIX. JULY, 1905. No. 3.

POLYGYRA DECEPTA N. SP.

BY GEORGE H. CLAPP.

While collecting at Blount Springs, Ala., in July, 1904, Mr. Herbert N. Smith gathered a good series of shells which, at first glance, appeared to be *Polygyra hirsuta*, but careful examination showed two species, a small form of typical *hirsuta*, gr. diam. 7, lesser $6\frac{1}{4}$, alt. $4\frac{1}{2}$ mm., and the above-named new species, in the proportion of about 1 of the former to 7 of the latter.

P. decepta n. sp.



P. hirsuta Say.

By comparison with *hirsuta* the following differences will be noted: Lip broader and more rounded at the top so that when the shell is viewed from below, the body-whorl joins it in a regular curve instead of forming an obtuse angle; parietal tooth hooked at the outer end and curving into the aperture, the lip being deeply recessed around it; lip-notch narrow and sinuous with a well raised margin which projects above the level of the parietal tooth; width

of aperture, measured from back of lip to edge of parietal callous across the lip-notch, more than half the length, while in *hirsuta* it is less; parietal tooth not quite joining lip at basal margin; internal tubercle short and *completely covered* by the lip so that it is not visible through the base of the shell. The parietal tooth is connected to the end of the lip by a slight buttress and there is a well developed tooth-like process on the lip, but these characters are common to most of the species of this group. Color and hairs about the same as in *hirsuta.*

The outline figures bring out the differences better than the description, *decepta* being drawn from the type and *hirsuta* from a Blount Springs shell.

Type: Greater diam. 7, lesser $6\frac{1}{2}$, alt. $4\frac{3}{4}$ mm., whorls 5.

Greater diam. $6\frac{1}{4}$, lesser $5\frac{3}{4}$, alt. $4\frac{1}{2}$ mm., whorls $4\frac{2}{3}$.

These measurements show the extreme variation in size.

Type No. 5223 of my collection and cotypes in the collections of the Academy of Natural Sciences, Bryant Walker and T. H. Aldrich.

In the character and shape of the lip-notch this species bears a strong resemblance to *P. pilula* Pils. but differs in other important points.

NOTE ON A VARIETY OF CREPIDULA NIVEA C. B. ADAMS, FROM SAN PEDRO, CALIFORNIA.

BY W. H. DALL.

I have recently received from several Pacific coast correspondents a curious form of *Crepidula nivea* C. B. Adams, the form which on that coast takes the place in the fauna occupied by *C. plana* Say, on the Atlantic shores, and usually occupies a situs on the interior of dead, univalve shells, especially such forms as *Lunatia;* but is sometimes found between dead, but still paired, bivalves, or in the borings of *Lithophaga* or *Pholas.* It has as many forms as the *loci* have differences, but, in general, is externally flat or concave and more or less lamellose, of a white color, and elongate-oval shape.

The specimens referred to, however, broke all records by being uniformly straight, convex, smooth, equilateral, white and posteriorly attenuated. It was obvious that the uniformity was due to some special *situs*, but what it was I could not imagine. The other day

Mrs. W. H. Eshnaur satisfied our curiosity and excited our surprise by sending several of these shells *in situ*, and, of all places, on the valves of *Glottidia albida* Hinds! The latter were well grown, and the *Crepidula* exactly covered the outside of the valve, some specimens having a *Crepidula* on both valves, others only on one.

It is well known that the brachiopod in question burrows in the sand; a mucus which exudes from it consolidates the adjacent sand into a sort of tube, from which the distal margins of the valves protrude a little. Hence the *Crepidula* could satisfy its instinct for being on the inside of things, yet not out of reach of food, and the brachiopod was supplied gratis with a well-fitting cuirass or accessory armor, both benefiting. This peculiar-looking *Crepidula* might appropriately take the mutational name of *glottidiarum*, in case one wishes to refer to it briefly. It forms a striking instance of the way in which form is dependent in this genus on *situs*, a subject somebody would find it profitable to work up.

NOTES ON A COLLECTION OF SHELLS FROM BASS LAKE, INDIANA.

BY FRANK COLLINS BAKER.

Some months ago my assistant, Mr. Frank M. Woodruff, made a small collection of shells at Bass Lake, Indiana, which seems of interest enough to list. Bass Lake is a beautiful sheet of water, the clear, crystal depths of which teem with fish and mollusks. The specimens are particularly large and fine.

Anodonta grandis Say. The specimens obtained are the form called *salmonia* by Lea. As stated by Simpson, this form is nearly always blistered and scaly. The salmon color is very beautiful in some specimens.

Anodonta grandis var. *footiana* Lea.

Sphærium occidentale.

Calyculina truncata.

Pisidium abditum Haldeman.

Vivipara contectoides Binney. The individuals from this locality vary from uncolored to distinctly four-banded, and are notably large and fine.

Amnicola limosa Say.

Amnicola limosa var. *parva* Lea.

Goniobasis livescens Menke.

Physa heterostropha Say. The individuals are smooth and highly polished, and are destitute of impressed spiral lines. One specimen is a scalariform monstrosity.

Physa integra Haldeman. Rare.

Lymnæa desidiosa Say. Many zebra-like forms.

Planorbis trivolvis Say.

Planorbis bicarinatus Say.

Planorbis parvus Say.

Segmentina armigera Say.

Note on Valvata.

A collection of *Valvatæ* from Long Lake, Lake County, Illinois, recently received, is of some interest, especially as regards the relative numbers of individuals.

Valvata tricarinata 107.

Valvata tricarinata confusa 6.

Valvata bicarinata 1.

Valvata bicarinata normalis 33.

A NEW SPECIES OF SUCCINEA.

BY HENRY A. PILSBRY.

Succinea indiana n. sp.

Shell obesely ovate, thin, brownish-amber or raw sienna colored, the apex reddish. Sculpture of fine growth-lines and wrinkles, becoming rather coarse wrinkles on the last half whorl. Whorls $3\frac{1}{2}$, very convex, the last large and inflated. Aperture large, oblique, the outer lip either regularly arcuate or somewhat flattened in the middle. Columella thin and strongly arcuate throughout.

Length 11, diam. 7, length of aperture 7.7 mm.

Length 10.7, diam. 6.9, length of aperture 7.7 mm.

Length 10, diam. 6, length of aperture 7 mm.

New Harmony, Posey Co., Indiana; cotypes in collections A. N. S. P., the State Museum at Indianapolis, and L. E. Daniels; collected by L. E. Daniels.

This species seems to be closely related by the obese shape to *S. campestris* of Georgia and Florida and *S. unicolor* Tryon of New

Orleans. It differs from both in color and texture. *S. grosvenori* Lea (of which *S. greeri* Tryon is a synonym) has a longer spire and smaller last whorl.

While it seems strange that a new *Succinea* should be found in so well known a district of the middle west, yet I am unable to identify the form found by Mr. Daniels with any described species.

It was found in 1904 just south of New Harmony on the hillside facing the west between the marl cliffs and the highway.

ON SOME NEW VARIETIES OF CYPRAEA.

BY SLOMAN ROUS.

Cypræa miliaris var. *Brookei* n. var.

Dorsal surface light yellowish-brown with a subquadrate patch of a shade darker color, sprinkled with very faint, scarcely perceptible spots of lighter color, base and extremities pure, shining white, columella tinged with same color but lighter than dorsal surface. Long. 29, lat. 17.3, height 14.5 mm. Philippines.

This beautiful little shell is in the collection of Mrs. J. M. Brooke, of Lexington, Va., who received it from a friend in Cebu, P. I.

Cypræa capensis var. *Elizabethensis* n. var.

Rather wider and higher in proportion to its length than is usual in normal *capensis*, with the irregular brown patch so often found in this species, but with the dorsal line (which in *C. capensis* is usually very indistinct and often invisible, being crossed by the liræ) very broad, distinct and smooth. The liræ on the outer side of the shell are painted with the same color as the dorsal patch. Length 29, width 18.2, height 14 mm. Port Elizabeth, Cape of Good Hope.

I lived in Port Elizabeth over forty years during which I collected very many specimens of *C. capensis*, and saw, I think, almost all the shells about which there was anything unusual that were taken by the other local collectors all of whom were my intimate friends. I do not recollect seeing a shell like this and I scarcely think it could have escaped my notice. The most remarkable difference between it and the type form being the brown color of the ribs below the dorsal line.

CYCLADIDÆ OF THE SOUTHERN STATES.

BY V. STERKI.

The year 1904 has brought us many good things in the line of Cycladidæ, especially from the South, from Indiana and from Canada. Our knowledge of these small bivalves from the Gulf States has been very limited. Mr. H. E. Sargent had done some collecting in North Alabama, and Mr. Frierson in North Louisiana, and a few lots had been seen from other states. The collecting of Mr. Smith in Georgia and Alabama, mainly along the Coosa river, and of Mr. A. A. Hinkley in Alabama and Mississippi, have opened that territory known as particularly rich in Strepomatidæ and Unionidæ, and added considerably in regard to systematics as well as geographical distribution. The specimens collected by Mr. Smith were kindly sent for examination by Mr. Bryant Walker, those of Mr. Hinkley partly by himself and partly by Mr. Walker. The following list and notes may be of interest to students of a much neglected yet integral part of our mollusk fauna:

Pisidium virginicum Gm. From Georgia, Alabama and Mississippi, common and rather variable. The prevalent form along the Coosa river is decidedly oblique and rather angular in outlines; it may represent a variety.

Pis. compressum Pr. Common and decidedly variable, making a considerable addition to the already wide range of variation of this species, and some forms seem to represent real varieties.

Pis. kirklandi Sterki. Shoal creek near Florence, Town creek at Montevallo, Ala., full grown and young specimens; seen from the South for the first time. There is a small but distinct roundish, somewhat raised, granular area in the center of each beak, a characteristic feature of the species, not noted in the description (THE NAUTILUS, xiii, p. 11, 1899).

Pis. cruciatum Sterki. Shoal creek, Florence, Ala., collected by Mr. Hinkley. This minute Pisidium, distinguished by the unique formation of its hinge and the shape of the ridges on the beaks, had also been known only from Ohio, Michigan and Illinois (also fossil).

Pis. fallax Sterki. Two badly eroded specimens from the Town creek, Montevallo, Ala. The species is widely distributed and variable, and specimens of it are generally more eroded than any others.

Pis. limatulum Sterki. Various places in Alabama.

Pis. peraltum Sterki. Grenada, Miss., only one specimen, but good and characteristic, collected by Mr. Hinkley. Had been known from Virginia, Kentucky, Illinois and Iowa. A form from Michigan referred to it seems to be distinct.

Pis. noveboracense Pr. Specimens from Alabama and Mississippi were referred, somewhat doubtfully, to this widely distributed and very variable species. Some forms from various places of the three states represented partly by hundreds of specimens, are either varieties or distinct species, and still more materials are desirable.

Pis. atlanticum Sterki. Wetumpka, Ala.

Pis. singleyi Sterki. Tuscaloosa, Ala. (over 200 specimens) and Columbus, Miss. (Mr. Hinkley); Buxahatchee Creek, Calera, Ala. (Mr. Smith). Somewhat different from the Texas form, rather like those from Frierson, La. (collected by Mr. Frierson), but larger.

Several other Pisidia have been seen, represented by small numbers of specimens; with more materials on hand, they may prove distinct species or varieties.

Sphærium solidulum Pr. Several places in Alabama and Georgia, variable. Good numbers, *e. g.*, from the Buxahatchee creek, near Calera, Ala., collected by Mr. Smith; one form closely resembles Ohio specimens regarded as typical, another, in the same lot, is rather different, the sulcation is much finer and the young are of somewhat different shape. The two forms are separable, one by one; whether the latter represent a variety or a distinct species will be ascertained with additional materials. From some places, the specimens were small and poor, yet seemed to be true.

Sph. stamineum Con. Several places in Alabama and Mississippi; over a hundred good specimens from the Town creek, Montevallo, Ala., "in weeds and mud," collected by Mr. Smith. A few specimens in the same lot were rather different, whether distinct, must be made out later.

Sph. striatinum Lam. Georgia, Alabama and Mississippi. Rather different forms from various places seemed to range under this very polymorphous species. Although many thousands of specimens of "Sph. striatinum" were seen from a wide territory, it has not yet been possible to define geographical varieties to any degree of satisfaction, nor to exclude with certainty such forms as may be considered distinct.

Sph. fabale Pr. Several places in Alabama, evidently common; scarcely different from the more northern form (Ohio, etc.).

Sph. occidentale Pr. Near the Coosa river, 300 good specimens, and a few from the Shoal creek, Ala. (low woods, Mr. Smith); Boligee, Ala. (Mr. Hinkley).

*Calyculina** *elevata* Hald. From various places in Alabama; Columbus, Miss.; also received from Frierson, La.

Cal. transversa Say. From a number of places in the three States, generally small and slight, while from Frierson, La., I have received specimens of large size.

Cal. truncata Linsl. Specimens from near Wetumpka, Ala., are rather resembling the Cal. from New York, Ohio, etc.

Cal. securis Pr. (?) A single specimen from Spring creek, Ebenezer Church, Ala., seems to range under that species.

A small, greenish to brownish Calyculina from Grenada, Miss., collected by Mr. Hinkley, may be a variety of Cal. securis; the same, although somewhat different, has been seen from Frierson, La.

Of *Eupera*, some specimens have been collected in Alabama, but were not examined. *Eupera* is known to inhabit all the Gulf States (except Mississippi?), and it is very desirable that more materials be brought up for systematic examination.

Although the specimens seen so far hardly justify speaking of lacking species, yet it may be noted that it was surprising not to see a trace of such widely distributed and common species as *Pisidium variabile* Pr. and *punctatum* Sterki; also none of *Sphærium simile* Say and *rhomboideum* Say and, as it seems, *Calyculina partumeia* Say.

SHELL COLLECTING ON THE MOSQUITO COAST OF NICARAGUA.—III.

BY W. H. FLUCK.

Strombus pugilis nicaraguensis var. nov.

The shell differs from the typical *pugilis*, especially in its smaller size, varying very little from 55 to 62 mm. The spire is regularly

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* Dr. E. von Martens thinks *Calyculina* Clessin should be replaced by *Musculium* Link.

tuberculated, rather high, acute, and sculptured with distinct revolving raised lines; prominent revolving ridges also mark the entire body-whorl, or in some specimens a large portion of it. The color is uniform dark salmon, except the spire, which tends to whiteness, while the aperture is lighter and brighter than the external parts, and anteriorly has just a suggestion of purple. The epidermis is thin.

Specimens were taken in large quantities, and were fully matured, with lip expanded in the characteristic way. I also have six quite young shells, which contained hermit-crabs, in which the lip is incomplete. My attention was first called to the small size of these shells by my friend Mr. Morris Schick, of Tropico, Cal., to whom I sent specimens from Nicaragua about 1902. I was loth, however, to report the shell as a new variety until Mr. C. W. Johnson wrote me, saying: "The beautiful little Stromb certainly deserves a varietal name. * * * * They are gems, and are as distinct as many of the varieties to which names have been given. They are only about half the size of my Florida and West Indian specimens." I then requested Mr. Johnson to describe the shell in THE NAUTILUS, but he generously asked me to do so. I hope this will explain how I came to "butt into" the variety-making business, and will appease the wrath of the bunchers.

I wish to acknowledge that Mr. Johnson has pointed out to me several of the points of difference in my shell, and has also suggested the very appropriate varietal name.

Specimens were taken now and then all along the beach between the Principulka and the Wawa rivers. At Kia, an Indian village 13 miles north of Wounta Haulover, the natives find it in such quantities that it is regularly sought after as an article of food. Boiled "atula," as the Indians call it, is tough eating, almost as tough as old parrot, as I know from experience when dining under the palms at Kia, but "any old thing" satisfies a hungry traveler when plenty of green cocoanut water can be had to wash it down.

Inquiry among the people elicited the fact that most of these molluscs were found just north of the Wawa river, about four miles from the village. I went there and found large quantities of them in the shallow water. This mollusc is a very beautiful one; the eyes are remarkable and seem to be eying one, and are ever on the alert. It is about as active a snail as I ever saw, using its operculum as a lever by which it was enabled to leap out of a glass fruit dish in

which I placed one. The types of this shell are in my own collection and the Boston Society of Natural History. Other collectors, however, have specimens, as I have sent out many sets.

(*To be Continued.*)

NOTES.

NATICA INTRICATOIDES HID. ON THE ALGERIAN COAST.—Last year I mentioned *Natica prietoi* Hidalgo, as found by myself at Algiers. Like *Natica intricatoides*, another very rare species from the Spanish coast, it had not been found before on our shores; now *Natica intricatoides* has been detected also at Algiers by the General de Lamothe, the well-known geologist, who gave me several beautiful specimens. It was associated with *N. filosa*, *N. macilenta* and *N. prietoi*; of the latter he found a single specimen. In the same lot from Sidi-Ferruch in the vicinity of Algiers, I saw a single and very fine *Nassa*, in fair condition, which may be *N. compta* A. Ad., known only as a West African shell.—C. F. ANCEY.

PLANORBIS ALABAMENSIS AND DILATATUS IN THE FLORIDIAN PLIOCENE.—The only small *Planorbis* reported from the Caloosahatchee Pliocene in Dall's great work on that fauna is *P. exacutus* Say. Some years ago I received from Mr. Johnson numerous specimens of another species, *P. alabamensis* Pils. They differ constantly from the recent form in having a decidedly smaller umbilicus. This variety may be called *P. alabamensis avus*. With these there were a few specimens of *P. dilatatus* Gld., which also differ a little from the typical form in having a smaller aperture and distinctly thickened lip.—H. A. PILSBRY.

NOTE ON CANADIAN UNIO LUTEOLUS.—While examining recently the shells in the collection presented to the Smithsonian Institution by Dr. Isaac Lea, I was surprised to observe that a large green specimen of *Unio luteolus*, from the "Rideau Canal, Ottawa, Canada," had written upon one of its valves in his well-known handwriting the name "*U. radiatus*." The entry number of the shell is 85042. The error would not be remarkable if made by an authority of less repute than Dr. Lea, as many of the male *luteolus* found in the Rideau Canal resemble *radiatus* in outline, coloring and even in the

texture of the epidermis, urged by some as a distinguishing characteristic. A full series of the shell from the Rideau Canal here, where it occurs abundantly, and where *radiatus*—common elsewhere in this vicinity—does not occur at all, would however be readily recognized as *luteolus*. But Dr. Lea's identification of the Ottawa shell as *radiatus* is liable to mislead, and notwithstanding this correction doubtless will mislead many students, who while his great collection endures will have recourse to it for the solution of not a few difficulties.—F. R. Latchford, Ottawa, Ont.

PUBLICATIONS RECEIVED.

Annotated List of the Types of Invertebrate Cretaceous Fossils in the collection of the Academy of Natural Sciences of Philadelphia. By Charles W. Johnson. Proc. A. N. S. Phila., 1905, pp. 4-28. Four hundred entries, exclusive of synonyms, are comprised in this catalogue of types, which is one of the fruits of Mr. Johnson's labor in working over the entire collection of American Cretaceous invertebrates in the Academy's collection. The following groups are represented: Corals, 5 species; Annelida, 8 species; Polyzoa, 31 species; Brachiopoda, 4 species; Echinoderms, 23 species; Crustacea, 4 species; Mollusca, 325 species. No attempt at full synonymy is made, but the author's broad acquaintance with the subject enables him to add many critical notes and to bring the list abreast of the times in nomenclature. Three new species are introduced: *Nemodon conradi* Johnson, *Cucullæa gabbi* Johnson, *Straparollus deplanatus* Gabb.—H. A. P.

Notes on the Molluscs, Reptiles and Amphibians of Ontonagon Co., Michigan. By A. G. Ruthven. Sixth Ann. Rep. Mich. Acad. Sciences. Records of Mollusca from the Upper Peninsula have been very rare hitherto. This list of 71 species therefore fills a gap in the map.

Fossils of the Bahama Islands, with a list of the non-marine Mollusks. By Wm. H. Dall. Extract from "The Bahama Islands." The marine fossils noted are all of recent species. *Phacoides pennsylvanicus*, *Codakia orbicularis*, *Tellina radiata*, *Arca occidentalis*

and *Arca reticulata* are figured. The list of non-marine forms comprises 147 species and numerous varieties, the following being described as new: *Cerion rhyssum*, *Cepolis* (*Hemitrochus*) *exumana*, *C.* (*H.*) *agassizi*, *C.* (*Plagioptycha*) *gregoriana*, *C.* (*P.*) *inaguana*, *C.* (*P.*) *pharcida*, and a number of varieties. All are figured. An interesting discussion of the relationships and history of the fauna precedes the descriptions.

Check List of the Mollusca of New York.—By Elizabeth J. Letson. (Bull. 88 N. Y. State Museum, 1905).[1] Miss Letson has brought together references to the New York mollusca from all sources from the time of DeKay (1843) to the present time; so that her check list is a bibliography as well. The marine fauna is not a rich one. Of non-marine forms, 243 species and some varieties are recorded; and though a few given on the authority of old records will probably be deleted, yet the number of species remaining is remarkably large for a Northern State. The work will be useful to all interested in the species of our northern and middle States.—H. A. P.

Bemerkungen ueber die Chitonen-Sammlung im Zoologischen Museum zu Leiden.—Von Dr. H. F. Nierstrasz. Notes Leiden Mus., vol. xxv. Dr. Nierstrasz is known as a careful and competent author on Chitons by his report on those of the Siboga Expedition. In the present paper he describes as new *Callistochiton leidensis* from Santa Elena and *Callistochiton porosus* from Rio Janeiro, and gives interesting notes on various species of *Liolophura*, *Oñithochiton* and other genera. Full details are given of Dr. Nierstrasz's genus *Squamipleura*, from a series of 40 examples from near Timor. It stands between *Acanthopleura* and *Liolophura*, but nearer the latter. A few locality records, on the authority of specimens in the Leiden Museum (no collector mentioned) are undoubtedly erroneous. *Ischnochiton magdalensis* surely never came from Martinique, nor *I. punctulatissimus* from the Gulf of Mexico. The record of *Nuttallina scabra* from Chili is almost as doubtful; and only the most definite data would justify us in adding *Acanthopleura granulata* to the faunæ of Magellan Strait and the Cape of Good Hope.—H. A. P.

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[1] Pp. 112, New York State Educational Department, Albany.

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VOL. XIX. AUGUST, 1905. NO. 4.

LAND SHELLS OF THE FLORIDA KEYS.

BY HENRY A. PILSBRY.

During the spring of 1904 Mr. Clarence B. Moore made an exploration of the Keys of Florida primarily for archæological research, from Key Marco southward to Cape Sable and Long Key, then northward on the East Coast to Lake Worth. During this cruise he collected shells, particularly *Liguus* and *Oxystyla*. The latter will form the subject of special report. Subsequently he sent Messrs. Fowler and Brown, of the academy staff, to the outer keys, Key West to Duck Key. The land shells collected are enumerated below. In addition to the species of the Keys I have included those taken at Cape Sable. The fauna of the mainland at that place is related to that of the Keys, being practically insulated by the everglades which extend across the peninsula.

With the exception of Key West and Key Largo, very few records of land shells have heretofore been made from the Keys, and from many of them no mollusks whatever have hitherto been reported. The prevalence of the same species on most of the Keys supports Professor A. Agassiz's theory that that land area is in process of disintegration, the present islets being remnants of a once continous land-mass.

Cyclostomatidæ.

Chondropoma dentatum Say. Two miles east of Planter, Key Largo, East end Windly's Island or Umbrella Key, Lignum Vitæ Key, West end Upper Matacumbe Key, Summerland Key, Big Pine Key, Little Pine Key, Sugar-loaf Creek, Sugar-loaf Key and Key West.

Truncatellidæ.

Truncatella caribeensis 'Sby' Rve. Rabbit Key, Monroe county; Bahia, Honda Key, Key Largo, Big Pine Key, Sugar-loaf Key, Key West.

Truncatella bilabiata Pfr. Blue Hill Island near Goodland Point, Key Marco, near Punta Rassa, Fakahatchee Key, Ten Thousand Islands, Pavilion Key, Bahia Honda Key, Key Largo, Big Pine Key, Sugar-loaf Key, Key West.

Truncatella sp. Sugar-loaf Key.

Helicinidæ.

Helicina orbiculata Say. Little Palo Alto Key, Big Palo Alto Key, Lignum Vitæ Key, Snipe Key, Key West, Pineland, northwest end of Pine Island, Fakahatchee Key in Ten Thousand Islands, East Cape, Cape Sable, Little Pine Key.

Helicina tantilla Pils. Duck Key and Grassy Key. Originally described from Palm Beach, on the east coast.

Helicidæ.

Cepolis varians Mke. South end of Key Biscayne, Cape Florida, West end of Upper Matacumbe Key.

Polygyra cereolus (Mühlf.). East end Lower Matacumbe Key; Long Key; Big Pine Key; Little Pine Key; Sugar-loaf Key at Sugar-loaf Creek; Boca Chica Key; near Blind Pass, Middle Cape, Cape Sable, and a small Key opposite Flamingo, in the same region.

Polygyra cereolus carpenteriana (Bld.). Western end of Upper Matacumbe Key; Lignum Vitæ Key; Summerland Key; Cudjoe Key; Key West near Punta Rassa; Blue Hill Island near Goodland Point, Key Marco; Fakahatchee Key in the Ten Thousand Islands; Turner Key; Rabbit Key; Pavilion Key.

Polygyra uvulifera (Shuttlw.). Big Pine Key; Blue Hill Island near Goodland Point, Key Marco; Turner River, Turner Key; Middle Cape and East Cape, Cape Sable.

Thysanophora selenina (Gld.). Big Pine Key; Blue Hill Island near Goodland Point, Key Marco; Fakahatchee Key in the Ten Thousand Islands. (*Helix selenina* Gld.=*Helix vortex* Pfr., preoc.).

Thysanophora plagioptycha (Shuttl.). Mainland at Middle Cape Cape Sable; Duck Key; Big Pine Key.

Thysanophora sp. undet. Little Pine Key.

Bulimulidæ.

Drymæus dominicus (Rve.). Cutler; Fakahatchee Key, Ten Thousand Islands.

Drymæus multilineatus (Say). Big Palo Alto Key; Western end of Upper Matacumbe Key; Lignum Vitæ Key; Eastern end of Lower Matacumbe Key; Noname Key; Big Pine Key; Little Pine Key; West end of Cudjoe Key; Sugar-loaf Key; Summerland Key; Boca Chica Key; Blue Hill Island near Goodland Point, Key Marco.

Liguus fasciatus (Müll.).

Oxystyla undata reses (Say).

Oxystyla floridensis (Pils.).

These species will form a special report.

Urocoptidæ.

Urocoptis poeyana (Orb.) *var.* Big Pine Key.

Microceramus pontificus (Gld.). Lignum Vitæ Key; Big Pine Key; Summerland Key.

Microceramus floridanus Pils., *var.* Fakahatchee Key, Ten Thousand Islands; Turner Key.

Cerionidæ.

Cerion incanum (Binn.). Southern end of Key Biscayne, Cape Florida; Western end of Long Island or Cantation Key; Eastern end of Windly's Island or Umbrella Key; Indian Key; Eastern end Lower Matacumbe Key; Long Key; Grass Key; Vaca Key; Bahia Honda Key; Little Pine Key; Noname Key; Big Pine Key; Summerland Key; Cudjoe Key; Sugar-loaf Creek, Sugar-loaf Key; Snipe Key; Boca Chica Key; Key West. Found everywhere in copious quantity.

Strobilops sp. undet. Big Pine Key. A young shell of the *labyrinthica* type.

Pupillidæ.

Pupoides modicus (Gld.). Fakahatchee Key, in the Ten Thousand Islands.

Bifidaria pellucida (Pfr.). Big Pine Key, mainland at Middle Cape, Cape Sable.

Bifidaria rupicola (Say). Pineland at northwest end of Pine Island; Fakahatchee Key, Ten Thousand Islands; mainland at Middle Cape, Cape Sable.

Bifidaria contracta (Say). Pineland, northwest end Pine Key; mainland on Middle Cape, Cape Sable.

Vertigo rugosula oralis Sterki. Mainland at Middle Cape, Cape Sable.

Vertigo sp. undet. Grassy Key. An imperfect shell.

Achatinidæ.

Melaniella gracillima floridana Pils. Big Pine Key.

Glandinidæ.

Glandina truncata (Brug.). Hammock near north mouth of Suwanee river, near Punta Passa; Pineland, northwest end Pine Island, also northeast end Pine Island; Blue Hill Island near Goodland Point, Key Marco; Fakahatchee Key, in the Ten Thousand Islands; Russell's Key; Wiggins' Key, Sandfly Pass; Lossman's Key; Big Pine Key.

Glandina truncata minor Binn. Mainland, Middle Cape, Cape Sable; East end of Lower Matacumbe Key; Big Pine Key.

Zonitidæ.

Guppya gundlachi (Pfr.). Pineland, Northwest end of Pine Island; Fakahatchee Key in the Ten Thousand Islands; mainland at Middle Cape, Cape Sable; Sugarloaf Key.

Guppya miamiensis Pils. Grassy Key.

Zonitoides arboreus (Say). Mainland at Middle Cape, Cape Sable.

Zonitoides dallianus ('Simpson' Pils.). Fakahatchee Key in the Ten Thousand Islands.

Zonitoides minusculus (Binn.). Big Pine Key; Fakahatchee Key in the Ten Thousand Islands; mainland at Middle Cape, Cape Sable.

Zonitoides minusculus alachuanus (Dall.). Pineland at northwest end of Pine Island.

Succineidæ.

Succinea campestris Say. Lignum Vitæ Key; Long Key.

Succinea floridana Pilsbry, n. sp.

Shell obesely ovate, thin but strong for the genus, *opaque*, flesh-tinted or pinkish-white, marked with corneous-fleshy streaks, and usually a few scattered clear dots, readily seen by holding the shell up towards the light; apical whorl usually reddish-brown. Interior more or less deeply *tinted with ochre-yellow*. Whorls $3\frac{1}{2}$ to $3\frac{3}{4}$, very

convex, the last whorl evenly convex. Sculpture of fine, unequal growth-lines and coarse but low wrinkles, with some indistinct malleation on the last whorl. Aperture ovate, short; outer lip well arched; columella oblique and nearly straight.

Length 12.3, diam. 7.2, length of aperture 8 mm.

Length 12.2, diam. 7, length of aperture 7.8 mm.

Length 12.8, diam. 7, length of aperture 8 mm.

Northern end of Big Pine Key, abundant in long grass, types no. 87358 A. N. S. P., collected by Messrs. Fowler and Brown, June, 1904. Other localities are Summerland Key, Cudjoe Key, Sugarloaf Key, Boca Chica Key, Key West. On the mainland and keys of west Florida at Blue Hill Island, near Goodland Point (C. B. Moore), and one mile east of Marianna, Chipola river (C. W. Johnson, 1900, one bleached specimen).

This species has hitherto been considered a form of *S. luteola*, from which it differs in the much shorter contour and more convex last whorl. I have seen no specimens from Florida referable to *luteola*. *S. floridana* is also closely related to *S. campestris*, which is still more obese, and more strongly corrugated, with the spire less slender. The most nearly related forms are, however, the Antillean *S. ochracina* Gundl. of eastern Cuba and *S. dominicensis* Pfr. of Santo Domingo. In both of these, however, the color is more lemon than ochre-yellow. *S. dominicensis* is a smoother, white and very beautiful shell. *S. ochracina* is somewhat rough, streaked white and corneous with a pale lemon tint throughout, and with a longer aperture than *S. floridana*.

S. floridana varies a good deal in size. The largest seen is from Key West, 14 mm. long, and the smallest adults are from Boca Chica Key, $8\frac{1}{2}$ mm. long, with $3\frac{1}{2}$ whorls.

A NEW CALIFORNIAN HELIX.

BY REV. J. ROWELL.

Helix (*Epiphragmophora*) *sequoicola soquela* n. subsp.

Shell broadly umbilicate, thickly and regularly striate, very dark brown approaching black, of uniform color with the exception of two parallel white bands above the middle of the body-whorl, shell depressed with depressed spire, whorls seven, the last much inflated, strongly banded within. Greater diameter 28 mm., height 12 mm.

Differs from *dupetithouarsi* and *sequoicola* in much darker color, more inflated aperture, depressed form, greater breadth, and enclosed band of the same color as the body of the shell.

Habitat, Santa Cruz mountains midway between Soquel creek and Skyland.

REMARKS ON SOME LAND AND FRESH-WATER SHELLS FROM THE NEW HEBRIDES, WITH DESCRIPTION OF NEW SPECIES.

BY C. F. ANCEY.

The following species represented in my collection were obtained from various sources, principally from my regretted friend E. L. Layard, the well-known student, and from Dr. Ph. François, who collected somewhat extensively in the Archipelago several years ago, and has explored chiefly the northern group. To the latter I am particularly obliged for useful data on several of the localities he visited, and for the liberal gift of specimens, most of these, however, having been examined by the late Mr. Mabille and forming part of the collection of the Paris Museum.

1. *Lamprocystis Layardi* (Thomson).

Hab. Vate island (Glisson, fide Layard). This form is united to *L. guttula* Pfr., by Mr. E. R. Sykes (Proc. Malac. Soc., London, 1902, p. 196), but having specimens of both I do not share this opinion, the general aspect being the same, but the columellar insertion being different. It was well described and figured by Mr. J. H. Thomson (Proc. Zöol. Soc., 1885, p. 25, with fig.).

2. *Macrochlamys* (?) *Annatonensis* (Pfr.).

Hab. Vate island (Glisson).

This form is closely allied to "Zonites" Vitiensis Mousson, of the Viti group. The generic reference is doubtful, but I consider they are more nearly related to *Macrochlamys* than to the European genera *Vitrea* or *Polita*.

3. *Endodonta tenuiscripta* Anc.

Hab. Mallicollo island.

The original description states that the shell is "widely umbilicated." One must read "*not* widely umbilicated" (see NAUTILUS, 1896, p. 90).

4. *Draparnaudia singularis* Pfr., var. *diminuta* Anc.

Hab. Aneitum (= Annaton) island (fide E. L. Layard).

I venture to give this varietal name to the shell I have mistaken for the true *H. singularis* Pfr. (see NAUTILUS, 1897, p. 27), which is described from Aneitum. According to Mr. Sykes (loc. supra cit., p. 197), specimens of the latter, so named by Dr. Pfeiffer, are in the British Museum, and are the ordinary, large, strongly-keeled form usually met with in collection. The present one is also strongly but obtusely angled, has 6 whorls only and the last whorl is not deflected at all in front. It is $6\frac{1}{2}$ mm. high and 6 mm. wide. In size it is quite like *D. Walkeri* Sykes (loc. supra cit., p. 197, fig. II), but the latter appears to have a higher body-whorl and more rounded periphery. It was collected on Espiritu Santo island, very distant from that of Aneitum.

5. *Dendrotrochus Eva* (Pfr.).

Hab. Vate island.

It is peculiar, I think, to the above island. The specimens are more commonly white, sharply keeled, with or without a brown lip. In others the keel is more obtuse, while in some cases there is a brown zone between the keel and the suture.

6. *Dendrotrochus Layardi* (Hartm.).

Hab. Aura (= Aurora island), fide Layard; also Espiritu Santo island (J. J. Walker, Dr. Ph. François).

I have seen an extensive series of this fine shell, originally described as "*Oxychona*." It is now well established that *Oxychona* is a genus of *Bulimulidæ* allied to *Zaplageus* and *Drymæus*, restricted in its distribution to Brazil. The present species is related to *D. Eva*, which it appears to replace in the northern group. The following variations occurred to my notice:

a. Plain ashy-white.

b. Ornamented with a narrow brown line on the keel and the suture.

c. With a wide dark-brown band between the keel and the sutures, sometimes extending, sometimes fading on the upper whorls.

The lip is either brown or whitish and the base, around the axis, is frequently tinged with brown. There are always some minute spots and black, oblique lines on the pale ground.

7. *Diplomorpha Brazieri* Hartm.

Hab. Espiritu Santo island. A scarce species, never found, I suppose, in fresh condition.

8. *Diplomorpha Delantouri* Hartm.

Hab. Aura (= Aurora island), Delantour, fide Hartman.

The numerous specimens from Espiritu Santo island (Ph. François), belong to a variety *major* (long. 21–25, diam. 15–16 mm.), but otherwise are quite like the type.

9. *Diplomorpha ruga* Hartm.

Hab. Espiritu Santo island.

10. *Diplomorpha Bernieri* Hart.

Hab. Espiritu Santo island. I am informed that "Segon island," quoted by Dr. Hartman, does not exist in the New Hebrides. The locality is to be corrected to "Canal du Second," Espiritu Santo island.

11. *Placostylus* (*Pœcilocharis*) *Françoisi* Mab.

The types which I have had the opportunity of examining through the kindness of Prof. Joubin, in the Paris Museum, appear to be conspecific with *P. hebridarum* of the same author.

12. *Partula Auraniana* Hartm.

Hab. Buka-buka, Torres group (Dr. P. François).

13. *Opeas oparicum* Pfr.

Hab. Espiritu Santo island (Dr. P. François).

14. *Auriculus elongatus* Pfr.

Hab. Espiritu Santo island (Dr. P. François).

15. *Physa Layardi* Anc., n. sp.

Testa oblongo-attenuata, tenuis, nitida, pallide corneo-virens, indumento ferrugines plerumque coöperta. Spira conoidea, satis producta, regularis, acuta. Anfractus 5 convexi, sutura subappressa, obliqua divisi, lineis incrementi vix conspicuis, in ultimo antice curvatis; ultimus ovalis, basi attenuatus. Apertura subobliqua, superne angustata, irregulariter ovalis, intus nitida, basi interdum lacteo-subincrassata, margine sinistro antrorsim flexuoso. Columella crassa, lactea, intus late pliciformis, plica parum prominente. Peristoma simplex, acutum, ad columellam anguste reflexum, marginibus callo tenui junctis.

Long. $9\frac{1}{4}$, diam. $5\frac{1}{4}$, alt. apert. $5\frac{3}{4}$ mill.

Hab. Vate island (Glisson, fide E. L. Layard).

An inconspicuous little form, like many of those described from Australia and New Caledonia, but sufficiently distinct. No species of this genus has hitherto been recorded from the New Hebrides.

16. *Palaina Françoisi* Anc.

Testa sinistrorsa, oblique et compresse rimata, subcylindraceo-

oblonga, tenuis, pallide cinereo-fulvescens, acute costulata, costulis filiformibus, parum nitens. Spira oblongo-attenuata, apice minuto. Anfractus $6\frac{1}{2}$ convexi, sutura impressa discreti, embryonales læves, sequentes remote et argute chordato-costulati, penultimus multo densius costulatus, dorso subgibbosus, ultimus antice distincte planulatus, infra attenuatus, ad aperturam valde ascendens, dorso laxius liratus. Apertura fere recta, circularis, columella intus obscure subinflata. Peristoma continuum, undique modice expansum.

Long. $2\frac{3}{4}$, diam. vix $1\frac{1}{2}$, alt. apert. 1 mill.

Hab. Espiritu Santo island. A single specimen found in the aperture of Helicina Layardi, Hartm.

The genus has not yet been recorded from the New Hebrides. Some have been ascribed to "Lord Howe's island, New Hebrides," but this particular island is the one lying between the coast of New South Wales and Norfolk island, although another islet in the New Hebrides bears the name of "Lord Howe." The present species is allied to Palaina Montrouzieri, of New Caledonia, but of different sculpture.

17. *Omphalotropis conella* Sykes (??) var.

Testa minute umbilicata, conico-turbinata, solidula, castanea, haud nitens, costulis cuticularibus verticalibus remotis, subobliquis, atque lineis elevatis spiralibus parum conspicuis, infra peripheriam distantibus et validiusculis sculpta, carina peripherica et lira circa umbilicum distinctis. Spira conoidea, obtusiuscula. Anfractus 6 convexiusculi, sutura impressa, ultimus medio angulatus, infra 5 liris spiralibus munitus. Apertura leviter obliqua, supra angulata. Peristoma simplex, acutum, ad columellam subsinuatam vix expansiusculum.

Long. $4\frac{1}{2}$, diam. vix $3\frac{1}{2}$, alt. apert. 2 mm.

Hab. Espiritu Santo island.

Only one specimen was obtained. This little shell is shaped like Sykes' *O. conella*, of which it may perhaps be considered a variety or a fresh example; however it comes from a very distinct locality and it may prove to be specifically distinct.

18. *Helicina Layardi* Hartm.

Hab. Espiritu Santo. All the specimens have a reddish band. It is the form recorded by Mr. Mabille as *H. Bairdi*, and I am disposed to share Mr. Sykes' opinion that it is simply a form of *H. sublævigata* Pfr. The sculpture is precisely the same, as described by

Mr. E. A. Smith in his report on the Land and Freshwater Shells of the Challenger Expedition.

19. *Potamopyrgus brevior* Anc.

Testa parva, oblongo-attenuata, nitidula, pallide cornea, fere imperforata, lineis incrementi indistinctis, indumento ferrugineo tecta. Spira sat producta, conoideo-attenuata, obtusula. Anfractus 5 convexiusculi, sutura impressa, ultimus oblongus, infra attenuatus. Apertura recta, imo basi antice leviter provecta, oblique oblongo-ovata, basi ad sinistram distincte prodiens, supra attenuata, marginibus continuis, externo subobtusato.

Long. $2\frac{1}{2}$, diam. $1\frac{1}{4}$, alt. apert. 1 mm.

Hab. Vate Island (fide Layard).

Very near to *P. whiteleggei* Braz., from Lord Howe's Island, but with shorter spire. This is the first record of the genus in the New Hebrides. Only one specimen was seen. The genus is also found in the Viti group, and I have from them a very closely allied species.

20. *Melania setosa* Swains.

Hab. Aurora Island (Layard).

21. *Melania mauiensis* Lea.

Hab. same island (Layard).

22. *Septaria suborbicularis* Sowerby.

Mr. Layard wrote me he procured one specimen nearly 2 inches long.

Hab. Aurora Island.

A FOSSIL FORM OF OREOHELIX YAVAPAI, PILSBRY.

BY T. D. A. COCKERELL.

Oreohelix yavapai compactula, n. subsp.

Shell compact; spire elevated, pyramidal; last whorl somewhat gibbous above, with a strong cord-like keel extending to the aperture; shell with coarse, oblique striæ, especially prominent on the last two whorls above, and also with fine spiral lines, most prominent on the last whorl, where they are more or less beaded; sometimes the spiral lines are scarcely apparent, but this is probably the result of weathering. Five specimens, two with the spire broken; the dimensions are:

Max. diam. 13, $12\frac{1}{2}$, 11, 13, 12 mm.

Alt. (at right angles to axis) $8\frac{1}{3}$, $7\frac{1}{2}$, $6\frac{1}{2}$ mm.

Hab.—Found in a pleistocene deposit in the Pecos Cañon, New Mexico, a few miles above the Vallé Ranch, by my wife and Dr. M. Grabham, in 1903. With them occurred a form of *O. strigosa*, which seems not to differ essentially from the smaller forms of the *huachucana* group. The largest has max. diam. $17\frac{1}{2}$, alt. 10 mm.[1]

NOTES AND NEWS.

REPUBLICATION OF THE MUSEUM BOLTENIANUM, PART 2, 1798.

The rarity of part 2 of this work, which relates to Mollusca, is well known to students. In response to a number of inquiries it is proposed to reproduce a few copies, by photographic facsimile, from the Crosse copy now in the British Museum (Natural History).

The large number of pages (204) must render this a somewhat costly task, and we should be glad to know if you would care for a copy to be reserved for you at the price of £2 (two pounds).

The work would be done, under our supervision, by Mr. F. W. Reader.

The issue will be limited, numbered and signed, and could be prepared for distribution during autumn.

It must be clearly understood that unless sufficient subscribers are forthcoming no issue can be made.

Please address reply to Mr. Sykes.—E. R. SYKES, C. DAVIS SHERBORN.

NEW LOCALITY FOR LYOGYRUS BROWNII CARPENTER. — Several years ago the lakes in Roger Williams Park, Providence, R. I., were drawn off, the bottoms dredged out and the contents thrown out upon the land. They were left empty, exposed to the sun for two years and all the species of mollusks destroyed. There were fourteen species in the lakes and thousands of specimens. Among others were the *Lyogyrus Brownii*, and as they were never discovered anywhere else, I supposed (the locality being exhausted) that they were extinct. Last week a young collector here, Mr. Frank Perry, has found in Old Warwick Pond, about four miles

[1] *O. y. compactula* seems to me to be a form or subvariety of *O. y. neomexicana*, which occurs living in the same general region.—H. A. P.

from the Park Lakes, and having no connection whatever with them, a new locality for the *Lyogyrus*, and he assures me that he found them there in great quantities.—H. F. Carpenter.

PUBLICATIONS RECEIVED.

The Mud Snail: Nassa obsoleta.—By Abigail Camp Dimon. (Cold Spring Harbor Monographs, V, 1905.) This is a very exhaustive treatise on its distribution, structures and functions, breeding and development; experiments on its relation to external factors, such as light, gravity and currents: resistance to desiccation, and different densities of water; response to mechanical stimuli, food, etc.—C. W. J.

Notes on some Fresh-water Shells from the Yukon Territory.—By J. F. Whiteaves (The Ottawa Naturalist, xix, p. 63, 1905). Five species of *Pelecypoda* and ten species of *Gasteropoda* are recorded.

List of Land and Fresh-water Shells from the District of Keewatin.—By J. F. Whiteaves (Geological Survey of Canada, 1905). About forty species are recorded.

A New Genus and Several New Species of Land Shells Collected in Central Mexico by Dr. Edward Palmer.—By William Healey Dall (Smiths. Misc. Coll., Vol. 48, pp. 187–194, plates 43, 44). The new genus *Hendersonia*, dedicated to Mr. John B. Henderson, Jr., is a flattened, discoidal, many-whorled snail somewhat like *Polygyra cereolus*, with the last whorl free and upturned, *Anostoma* fashion, and with anatomical characters showing it to be related to *Holospira*. Nothing of the sort has been known among Cylindrelloid snails hitherto, and the new genus materially enlarges our conceptions of that type of snails. A single species, *H. palmeri*, is described. Subsequently learning that the name *Hendersonia* had been used by Wagner (in *Helicinidæ*, 1905), the new genus was renamed *Hendersoniella*. Five new species of the genera *Xanthonyx*, *Streptostyla*, *Schasicheila* and *Sphærium* are described. The new *Xanthonyx potosiana* is the greatest of its kind, with a shell 18 mm. in diameter.—*H. A. P.*

THE NAUTILUS.

VOL. XIX. SEPTEMBER, 1905. No. 5.

NOTES ON YOUNG UNIONIDÆ.

BY L. S. FRIERSON.

Recently while searching for young Unionidæ I was rewarded by obtaining a dozen little fellows averaging a quarter of an inch long. One of these, a magnificent little *Lampsilis anodontoides* Lea, less than one-fourth of an inch in length, exhibiting the glochidial valves, was provided with a byssus four or five inches long, thus confirming my previous observations. Several specimens of *L. gracilis* Barnes, and one of *L. lævissimus* Lea, were also taken so provided. The byssus of one of these was fully eight inches in length. Several *L. texasensis* were also taken, as already recorded by me. Several very small *Anodonta imbecilis* Say, were captured, but these did not seem to have byssi. Some time after, I was rewarded in an hour's search, by a single specimen of *Unio tetralasmus* Say, perfect in every respect, and only $\frac{3}{16}$ of an inch in length. It was a jewel, but no sign of its being provided with a byssus could be detected.

Thus these preliminary and very scanty observations seem to limit the possession of a byssus to *Lampsilis* (including in this term the allied genus *Medionidus*).

The byssi of these specimens came out of a narrow *slit* in the central ridge of the foot, and located about the anterior third of the shell, and all were firmly enough attached to support the weight of the shell in the air, and of course amply strong to suspend the shell while partially supported by the water.

These baby shells revealed some facts about the so-called beak-

sculpturing, which, when further studied, may form a subsequent note for The Nautilus.

NEW VARIETIES OF CREPIDULA RUGOSA NUTT. FOUND ON NATICA AND ON NORRISIA.

BY MRS. M. BURTON WILLIAMSON.

In the July number of The Nautilus, Dr. Wm. H. Dall describes a variety of *Crepidula nivea* C. B. Adams, from San Pedro, California, and this reminds me of a variety found upon Natica that has not, to my knowledge, been described.

When I began collecting shells in San Pedro Bay some years ago, I found a specimen of this variety and it was for years a puzzle to me. Although only a dead, white shell, it would not classify with specimens in any tray of Crepidulæ. It did not look like an aberrant form, so I was loth to label it as such. It was a white, porcellanous specimen, shaped like some *Crepidula rugosa*, but much more pellucid-looking, but differed from *Crepidula excavata* Brod., in being thicker and in not having either the remote apex or the oblique growth of that form. It was also larger in size than any *Crepidula excavata* I had seen. Some seven or eight years after finding this dead specimen, two live ones, excepting that the animal had recently been removed, were found in the bay. I immediately recognized the white, granular form, and these specimens were maculated with chestnut-colored spots, and as would be expected, these live forms were thinner and more pellucid. I afterward found this puzzling variety *in situ* on a piece of Natica, *Lunatia Lewisii*.

If a specimen varies from the type sufficiently to be detected, dead or alive, it merits a varietal name, and for my own convenience I have labeled it on my cards. For the convenience of other students this white porcellanous shell with its brown spots might be labeled *Crepidula rugosa* Nutt. var. *naticarum*.

There is another variety of *Crepidula rugosa* Nutt. found on *Norrisia norrisii* Sby. This *Norrisia* is a smooth, reddish-brown turban shell, whose habitat appears to be on kelp. The Crepidulæ found on these shells are of a light magenta-pink in the interior. These slipper shells are usually much flatter than typical *C. rugosa*,

and the form of the septum or deck also varies. Besides variation in color and form the Norrisia specimens are more porcellanous than *Crepidula rugosa* (but not so much so as the form found on Lunatia), and the texture does not run into layers as in the typical *C. rugosa.* Some years ago this form was often distributed by collectors and labeled *Crepidula adunca* Sby. In notes on the mollusks of the vicinity of San Diego, Cal., and Todos Santos Bay, Lower California, by Charles R. Orcutt, he lists *Crepidula adunca* Sby. as "not rare on *Norrisia norrisii.*" While some of the forms found upon Norrisia have the remote apex of *C. adunca,* I have never seen one with the "short, deeply sunk and slanting deck, and a *hole above it passing up the spire,*" as described by Philip P. Carpenter in his catalogue of Mazatlan Mollusca in his note on the *adunca* form. Then again, *C. adunca* is found upon smaller univalves where the base for it is much contracted; for instance, I have seen it *in situ* on *Drillia penicillata* Cpr., and as one would infer, the shell has its sides closer together than the form found upon Norrisia. For the Norrisia form I would suggest *Crepidula rugosa* Nutt., variety *norrisiarum.*

A NEW SPECIES OF LYMNAEA FROM OHIO, WITH NOTES ON LYMNAEA PARVA LEA.

FRANK COLLINS BAKER.

Lymnæa sterkii n. sp.

Shell small, elongated, turreted, rather thin; color light yellowish-horn; surface dull to shining, marked by distinct, raised, crowded, growth lines, without spiral lines; protoconch very small, rounded, smooth, wine-colored; whorls $5\frac{1}{2}$, very convex, the last distinctly shouldered; spire narrow, rather acute, turreted, a trifle longer than the aperture; sutures very deeply impressed; aperture ovate, almost continuous in some specimens; peristome thin, acute; columella almost straight, without a plait but with a faint thickening; inner lip reflected to form a broad, flat callus which is appressed to the parietal wall and projects widely over the umbilical region; umbilicus rather wide and deep.

Length 7.75; width 3.50; aperture length 3.50; width 1.75 mm.

Length 7.75; width 4; aperture length 3.25; width 2 mm.

Length 8; width 3.50; aperture length 3.50; width 2 mm.

Length 7; width 3.50; aperture length 3.25; width 2 mm.

Habitat: Twelve miles west of Cleveland, Ohio, in a small, swampy brook.

This curious species was at first thought to be Lea's *exigua* but his description does not cover the present species and the figure is totally unlike it. The type of *exigua* is not in existence. It is probably a small form of *desidiosa* and its best disposition would seem to be as a synonym under that species.

L. sterkii is narrower than *humilis*, the whorls are more shouldered and the aperture is much more oval. The wide-spreading columella callus is also different and peculiar. It has a superficial resemblance to *owascoensis* Baker, but that species has six full whorls, the whorls are more shouldered, the aperture is more elliptical, the umbilicus is more open and the columella callus is not so wide. Juvenile specimens are rounder and more robust than the adult forms.

The specimens were collected by Dr. Victor Sterki, to whom the species is dedicated.

Lymnea parva Lea, Proc. Am. Phil. Soc., II, 33, 1841.

Shell very small, thin, ovate-conic, turreted; color greenish-horn; surface dull, marked by heavy, crowded growth lines; protoconch very small, rounded, light-horn colored; whorls $4\frac{1}{2}$, rounded and shouldered; spire obtusely conic, turreted, a trifle longer than the aperture; sutures very deeply impressed; aperture roundly ovate; peristome thin, acute; columella almost straight, covered with a rather heavy callus which is reflected over the flat parietal wall and also forms an erect border to the umbilicus, which is open and deep.

Length 3.25; width 2; aperture length 1.50; width 1 mm.

Length 4; width 2; aperture length 2; width 1 mm.

Length 3; width 2; aperture length 1.25; width .9 mm.

Length 4.25; width 2; aperture length 1.75; width 1 mm.

Habitat: marsh on Lake James, Steuben Co., Indiana (Daniels); Cincinnati, Ohio (Lea); Lilycash Creek, Joliet, Ill. (Handwerk); Northern Illinois, in drift (Sterki).

This little species, the smallest of our American Lymnæas, belongs to the section of this genus typified by *humilis* Say and *curta* Lea. It is more nearly related to *curta*, appearing at first sight to be a

small example of that species. Besides its small size it differs from that species in having the sutures more impressed, the aperture longer, the spire slenderer and the whorls more shouldered. It seems to be quite distinct and easily recognized.

There is some variation in the length of the spire, many specimens having a rather long spire while in others the spire is much depressed and the whorls humped, this last being in abnormal forms.

This species was at first thought to be a new one, but after careful study it seems to agree very well with Lea's description of *parva* and with specimens so named by him in the Smithsonian Institution. In his remarks under *parva* he says, "This is the smallest species which has come under my notice. In general form it resembles *L. curta*, herein described. It is rather less inflated, has a longer aperture, and is diminutive. The perforation, too, is smaller and the columella more curved.

In a paper entitled "Critical Notes on the Smaller Lymnæas," in the March NAUTILUS, the writer made this species a synonym of *curta*, but a study of the material from Lake James, which is unusually abundant, would make it seem to be a well-recognized species. Specimens were submitted to the writer by Dr. Sterki, Mr. Bryant Walker and Mr. L. E. Daniels, the latter gentleman having collected them.

Parva would seem to be a common species, and will probably be found in many cabinets under the all-embracing name of "*humilis*."

VERTIGO PERRYI, N. SP.

BY V. STERKI.

Shell minute, dextrorse, ovate with the apex rather acute, rimate; thin, transparent, of rather dark brown color with a slight greenish tinge; whorls $4\frac{1}{2}$ rather rapidly increasing, separated by a moderately deep suture, the last comparatively large, occupying over one-half of altitude, rounded; with a slight impression over the palatal fold; aperture well rounded, truncate, the margins slightly everted, the outer margin barely impressed at the auricle which is marked by a slight angle projecting over the level of the peristome; no callus in the palate; lamellæ and folds three or four, small, very short, of brownish color; the parietal, columellar and inferior palatal, and

sometimes there is also a superior palatal; surface with very fine irregular striæ, somewhat shining.

Size: alt. 1.5–1.6, diam. 1.1 mill., apert. alt. 0.6 mill.

Soft parts: they could not be fully examined. The dried body of a specimen accidentally crushed was softened up, and showed a considerable amount of dark pigment. Jaw yellow, rather narrow (means really: short), slightly curved, with a shallow indentation in the middle of the front edge, the lateral ends produced backward, in curves, like horns; the surface shows several (4–5) sharp, fold-like ribs on either side, of unequal sizes. Radula: rather broad, with 13 + C + 13 teeth, about seven being laterals, the outer three or four marginals, Nos. 8 and 9, about, marking the transition. The central tooth, with its plate almost square, is tricuspid, the medium cusp being about half the length of the plate, the outer ones much smaller; the first to third, or fourth laterals are bicuspid, but many of the teeth show, more or less distinctly, a minute third, intermediate tooth; the fourth or fifth, to eighth, are tricuspid with the cusps small and the mesodont at last hardly larger; from the tenth on, the cusps gradually disappear. Other parts of the body were not clearly distinguishable or not well defined.[1]

Habitat: Warwick, Rhode Island, collected by Mr. J. Francis Perry.

The present species resembles the low form of *Vertigo ventricosa* Mse. in the shape and size of the shell, but the formation of the aperture and its lamellæ and folds is quite different, the color is deeper and the surface less shining. From the other three described, typically three-toothed eastern vertigos: *tridentata* Wolf, *oscariana* Sterki and *parvula* Sterki, *V. Perryi* is also very different; in all of the three, the parietal lamellæ and palatal folds are much larger, longer, and of whitish color; the aperture is higher than wide; the shells are more elevated and of lighter color.

A new Vertigo from New England certainly is a surprise, and it is the more remarkable for being of a type rather different from all our other Eastern species. No doubt careful search will bring it to light from other localities. I take pleasure in naming the species in honor of its discoverer.

[1] In what appeared to be the mantle, or the pulmonary cavity, there was a small, evidently parasitic, worm, coiled up, the larva of a nematode, as it seemed.

SHELL COLLECTING ON THE MOSQUITO COAST OF NICARAGUA.—IV.

BY W. H. FLUCK.

Strombus bituberculatus Lam. Man of War Keys. Common.

Cypræa exanthema L. Same locality. A common shell on all the keys, including Great and Little Corn Island.

Dolium perdix L. Same locality.

Pyrula papyratia Say. Four dead shells on the beach near the mouth of the Wawa river.

Polinices brunnea Link. Wounta Haulover. Abundant.

Polinices lactea Guilding. Man of War Keys. Plentiful.

Natica maroccana Dillw. Wounta Haulover. Abundant.

Crepidula plana Say. Beach, north of Wawa river. One specimen.

Crepidula convexa Say. Beach, Wounta Haulover. Abundant.

Janthina sp? Although I tramped the beach nearly every evening for four years I found but two of these shells, but they were perfect, living specimens.

Vermicularia spirata Phil. Walpa Siksa. One shell.

Litorina lineata Phil. On the rock at Walpa Siksa. Plentiful in the dry season when no fresh water from the river entering the sea near the rocks disturbs them. Shells rather small, carinate and distinctly marked with the characteristic zigzag lines. I also have ten specimens from the Man of War Keys which are larger, less carinate and not so distinctly marked.

Litorina columellaris D'Orb. Wounta Haulover and everywhere on the beach along the whole coast. Invariably attached to stranded logs and pieces of wreckage. It often hollows out a pocket for itself in the decaying wood. This is the commonest litorine on the whole coast of Nicaragua.

Litorina angulifera Lam. This large and beautiful litorine is found along all the lagoons and rivers, hanging to mangroves beneath the surface of the water or not many feet above it. Specimens from Karata and Wounta. I never found it along the sea nor in fresh water up the rivers. It seems to prefer the brackish water "inside" not far from the sea. Very abundant.

Tectarius muricatus L. Man of War Keys. Plentiful.

Cerithium literatum Born. King's Keys. Abundant.

Planaxis nucleus Wood. King's Keys. Plentiful.

Pachycheilus corvinus Morel. Tungla river, near Quiquina, Nic. A common shell in all the rivers beyond the influence of the salt water. Dr. Pilsbry identified this shell for me, but Mr. Ancey, who received some of my shells from Mr. Shackleford, of Clitheroe, Eng., wrote me that my shells "differ from the true *P. corvinus* from Guatemala, named by the author himself." It was my intention to collect more of these shells, in order to supply my friends, but whenever I made preparation for a shell-collecting trip, some duty turned up and prevented me. At my request an Indian brought me about 100 specimens, and at first sight of them my heart rejoiced, but when I discovered that he had perforated the body-whorl of each, I rejected them in the hope of some day having opportunity to collect for myself. That time never came. The Indian's idea of shell collecting was limited to eating the inside and using the shells as beads! What an opportunity that would have been for lady shell-collectors!

Ampullaria reflexa Swn. Wounta. Found on the beach after heavy floods, just south of the river mouth at that place. Where they came from I do not know, presumably from "up the river." One had a perfect operculum, although a dead shell.

Nerita peleronta L.

Nerita versicolor Lam.

Both these forms from King's Keys and Man of War Keys. Much larger and more beautiful than those I have from the West Indies. A common article of food among the Indians, in turtle-spearing season, when they spend much time on the keys.

Nerita tessellata Gmel. Man of War Keys. Abundant.

Nerita praecognita C. B. Ads. Same locality. One specimen.

Nerita fulgurans Gmel. Walpa Siksa. On the rocks. Large. Not plentiful.

Neritina lineata Lam.

Neritina lineata var. *reticulata* C. & J. Common in Bluefields lagoon and in all the other lagoons and rivers as far up as the brackish water extends. The variety *reticulata* is by far the commoner of the two, only one in about forty being *lineata*. *Reticulata* averages larger, too. These shells are found on submerged mangrove roots and logs, or on the muddy bottom itself. The "tingnis," or channels, peculiar to the Mosquito Coast are its favorite haunts. It never ventures far from the water.

Neritina virginea L. On rocks and stones at the water's edge, inside the harbor, near the government wharf at Bluefields Bluff. As I made annual trips to Bluefields from my station at Wounta Haulover, I searched this spot and turned over the stones in April of 1899, 1900 and 1901, but saw none of these shells until May 5, 1902, when I found them in large quantities. The spot is about 200 yards from the sea, but in the rainy season is washed with fresh water for weeks. Have these shells been brought to Nicaragua by schooners from Grand Cayman or by fruit steamers from other ports? The shell is small, being about the size of *Neritina pupa* L., very uniform in its dark color and modest marking. It is very unlike the *N. virginea* I have seen from the West Indies.

Astralium cælatum Gmel. Man of War Keys. A very abundant shell on and about all the keys. An article of food among the Indians.

Astralium americanum Gmel. Same locality. Plentiful, but not as numerous as *caelatum*.

The Indians use the opercula of these shells for divination. By pouring strong banana vinegar over an operculum, the lime is eaten and gas liberated. This causes the operculum to "dance" about in one direction or another and in that way they find out the particular thing they want to know. No amount of explanation was able to convince them of their foolishness.

Turbo filosus Fischer. Man of War Keys. I found only two or three dead shells.

(*To be continued.*)

LIST OF WISCONSIN SHELLS.

BY GEORGE HALCOTT CHADWICK.

The following shells were collected in the summer of 1902 with the active assistance of the members of the Wisconsin Natural History Society, through whose bulletins a more complete annotated list will shortly be published. A thorough survey of the State is contemplated by the Society, for which this list will constitute a beginning. The specimens listed are all in the Milwaukee Public Museum.

A. Land Shells.

Helicina occulta, Say. Whitefish Bay.
Helix pomatia, Müll. Milwaukee, teste P. Wells.
Vallonia pulchella, Müll. Milwaukee. Common.
Polygyra profunda, Say. Milwaukee and vicinity; Crystal Lake.
Polygyra albolabris, Say. Whitefish Bay; Wauwatosa. Scarce.
Polygyra multilineata, Say. Milwaukee and vic. Scarce.
Polygyra thyroides, Say. Milwaukee and vic. Scarce.
Polygyra hirsuta, Say. Milwaukee; Mishicot, Manitowoc Co.
Polygyra monodon, Rack. Milwaukee and vicinity.
Polygyra monodon fraterna, Say. Milwaukee and vicinity.
Strobilops, cf. *virgo*, Pils. Milwaukee and vic.; Mishicot.
Pupoides marginatus, Say. Kenosha.
Bifidaria armifera, Say. Vicinity of Milwaukee.
Bifidaria contracta, Say. Vicinity of Milwaukee.
Bifidaria corticaria, Say. Wauwatosa.
Bifidaria curvidens, Sterki. Wauwatosa.
Bifidaria pentodon, Say. Vicinity of Milwaukee.
Vertigo milium, Gould. Near Milwaukee.
Vertigo ovata, Say. Near Milwaukee.
Cochlicopa lubrica, Müll. Vicinity of Milwaukee.
Vitrina limpida, Gould. Milwaukee. Rare.
Vitrea cellaria, Müll. Greenhouse, Milwaukee.
Vitrea draparnaldi, Beck. Greenhouses. Common.
Vitrea hammonis, Ström. Vicinity of Milwaukee.
Vitrea indentata, Say. Vicinity of Milwaukee.
Euconulus fulvus, Müll. 1 specimen.
Zonitoides nitidus, Müll. Milwaukee. Common.
Zonitoides arboreus, Say. Vicinity of Milwaukee; Mishicot.
Zonitoides minusculus, Binn. Vicinity of Milwaukee.
Limax maximus, Linn. Greenhouses, Milwaukee.
Limax flavus, Linn. Greenhouses, Milwaukee.
Agriolimax agrestis, Linn. Abundant about Milwaukee.
Agriolimax campestris, Binn. Milwaukee and vic.
Philomycus dorsalis, Binn. Whitefish Bay.
Pyramidula alternata, Say. Very common about Milwaukee; Mishicot.
Pyramidula perspectiva, Say. Whitefish Bay. 1 shell.
Pyramidula striatella, Anth. Milwaukee and vic. Common.

Pyramidula striatella catskillensis, Pils. Wauwatosa; Mishicot.
Helicodiscus lineatus, Say. Vicinity of Milwaukee.
Punctum pygmaeum, Drap.? Whitefish Bay.
Succinea retusa, Lea. Vicinity of Milwaukee.
Succinea ovalis, Say. Vicinity of Milwaukee. Abundant.
Succinea ovalis, cf. *totteniana*, Lea. Vic. of Milwaukee.
Succinea avara, Say. Vicinity of Milwaukee.

B. Unionidæ.

Lampsilis ventricosus, Barnes. Milwaukee River; Clear Water Lake, Oneida Co.; Lake Winnebago.

Lampsilis luteolus, Lam. Milwaukee River; Okauchee Lake, Golden Lake and Fox River, Waukesha Co.; Clear Water Lake, Oneida Co.; Boom, Winnebago Co.; Two Rivers, Manitowoc Co.; Lake Winnebago; ? ancient shell heaps at Winneconne, Winnebago Co.

Lampsilis superiorensis, Marsh. ? Two Rivers, Manitowoc Co.

Lampsilis ligamentinus, Lam. Milwaukee River; Fox River, Waukesha Co.; Clear Water Lake, Oneida Co.; ? Winnebago Lake at Menasha.

Lampsilis rectus, Lam. Fox River, near Big Bend, Waukesha Co. (pathologic).

Lampsilis iris, Lea. Milwaukee River at Milwaukee.

Lampsilis ellipsiformis, Conrad. Milwaukee River; Fox River, Waukesha Co.; Hika, Manitowoc Co.

Lampsilis alatus, Say. Lake Winnebago at Menasha; Two Rivers, Manitowoc Co.

Lampsilis gracilis, Barnes. Fox River and Lake Winnebago at Menasha; Boom, Winnebago Co.

Plagiola donaciformis, Lea. Kinnikinnick River, Milwaukee.

Strophitus edentulus, Say. Milwaukee and Kinnikinnick Rivers; Hika, Manitowoc Co.

Anodonta cataracta, ? Say. Maple Lake, Oneida Co.; Golden Lake, Waukesha Co.

Anodonta imbecilis, Say. North shore of Lake Winnebago (juv.).

Anodonta grandis, Say. Milwaukee River; Wauwatosa; Fox River, Okauchee Lake and Golden Lake, Waukesha Co.; Two Rivers, Manitowoc Co.; Winnebago Lake at Menasha; Maple Lake, Oneida Co.

Anodontoides ferussacianus, Lea. Milwaukee and Root rivers, Milwaukee Co.; Jambo Creek, Manitowoc Co.

Symphynota compressa, Lea. Jambo Creek, Manitowoc Co.

Symphynota costata, Raf. Milwaukee River.

Symphynota complanata, Barnes. Milwaukee River; Two Rivers, Manitowoc Co.

Alasmidonta calceola, Lea. Lake Michigan, Milwaukee; Jambo Creek, Manitowoc Co.

Alasmidonta marginata, Say (*truncata*, B. H. Wr.). Milwaukee River.

Unio gibbosus, Barnes. Milwaukee River; Fox River, Waukesha Co.; Two Rivers and Hika, Manitowoc Co.; Lake Winnebago; ancient shell heaps at Winneconne, Winnebago Co.

Quadrula undulata, Barnes. Fox River, Waukesha Co.; Two Rivers, Manitowoc Co.; Clear Water Lake Creek, Oneida Co.; ancient shell heaps, Winneconne, Winnebago Co.

Quadrula pustulosa, Lea. Ancient shell heaps at Winneconne.

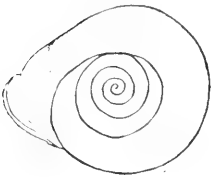
Quadrula rubiginosa, Lea. Milwaukee River; Two Rivers, Manitowoc Co.; Clear Water Lake Creek, Oneida Co.

Quadrula trigona, Lea ? Milwaukee River at Lindwurm.

A list of the *Limnæidæ*, *Sphæriidæ* and other fresh-water shells will be given in a future number.

PUBLICATIONS RECEIVED.

Descriptions of Indian and Burmese Land Shells referred to the genera *Macrochlamys*, *Bensonia Taphrospira* (gen. nov.), *Microcystina*, *Euplecta*, and *Polita*. By W. T. Blanford (Proc. Zoöl. Soc., Lond., 1904, pub. Apr. 18, 1905). Eighteen new species are described, and the new genus *Taphrospira* is erected for *Macrochlamys*-like snails with a trench or gutter bordering the suture outwardly. Four species are referred to this group: *T. convallata* Bens., *T. bathycharax* 'Bens.' Fult., T. *compluvialis* Blf. and *T. excavata* n. sp., the last two being figured. This is an unusually well-marked group for the *Zonitidæ*, quite deserving recognition in nomenclature, though differing from *Macrochlamys* only in the sutural gutter. The soft anatomy is unknown. To the above list should be added *Macrochlamys diadema* Dall, described in a former number of this journal.—H. A. P.



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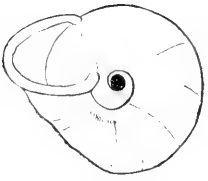

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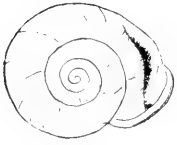

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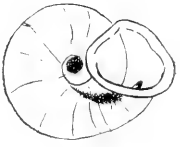

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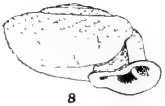

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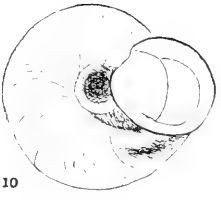

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STEGODERA, MOELLENDORFFIA AND GONIOBASIS.

THE NAUTILUS.

VOL. XIX. OCTOBER, 1905. No. 6.

DESCRIPTION OF A NEW SPECIES OF GONIOBASIS, FROM BRITISH COLUMBIA.

BY J. F. WHITEAVES.

Goniobasis Columbiensis sp. nov. Plate 2, figs. 11, 12.

Shell small (for the genus), apparently not exceeding fifteen millimetres in length, elongate conical and about twice as long as wide, spire rather short, a little shorter than the outer whorl, as viewed dorsally. Whorls actually five or six, but probably seven when perfect, the apex being always eroded; those of the spire obliquely compressed, the later ones thereof encircled with one to three very small spiral ridges or keels in some immature specimens, but smooth in full-grown ones. Outer whorl moderately convex, faintly and spirally angulate at the midlength in the immature stage but rounded in the adult, its lower or anterior portion always narrowing rather abruptly; sutural line impressed. Aperture subovate, longer than wide, acutely pointed posteriorly, produced and somewhat effuse but narrowly rounded in front, almost equal to the spire in length; outer lip thin and simple.

Surface of full-grown specimens almost smooth, and marked only with very numerous and closely disposed striæ that are parallel with the outer lip and so minute as not to be visible without the aid of a lens; also with one or two distant lines of growth that mark the position of previous lips.

Epidermis uniformly brownish or greenish-brown, without darker bands; aperture and inner surface of the last volution a lustrous

polished white, or with a very small, pale-purplish spot or stain on the columella posteriorly.

Operculum and animal not preserved.

Headwaters of the Columbia River, at Upper Columbia Lake, in the East Kootenay District of British Columbia, J. B. Tyrrell, 1883: thirty-seven fresh and living specimens, all of which are in the Museum of the Geological Survey of Canada at Ottawa.

This species seems to differ from the eastern *G. livescens* in its much smaller size, fewer whorls, and proportionately shorter spire; also in the color of its epidermis and aperture. It is believed to be the first non-plicate *Goniobasis*, of the type of *G. livescens*, that has been found in the Pacific drainage system.

Ottawa, August 15, 1905.

NOTES ON THE SEMI-FOSSIL SHELLS OF POSEY COUNTY, INDIANA.

BY L. E. DANIELS.

Ages ago the Wabash River, which forms the western boundary of Posey County, Indiana—the extreme southwestern county of the State—was much wider than now, as indicated by the range of bluffs which border and run parallel with the bottom-lands of the present river, which, in some places are six miles in width. These bluffs or hills are in most cases one hundred or more feet above the level of the bottom-land, and many of them contain deposits of marl from one to twenty feet in depth.

During the summers of 1901–4, while working for the Indiana State Geological Survey, I had an opportunity of examining several of the deposits, particularly at New Harmony and Grand Chain, Posey County, and collected from them several species of recent shells in a fossil state. The marl is usually covered with two or more feet of soil, and the shells occur from six to fifteen feet below the surface, being the more plentiful from the middle to the bottom of the marl deposit.

Polygyra monodon (Rack.)—the shell formerly called *leai* Ward—is abundant, but I have been unable to find a single living specimen here, and nowhere else in the State except on the marshes bordering several of the lakes in the northern part of the State, where it is

plentiful. It seems strange that a species once so abundant here should have entirely disappeared.

Following is a list of the species I have taken from the marl beds at New Harmony and Grand Chain:

Helicina occulta Say. Abundant.
Vallonia pulchella (Müll.).
Polygyra multilineata (Say).
Polygyra hirsuta (Say). Abundant.
Polygyra monodon (Rack.). Abundant.
Polygyra monodon fraterna (Say). Abundant.
Strobilops labyrinthicus (Say).
Strobilops affinis Pils.
Pupoides marginatus (Say). Common.
Bifidaria armifera Say.
Bifidaria contracta Say.
Circinaria concava (Say).
Omphalina inornata (Say).
Vitrea hammonis (Strom.).
Vitrea wheatleyi (Bland).
Euconulus fulvus (Müll.).
Zonitoides nitidus (Müll.).
Zonitoides arboreus (Say).
Gastrodonta ligera (Say).
Pyramidula alternata (Say).
Pyramidula perspectiva (Say).
Pyramidula striatella (Anth.).
Helicodiscus lineatus (Say).
Succinea retusa Lea.
Succinea avara Say.
Pomatiopsis lapidaria Say. Abundant.

NOTES ON MOELLENDORFFIA AND STEGODERA.

BY HENRY A. PILSBRY.

In southeastern China, Tonquin and the neighboring region, there is a group of curious Helices with reflexed lip, toothed aperture or plicate throat, and granose, often hairy surface. The systematic re-

lations of these snails are still uncertain. No member of the series has been dissected.

One of the first forms described was *Stegodera angusticollis* Martens (pl. 2, fig. 1, 2, 3), a sinistral snail from the Yangtse valley, with the last whorl distorted, making the throat very narrow. It has not before been noticed that there is a weak and shallow groove on the upper part of the last whorl (indicated in fig. 1), and another one, very weak and shallow, on the base. These vestigeal furrows, which would scarcely be noticed, evidently represent structures far better developed in the following species.

Helix triscalpta Martens, type of Ancey's group *Traumatophora*, is shaped like *Stegodera*, but has a regular coil, and is dextral. There are three furrows in the latter part of the last whorl, marked inside by irregular lamellæ. The texture and granose sculpture are like *Stegodera*.

Helix horrida Pfr. and its allies are quite different. The spire is sunken, as in *Chloritis*, the peristome continued in a cord across the parietal wall, and the last whorl has two deep furrows, one basal, the other above the periphery. This and all the preceding have the apical whorl smooth and glossy. (See pl. 2, figs. 4–6.)

Another series has the apical whorl granulated. There are two or three furrows outside, with corresponding prominences within. *Helix trisinuata* type of *Moellendorffia* Ancey, is typical of this group (pl. 2, figs. 7, 8).

The absence of any internal lamellæ or barriers on the parietal wall differentiate all of the above from *Plectopylis* and *Corilla*, while the granose surface, external furrows, etc., indicate that the various members are related to one another. The tendency to have two external pits or furrows in definite positions shows a great likeness to certain forms of *Chloritis*, and the very closely related group *Planispira*, such as *C. bifoveata* Bs., *P. endoptycha* Mts., *porcellana* Grat., *infracta* Marts., etc.[1] The correspondence is so close that I have now little doubt that this Chinese series of Helices is closely related to the genus *Chloritis*, though the full demonstration awaits an examination of the soft anatomy. Pending this, I would suggest the following classification of the species:

[1] Mr. Sykes has proposed a section *Vulnus* for these pitted Planispiras.—J. of Malak., 1904, p. 88.

I. Peristome continuous, free, or continued as a thick cord across the parietal wall; aperture subtriangular, squarish or subcircular, the throat with two or three plicæ.

Genus MOELLENDORFFIA Anc.

1. Apical whorl granulated; parietal callus free and erect or shortly adnate.

a. Spire convex or low-conic; surface coarsely warty; periphery angular or rounded, both sulci below it; peristome continuous, the parietal callus free and erect, bearing a rounded tooth. There is often a small sulcus above the principal outer one.

Subgenus *Moellendorffia* s. str., Anc.

a[1]. Spire flat, the periphery carinate, two sulci, one subperipheral, the other basal below it. Aperture subcircular, the adnate parietal callus very short, not toothed.

Subgenus *Moellendorffiella* Pils.

2. Apical whorl smooth; parietal callus adnate, thickened at the edge; spire more or less concave; aperture heart-shaped, subtriangular or squarish; edge of the parietal callus thickened, cord-like. Surface minutely granose between larger warts which sometimes bear hairs. Typically with a basal and a superperipheral furrow behind the aperture, with corresponding prominences inside, but these may be reduced to indistinct vestiges. Subgenus *Trihelix* Anc.

II. Peristome widely interrupted, the parietal callus thin throughout; aperture rounded-lunate; periphery rounded and spire convex in known forms; apical whorl smooth.

a. Sinistral, last whorl distorted; external sulci vestigeal; no internal lamellæ. Genus STEGODERA Martens.

a[1]. Dextral, regular; three external sulci and internal plicæ. Subgenus *Traumatophora* Anc.

The species now known are as follows:

Moellendorffia eastlakeana (Mlldff.), China.

Moellendorffia hensaniensis (Gredl.), China.

Moellendorffia trisinuata (Marts.), China.

Moellendorffia trisinuata sculptilis (Mlldff.), China. (Pl. 2, figs. 7, 8.)

Moellendorffia loxotata (Mab.). Tonquin.

Moellendorffia spurca (Bav. & Dautz.). Indo-China.

Moellendorffia spurca deflexa (Mlldff.). Indo-China.

Moellendorffia messageri (Bav. & Dautz.). "

Moellendorffia callitricha (Bav. & Dautz.). "

Moellendorffia (Moellendorffiella) erdmanni (S. & B.), China. (Pl. 2, figs. 9, 10.)

Moellendorffia (Trihelix) horrida (Pfr.). Cambodia.

Moellendorffia (Trihelix) biscalpta (Hde.), China.

Moellendorffia (Trihelix) faberiana (Mlldff.), China.

Moellendorffia (Trihelix) hiraseana Pils., Formosa. (Pl. 2, figs. 4, 5, 6.)

Moellendorffia (Trihelix) eucharistus (Pils.), Ryukyu Is.

Moellendorffia (Trihelix) eucharistus tokunoensis Pils. & Hir.

Moellendorffia (Trihelix) eucharistus diminuta Pils. & Hir.

Stegodera angusticollis (Marts.), China. (Pl. 2, figs. 1, 2, 3.)

Stegodera (Traumatophora) triscalpta (Marts.), China.

Moellendorffia (Trihelix) hiraseana n. sp. Plate 2, figs. 4, 5, 6.

Shell planorboid, umbilicate, the umbilicus about one-fifth the diameter of the shell, thin but moderately strong, brown (the exact color not known, as the specimens found are dead). Sculpture of very distinct minute granules, close but not regularly arranged, and on the last whorl and a half, comparatively large oblong low tubercles, rather widely spaced, and standing in somewhat irregular oblique rows. Spire slightly sunken in the middle. Whorls $4\frac{1}{2}$, convex, the last more than twice the width of the preceding, convex above and below, rounded peripherally, having a deep obliquely ascending sulcus above the periphery on its last fourth, shallower as it approaches the lip, and another on the base, tangentially passing out from the umbilicus. Aperture very oblique, heart-shaped, obstructed within by two strong plicæ representing the external furrows, the basal plica standing transversely, the peripheral one entering. Peristome well reflexed, whitish, the margins connected by a raised callous parietal cord; upper lip arcuate and tapering near the upper insertion, then straightened and sloping, with a very slight prominence within where the sulcus terminates; basal lip but slightly arcuate.

Alt. 7.7, diam. 18 mm.; length from lip-edge to rear end of upper sulcus 9 mm.

Hotawa, Taiwan [Formosa]. Type no. 89999, A. N. S. P., from no. 1406 of Mr. Hirase's collection.

Two specimens of this fine species were obtained. It is closely related to *biscalpta* (Heude) and *faberiana* (Mlldff.) of China. The former is a somewhat larger shell, in which the supraperipheral sulcus terminates at the lip in a downward projecting prominence, causing the upper margin of the lip to appear composed of two small arches, a structure not seen in *M. hirasei.* The spire in *M. biscalpta* is decidedly wider than in the Formosan shell. *M. faberiana* (Mlldff.) has not been figured. It is the size of *M. hirasei*, but differs by the shape of the last whorl, which is flat, obtusely angulated above, and obtusely angular around the umbilicus, by the absence of a parietal callus, sinuous outer lip, etc. It also seems to differ in sculpture and various other features. *M. hiraseana* probably will be found to bear hairs on the larger warts when in fresh condition.

A NEW SUBSPECIES OF POLYGYRA FERRISSI.

BY JAMES H. FERRISS.

Happening to look over my cabinet series of *P. ferrissi* by daylight, I noticed that some shells from Balsam Mountain, Swain Co., N. C., differed from *ferrissi* in several points, especially the minute sculpture, and I believe them to be a new subspecies.

Polygyra ferrissi sericea n. subsp.

The shell has $5\frac{1}{3}$ to $5\frac{1}{2}$ whorls, the inner ones but slightly paler than the outer, with but the slightest trace of punctation. The last whorl has perceptibly closer striation than *P. ferrissi*, is less glossy, and is covered with a weak, very minute granulation in the interstices between striæ; there is also a slight, fine malleation or indentation; the general effect being that of a dull silk. The color is rich reddish brown, with a slight olive tint. The lip is broad and flat, a little turned back. The outer edge is dark, the inner rim white. There is a very small parietal denticle, smaller than in *P. ferrissi.* Alt. 12.7 to 13, diam. 23 mm.

Balsam Mountain, Swain County, N. C.

THE SNAILS OF NEW MEXICO AND ARIZONA.

T. D. A. COCKERELL.

MOLLUSCA OF THE SOUTHWESTERN STATES. 1. UROCOPTIDÆ; HELICIDÆ OF ARIZONA AND NEW MEXICO. BY H. A. PILSBRY. (Proc. Acad. Nat. Sci., Phila., March, 1905.)

Several years ago I was walking at night in the streets of Albuquerque, N. M., looking for a building where a certain meeting was to be held. Accosting the first person I met, I asked the way. The stranger at once said that he was going to the same meeting, and we walked together. I do not know how it was, but through some inevitable necessity, the conversation soon led up to snails. My companion was from the Pacific coast; his name was Ashmun; he was interested in snails; did I suppose he could find any in New Mexico? Thus I had run across the only person in New Mexico, except myself, who cared anything about the mollusca. The information I gave him was not particularly encouraging; he was not likely to find much, but there were some little *Pupidæ* and other miscellanea in the debris on the banks of the Rio Grande.

The next time I met Mr. Ashmun was in the train between Las Cruces and Albuquerque. His first remark was, "I have found three new *Polygyras!*" I well remember my almost incredulous astonishment; I thought I knew there were no such things in that region; for even the Santa Fé Cañon records had become semi-mythical in the absence of recent confirmation.

Thus the corner of the veil was lifted; but how little we then realized that Arizona and New Mexico contained a whole new snail-fauna, including new genera of many species, large and varied in form! Fifteen years ago, the man who should have predicted the discovery of a very distinct genus of comparative large snails, with 26 different species and subspecies, within the borders of New Mexico and Arizona, would have been considered a veritable Munchausen; to-day we are prepared for almost anything, and humbly confess that we scarcely begin to know the fauna of the Southwest.

Astonishing as Mr. Ashmun's discoveries were, it remained for Mr. J. H. Ferriss to reveal even more wonderful forms. In 1902 and again in 1904, he visited the Chiricahua and Huachuca mountains in southern Arizona. The results of these journeys, together with the accumulated fruits of other investigations, are presented by

Dr. Pilsbry in the paper before us, so far as they relate to the *Urocoptidæ* and *Helicidæ*. A second paper, on the small species, is to appear later.

The paper is full of detail and profusely illustrated, so that it practically covers the ground, so far as present knowledge will permit. It has the lucidity and precision which we have learned to expect in Dr. Pilsbry's writings, presenting the facts in such a manner that the reader can judge for himself, whether he will agree with the conclusions reached or not.

In the *Urocoptidæ*, the genera *Holospira* and *Microceramus* are described. The latter includes *M. texanus* (Pils.), of Texas, but does not enter New Mexico or Arizona. *Holospira* has a species confined to Texas, one common to Texas and adjacent New Mexico, five apparently peculiar to New Mexico, and four only known from Arizona. They seem to be often confined to a single range, two species being sometimes found living together. Four new ones are described: *H. ferrissi* from the Huachuca Mts., *H. cionella* from Fort Bowie, Ariz., *H. regis* Pils. and Ckll., from near Kingston, N. M., and *H. chiricahuana* from the Chiricahua Mts.

The Helicidæ of Arizona and New Mexico include five genera: *Ashmunella*, *Sonorella*, *Oreohelix*, *Polygyra* and *Thysanophora*. The last is to be treated later on, and *Polygyra* is dismissed with the remark that it just enters New Mexico, one species—*P. texasiana*—having been found in the Pecos Valley. It is worth while to note here that these Polygyras were collected by Professor Tinsley, who subsequently took me to the locality where they occur. They exist exclusively, so far as I could learn, in a bed of white marl close to the Pecos river, and they are to be regarded as pleistocene fossils. It is quite probable that *Polygyra* has been long extinct in New Mexico; but if it still survives there the fact remains to be discovered. The fossil shell is probably worthy of a subspecific name, as it is not typical *texasiana*.

Incidentally, one may be excused for remarking that the pleistocene beds of the southwest urgently need investigation. They are abundant in New Mexico, at least, and there is no doubt that they will throw much light on the past history of the snails of that region. Unfortunately, it is usually impossible to form any good estimate of their age, for shells are well preserved in the dry soil, and specimens ten thousand years old may not look materially different from

weathered shells which flourished ten years ago. When mammalian remains can be found with the shells, of course they afford valuable clues.

The account of *Ashmunella* begins with an interesting general discussion occupying four pages, in the course of which it is argued, apparently on valid grounds, that the ancestor of all the forms had a tridentate aperture. It is to be noted that this is the case with *A. thomsoniana pecosensis*, the most ancient form yet known. The toothless forms have arisen independently in several localities, and have come to resemble each other so much that they are only separated readily by those intimately acquainted with the genus, or in some cases by the aid of the anatomy. In this connection I may note that I once found at Pecos, N. M., a toothless shell which was plainly an individual variation of the *thomsoniana* series; but anyone could have taken it for *A. ashmuni*. Recalling this specimen, and more particularly on geographical grounds, I will venture to prophesy that when the anatomy of *A. ashmuni* becomes known, it will be seen to be related to the *thomsoniana* series, rather than to the *rhyssa* series, where Dr. Pilsbry provisionally places it.

The classification of the *Ashmunellas* is as follows:

(1.) Group of A. rhyssa. *A. rhyssa; rhyssa miorhyssa; r. hyporhyssa; r. townsendi; altissima; pseudodonta; p. capitanensis; ashmuni*; *a. robusta* (new name = the so-called *chiricahuana* of the Jemez Mts.).

(2.) Group of A. thomsoniana. *A. thomsoniana; t. porteræ; t. pecosensis*—the last a fossil.

(3.) Group of A. levettei. *A. levettei; l. angigyra* (new); *l. heterodonta* (new; extraordinarily variable); *l. proxima* (new); *fissidens* (new); *duplicidens* (new); *angulata* (new); *ferrissi* (new, most extraordinary, acutely carinate, with the keel continued up the spire, projecting above the sutures); *walkeri; mearnsi.*

(4.) Group of A. esuritor. *A. esuritor* (new; aperture toothless, anatomy peculiar).

(5.) Group of A. chiricahuana. *A. chiricahuana; c. mogollonensis* (new).

(6.) Group of A. metamorphosa. *A. metamorphosa* (new; shell like *chiricahuana*, anatomy quite different.)

The account of *Sonorella* is not so exhaustive, because the genus has so recently been treated in detail by Mr. Bartsch. The follow-

ing are proposed as new: *S. hachitana bowiensis*, *S. granulatissima parva*, *S. g. latior*, *S. virilis* (looks like a variety of *hachitana*, but anatomy peculiar), *S. v. circumstriata*, *S. v. huachucana*.

Oreohelix is carefully defined, but only the species of Arizona and New Mexico are treated, and not even all of those. The very variable series grouped under *O. strigosa huachucana* is fully described and illustrated. The new forms are *O. strigosa socorroensis* (allied to *metcalfei*), *O. barbata* (very remarkable, the adult with an epidermal fringe), *O. yavapai*, *O. y. neomexicana* (this species and subspecies separated mainly on the anatomy; the *neomexicana* has been reported heretofore as *hemphilli*, which it much resembles), and *O. chiricahuana*. The last, along with *O. clappi* Ferriss and *O. avalonensis* Hemphill, goes in a new subgenus, named *Radiocentrum*, distinct by the smaller number and the sculpture of the embryonic whorls, and the somewhat modified genitalia.

I wish to call attention to a few apparent peculiarities of distribution, which should be confirmed or disproved by future observers:

(1.) On the east side of the Rio Grande, *Oreohelix* appears to get no further south than the Sandia Mountains. It is totally unknown in the Organs, Sierra Blanca, etc. On the west side of the river it goes nearly to the Mexican boundary, at least.

(2.) *Sonorella* gets as far east as the Organ Mts., but I have not seen it from Sierra Blanca or the Sacramentos; nor does it seem to range northward even as far as the Sandias.

(3.) The Organ Mts. mark the eastern limit of the *levettei* group of *Ashmunella*, the species found there being *mearnsi*. One has only to cross the valley to the Sacramentos to meet with the very different *rhyssa* series.

PUBLICATIONS RECEIVED.

Antarctic Nudibranchs.—Sir Charles Eliot has just published in the Transactions of the Royal Society of Edinburgh a very interesting paper on the Nudibranchiata of the Scottish National Antarctic Expedition. In the preface he remarks on the absence or extreme rarity of Dorids in the Antarctic, while in the tropics Dorids are greatly more abundant than Aeolids. This seems the more singular from the fact that the Dorids are tough and well-protected animals for the most part, while the Aeolids would seem too delicate for the stormy and cold seas (often below 30° Fahr.) of the extreme

south. Possibly the prevalence of other forms of life, including enemies of Nudibranchs, in the tropics may have something to do with it, especially since so many tropical Dorids (*Chromodoris*) show what seem to be warning colors, and are probably inedible.

The species obtained by the expedition in the southern seas were only five in number, and two of these were not in the Antarctic. Nevertheless all these except one proved new, and two are made the types of new genera. The first of these genera, *Notaeolidia*, is based on an animal nearly five inches long, obtained at the South Orkneys. This is so distinct that Sir C. Eliot believes it to represent a new family, standing between the Aeolidids proper and the Dendronotines. This would be a family in the sense of Bergh; a subfamily of Alder and Hancock. The Notaeolidiidæ (or Notaeolidinæ) are defined thus to include a single genus and these species:

"Large animals of Aeolidiform appearance. Oral tentacles large rhinophores perfoliate without sheaths. Foot rounded and grooved in front. Dorsal margin undulated, and bearing one or more rows of close-set cerata. Jaws not denticulate. Radula consisting of a central tooth and four (rarely five) laterals on each side. Central tooth with a strong median cusp and side denticles; laterals denticulate on inner side. The liver forms a lobed, flocculent mass within the body cavity, and in the body walls a thick, spongy layer, from which rise the diverticula which enter the cerata. The hermaphrodite gland lies above the liver."

The other new genus is *Tritoniopsis*, based on a species (*T. brucci*) from Gough Island, 40° 20′ S. It differs from *Tritonia* principally in the dentition, the central tooth being narrow and pointed, not broad, and provided with accessory cusps. The outer laterals are much elongated.—T. D. A. C.

An Arrangement of the American Cyclostomatidæ with a Revision of the Nomenclature. By Wm. H. Dall. (Proc. Mal. Soc., London, vi, 208.) A new subgenus (*Parachondria*) of the genus *Chondropoma* is proposed, type, *C. fascia* Wood, Jamaica. Also a new genus *Opisthosiphon*, type, *Chondropoma bahamense* Shutt.

A new Chiton from the New England coast, by Wm. H. Dall. (Proc. Biol. Soc., Washington, xviii, 203.)

This new species, *Tonicella blaneyi*, was dredged by Mr. Dwight Blaney in 20 fathoms, off Ironbound Island, Frenchman's Bay, Maine. Including the deep-sea species, this makes twelve species of Chitons recorded on and off the New England coast.—C. W. J.

THE NAUTILUS.

VOL. XIX. NOVEMBER, 1905. No. 7.

DESCRIPTIONS OF TWO NEW FORMS OF POLYGYRA.

BY GEO. H. CLAPP.

Polygyra smithii n. sp. Plate III, figs. 1–4.[1]

Shell imperforate, depressed, thin, horn-color, densely covered with elevated epidermal processes, giving the shell a scaly appearance, the hairs following the weak growth lines; embryonic whorls sculptured with elongate granules; spire low, convex, rounded, sutures well impressed, whorls about $5\frac{1}{2}$; body-whorl obtusely carinated above the periphery in its first third; rounded, swollen and very deeply constricted back of the peristome, sharply descending in front; upper half of the aperture, viewed from the under side, forming a half circle; below the periphery almost straight, so that the whole effect is like a human ear; lip wide, white, concave above and flat below, at the periphery a wide, flat entering tooth, basal lip straight, slightly thickened on the upper margin; parietal wall bearing a large, high, very slightly curved tooth extending from the lip-tooth to the axis, a thin wash of whitish callus connecting the upper and lower ends of the lip.

Gr. diam. $16\frac{1}{2}$, lesser 14, alt. 10 mm.

Gr. diam. $15\frac{1}{2}$, lesser $13\frac{1}{2}$, alt. 9 mm.

Gr. diam. 15, lesser 13, alt. $8\frac{1}{2}$ mm.

Gr. diam. $14\frac{1}{2}$, lesser $12\frac{1}{2}$, alt. $8\frac{1}{4}$ mm.

Gr. diam. $13\frac{1}{2}$, lesser $11\frac{3}{4}$, alt. $7\frac{1}{2}$ mm.

The first and last measurements given are the extremes of a considerable series, the average size being about 15 mm.

Near the top of Monte Sano, at an altitude of about 1,600 feet, about 5 miles east of Huntsville, Ala., under large logs, piles of stones, etc.

[1] This plate will appear in a future number.

"Almost always it is on the ground or on the lower surface of a stone which rests on the ground. I have never seen the snail crawling abroad, even in wet weather. The shells are invariably covered with a dark deposit, which is removed with some difficulty." (H. H. S.)

Also found, but more rarely, on Smithers Mountain and near Gurley and Princeton.

Animals almost black, very shy in confinement, spending most of their time either half or completely buried in the earth.

This most interesting and strongly-marked species is another of Herbert H. Smith's finds, and I take great pleasure in naming it after him. While bearing a striking resemblance to an overgrown *P. inflecta*, it is readily separated by the character of the hairs and the absence of the basal lip-tooth; it is also close to *P. subpalliata*, but is apparently most closely related to *P. inflecta*.

Monte Sano is an outlier of the Cumberland Plateau, so that this may be considered a species of that most interesting faunal region.

Types No. 5388 of my collection and co-types in the collections of the Academy of Natural Sciences, Bryant Walker and T. H. Aldrich.

Polygyra inflecta approximans n. subsp. Plate III, fig. 6.

Differs from typical *inflecta* in the closely approximated lip teeth, the space between them measuring only about $\frac{1}{2}$ mm. in width, while in the typical form it measures 1 mm. and over. The aperture is also wider, in proportion to its length, and less rounded in front; body-whorl narrower at the aperture, not swollen back of the lip. In other characters like the type—whorls about $4\frac{1}{2}$.

A considerable proportion of the shells have the umbilicus partly open, and while this can hardly be considered a specific character the proportion is greater than in any lot of *inflecta* I have seen.

Greater diam. $7\frac{1}{2}$, lesser $6\frac{1}{2}$, alt. $4\frac{1}{4}$ mm.

Greater diam. 8, lesser 7, alt. 5 mm.

Greater diam. $8\frac{1}{2}$, lesser $7\frac{1}{2}$, alt. $4\frac{3}{4}$ mm.

Greater diam. $8\frac{3}{4}$, lesser $7\frac{3}{4}$, alt. 5 mm.

Marion, Ala., where it practically replaces the typical form as only four dead shells of the latter were found. Collected by Herbert H. Smith in May, 1905. A specimen of *P. inflecta* from Jackson, Ala., is figured for comparison, pl. 3, fig. 5.

Types No. 5389 of my collection and cotypes in the collections of the Academy of Natural Sciences, Bryant Walker and T. H. Aldrich.

ON SOME CYPRAEIDAE IN THE COLLECTION OF MR. D. W. FERGUSON, OF BROOKLYN, WITH DESCRIPTIONS OF SEVERAL NEW VARIETIES.

BY SLOMAN ROUS.

In this collection—which Mr. Ferguson kindly allowed me to inspect—the Cypraeidæ are especially interesting. There are several varieties that appear to me to have been not hitherto noticed, and some which, though not attaining varietal dignity, are well worthy of remark.

CYPRAEA HELVOLA var. APHRODITE, var. nov.

More pyriform and much wider than the type, and considerably depressed. Very pale yellowish-brown, sides slightly darker, again changing to the paler dorsal color on the base, the interstices of the teeth a full shade darker, back flecked with numerous small snow-white spots, and a few larger spots of a still pale brown, but darker than the ground color. Edges of base rather heavily thickened.

I am not sure that this shell may not claim specific rank, while it is close to *C. helvola*, the differences are many. Beside its pyriform shape the outer half of the base is about two and a half times wider between the aperture and outer edge than the opposite, and the teeth are prolonged almost half-way over this space, making them appear finer and more elegant than in *helvola*. The aperture is almost straight and narrower than the type. This is accentuated by the columellar lip being much less arcuated than is normally the case, so that the anterior portion of the lips are almost as close together as the posterior. Long. 27, lat. 20, alt. 14 mm. It is a very lovely shell and undoubtedly very rare. Hab. Sandwich Is., W. H. Pease.

A specimen of *C. arabica* is curiously marked. On the inner side of the dorsal line the pattern is normal, but on the outer side, while some of the white spots are irregular in shape, most of them are round and annulated with dark brown. The dorsal line is very crooked and would seem to indicate a malformation of the mantle.

There is also a specimen of *arabica* var. *eglantina* Duclos. Mr. J. Cosmo Melvill, in his description of this shell in his "Survey of the Genus Cypraea," says it is shining brown. All the specimens I have seen have been the color of Portland cement, and decidedly not brown.

CYPRAEA EXANTHEMA var. PUDICA, var. nov.

Shape normal, small, color very pale brown, with spots of gray-

white, minutely—almost microscopically—thickly irrorated all over with dots of still lighter color than the spots, and showing on them as well as the rest of the shell, thickly, minutely granulated at the extremties, and less thickly so over dorsal surface, sides smooth. Long. 55, lat. 36 mm.

Notwithstanding the dull coloring and that the granulation detracts somewhat from the lustre of the shell, it is still a very pretty and striking addition to the handsome suite of exanthema in the collection.

A dwarf *C. cervinetta* is a very pretty little shell of a dark umber-brown, with whitish spots and dorsal line down the centre of the back, base fawn color with faint brownish blotch and bright chocolate-brown teeth. Long. 31, lat. 17, alt. 13.5 mm.

In the suite of *C. lynx* is a very interesting example. It is longitudinally corrugated from one side to the other by lines of growth. The earlier lines are narrow, numerous striations running from the spire obliquely to the base in which they disappear; on the back they are parallel to the sides, only bending near the anterior extremity; on the outer side they become parallel to the edge of the base. From the earliest to the latest stage of growth the intervals between the striae gradually and regularly increase in width until those on the outer side are shallow sulci between sharp costulae, the width of the last sulcus being 3 mm. It is a young shell, probably waiting its last deposit of enamel, which would very likely obliterate the growth lines; as it is, it is a very beautiful illustration of shell-formation.

Another specimen of *lynx* is interesting for its size; it is adult, normal in every respect, except size. Long. 21, lat. 11.5 mm.

Cypræa vitellus var. fergusoni, var. nov.

Teeth, base and sides normal, dorsal line wide, lighter in color than the back, dorsal surface rather dark fulvous brown, obscurely banded with lighter shade and spotted with bluish-white or light lead-colored spots, which seem to solve themselves into rows of three or four in various directions, each spot surrounded by a narrow blackish ring; the spots at sides are not annulated. Long. 37, lat. 23, alt. 19 mm.

The difference between this and the type lies in the annulation of the spots and their disposition in short rows. It is fully developed though small in size. Loc. ?

CYPRÆA CRUENTA var. VIOLACEA, var. nov.

There are two specimens of *cruenta*, one typical in shape, the other stunted, broader, somewhat depressed, with the strong teeth of var. *coloba* Melvill, but each having a large, bright violet patch on the base. The brownish-violet spots on the sides are also unusually bright. I propose the above name for such specimens as possess the violet basal blotch.

CYPRÆA CAPUT-SERPENTIS var.

Base and sides normal, back almost pure white but very faintly tinged with blackish on which the snow-white spots are just perceptible, the brown of the sides merging a little into the white of the dorsum, showing a narrow border of the typical white spots; extremities of the usual smoky white. The white back accentuated by the dark sides is curiously suggestive of a bald head.

Another specimen of *caput-serpentis* has the dorsal surface a lighter brown than the sides, and sparsely spotted and blotched with whitish-brown.

There is also a dwarf specimen: Long. 20, lat. 13, alt. 10 mm.

CYPRÆA CAURICA var.

Back light yellowish-brown with three brown bands, rather profusely sprinkled with small brown spots. Base and sides creamy white, striated with fine pure white lines. Sides with a few large dark-brown purplish-shaded spots.

CYPRÆA ISABELLA var. FULVA, var. nov.

Uniform yellowish-brown, only very faintly tinged with orange at the extremities, base creamy-white.

Length 30½, diam. 16 mm. (Coll. Ferguson.)

Length 35, diam. 19 mm. (Coll. Acad. Nat. Sci.)

There is another specimen of *isabella* the same color but with the normal longitudinal black markings and orange extremities.

CYPRÆA CARNEOLA var. ADONIS, var. nov.

Base pure white, extending a little up the sides, above which the sides are light yellowish-brown, thickly irrorated with minute white spots. Dorsum whitish, banded with four faint orange bands. Sides thickened. Teeth yellow, turning to orange anteriorly. More pyriform in shape than typical *carneola*.

There is a diversity of opinion respecting this shell among our

local collectors, some considering it a variety of *C. arenosa*, and others *C. carneola* var. *propinqua* Garrett. I think it is closer to *carneola* than *arenosa*, but it differs from *propinqua* in having no violet ring and in the color of the teeth.

SHELL COLLECTING ON THE MOSQUITO COAST OF NICARAGUA.—V.

BY W. H. FLUCK.

Liotia cruentata Mühlf.

Omphalius viridulus Gmel.

Omphalius indusii Ch.

Livona pica Linn.

All from Man of War Keys. The last-named species is found by the dory-load, and is used as an article of food by the natives. When perfect, the shell is beautifully mottled with white and black, but most specimens from "the keys" are badly incrusted. The beautiful spiral operculum is a study in itself.

Fissuridea alternata Say. Wounta Haulover. I found about a dozen in four years, the locality being, I suppose, not rocky enough for them.

Subemarginula octoradiata Gmel. Man of War Keys.

Acmæa melanoleuca Gmel. King's Keys. A white variety.

Guppya biolleyi Mart. Rama Key. This little island is in the Bluefields lagoon, about 10 miles south of the town of Bluefields. The shell was found in the yard of the Moravian Mission.

Epiphragmothora coactiliata Fér. Weilawas Hill, near Wani, Nicaragua, near where the Ulli river and Wani river meet to form the Prinzapolka river.

Bulimulus corneus Sowb. Bluefields, in the garden of the Moravian Mission, among flags and other plants and under stones.

Macroceramus caracasensis Rve. Bluefields. Same locality and station.

Macroceramus concisus Morelet. Weilawas Hill, Wani, Nic.

Bifidaria sp.? Bluefields. Numerous. Clinging to stones. Dr. Dall has seen specimens, and says they much resemble *B. eyriesii* Drouet, of Venezuela, or *P. wolfii* Miller, of Ecuador, adding: "There are so many of these described that I don't dare attempt to name it, especially as our series of these species from the tropics is very incomplete."

Oxystyla princeps Brod. Near Kukallaya, in the plantation clearings of the Indians, along the Kukallaya river (sometimes called Wounta river). Quite numerous. I have one specimen that lacks the characteristic zigzag markings, being quite plain, except for the dark-brown spot at the very point of the blunt apex, together with a faint suggestion of some narrow brown bands on the whorls.

Subulina octona Linn. Bluefields, under stones and beneath foliage in damp places.

Subulina mimosarum Orb. Bluefields, Rama Key, Wounta Haulover, Kukallaya. Under stones, wood, leaves, in damp places.

Succinea recisa Morelet. Wounta Haulover, in a puddle left by the rainy season, between the sea and the lagoon and not more than 100 yards from either. The bottom of the pool was grass-covered. Shells were clinging to a stem of cocoanut leaf, which had fallen and was submerged. 25 specimens. In the dry season the spot is dry and the grass dead, and the lagoon and all the water courses for miles around are salty. I never saw this shell anywhere else except on the banks of a little run in Bluefields, where they were rare.

Melampus flavus Gmel. Man of War Keys. Large, banded and unbanded specimens.

Melampus coffea Linn. Wounta.

Exceedingly numerous. Used as beads by Indians. The unbanded variety will average larger than the banded. In March, 1903, I collected some of these shells at the Bluff near Bluefields, but the shells were all small, none being larger than *M. lineatus* say of the North Atlantic. In the spring of the three years preceding 1903, I searched the same spot, but found none of these shells. I am inclined to regard them as newcomers to Bluefield.

Teredo sp ? Wounta Haulover and everywhere on the coast.

Pholas campechensis Gmel. Wounta Haulover, Prinzapolka, etc. Of the hundreds of valves cast up daily, I never found anything but *right* valves. Cannot some one who knows write an article on why it is that single right or left valves, as the case may be, are often found, to the exclusion of the other valves?

Tagelus poeyii Dall. Prinzapolka. On the beach toward the south from the town. Rare. Only 3 specimens.

Periploma inequivalvis Schum. Wounta Haulover. *Right* valves only.

Mactra (*Mactrella*) *alata* Spengler. Wounta Haulover, and along

the whole coast. Abundant, both alive and dead; fragile, white and beautiful.

Mulinia gaudeloupensis Recluz. Single valves on the shore at Wounta Haulover.

(*To be continued.*)

NEW VARIETIES OF NORTH AMERICAN PISIDIA.

BY V. STERKI.

During the twelve years' study of our Pisidia, on about 350,000 specimens examined, many new forms were found. Some of them have been published from time to time, since 1895, in the NAUTILUS, others were held back, mostly for years, in the hope of getting additional materials which would more clearly show their relations and positions. Owing to the great variation of most of our species, with some apparently endless, it is often difficult to know, or even to estimate, whether a new Pisidium represents a new species, or a variety, and it seemed preferable to be rather over-cautious with regard to "n. sp." than too hasty. Yet new forms, more or less different from those published or regarded as typical for a species, should be named and described, and short descriptions of a number of such are offered in the following lines. They are ranged under species already known, as varieties, in many instances with some doubts, leaving it for further evidence to prove their real affinities or their claims to representing distinct species. A few short notes are necessarily added, but a more detailed discussion of the affinities etc., of the various species and forms is left for a forthcoming revision of our Pisidia.

Pisidium idahoense Roper var. *indianense* n. Smaller than the types, less inflated; beaks much narrower, low, little prominent over the hinge margin; surface with several well-marked lines of growth, more horn-colored than in the other forms; shell and hinge slight, the right cardinal tooth less curved; long. 8, alt. 7, diam. 4 mill.

Hab.: Lake Maxinkurkee, Ind., collected in considerable numbers by Drs. Evermann and Bartsch, for the U. S. Fish Commission.

As compared with the types from Idaho and the larger, much inflated form from Seattle, Washington, the Indiana Pisidium appears to be of a distinct species. Yet a form, eventually a var., from

Lake Michigan: Charlevoix (Walker) and the South end (Daniels) is somewhat intermediate, although more like the Idaho form, and so it appears to be safer to regard the above as a variety of the same species for the present.

Pisidium compressum Prr., is very variable, but a number of its forms and varieties are characteristic and rather constant. As typical is accepted the common river and creek form: beaks high, narrow, with well developed appendages, above which there are small flattened or even impressed smoothish areas, usually with more or less distinct radial lines; balance of the surface with rather coarse, sharp, regular, concentric striæ, dull, with microscopic wrinkles, color whitish to grayish, and often there are marginal zones of straw to yellow color, with more shallow, irregular striæ, more or less shining; shell and hinge stout, with whitish nacre.

Var. *opacum* n. In shape and size near the typical form, well inflated, but the surface is finely and irregularly striate, dull to shining, color often plumbeous above; beaks with the appendages slighter, or merely flattened on top; shell and hinge stout, the former opaque.

This is a form of sloughs, ditches, pools, etc., along rivers and creeks, quiet places in such, with muddy bottom, also of lakes and ponds near inlets; it seems to be a retrograde one, with respect to the surface sculpture, and it is notable that also the young in such places have the fine, obsolete striæ.

Var. *lævigatum* n. Moderately oblique, of medium to rather large size, generally well inflated; beaks less elevated, rounded or more or less flattened on top with slight or obsolete ridges; surface with fine, irregular striæ to nearly smooth, more or less shining; color light to dark horn; shell slight, translucent, nacre, more glassy; hinge slight, generally less angular than in the type.

Widely distributed, in quiet waters. These mussels often have considerable resemblance, in shape, with *Pis. variabile* Prr. (which is variable on somewhat corresponding lines), and it is sometimes very difficult to distinguish dead or fossil specimens of the two, and even fresh shells of certain forms.

Var. *limnicolum* n. Near *lævigatum*, but much smaller, some specimens have ridges or well-formed appendages on the beaks; shell and hinge slight, cardinal teeth well formed. A form of deeper, quiet water, lakes, etc. Hundreds of specimens at all stages

of growth were collected in the Fox River, Wisconsin, by the late Geo. T. Marston.

Var. *rostratum* n. Of medium size, moderately to rather well inflated, oblique, outlines slightly angular; beaks little prominent, rounded or with slight ridges around the slightly flattened central areas; angles at scutum and scutellum well projecting, slightly rounded, especially at the latter, the projecting part of the mussel is somewhat rostrum-like, pinched, surface with fine, irregular striæ, somewhat glossy; color pale to yellowish or brownish-horn, shell rather thin, translucent, hinge slight, with the teeth small but well formed.

The typical form (of the var.) from Reed Lake (Dr. Kirkland), Blue Lake, and other waters in Michigan, Clear Lake, Indiana (Daniels).

Var. *arrosum* n. Rather small and low, not very oblique, outlines somewhat angular, moderately inflated, beaks not much elevated, narrow, rounded or slightly flattened on top, without appendages, and with barely any radial lines; surface with very fine striæ above, becoming somewhat more distant and irregular towards the margins, slightly shining, color pale to yellowish or reddish-horn, shell thin, somewhat translucent, hinge slight.

Michigan: Grand Rapids in several lots (Streng, Kent Scient. Inst.), Blue Lake, Allegan Co. (Dr. Kirkland), Brooks Lake, Newaygo Co. (Streng), Green Creek, Allegan Co. (Walker). A peculiarity of this rather constant form is a disease found on the shells of almost all specimens: small white spots of erosion gradually becoming confluent and extending over a large part of the surface.

Var. *confertum* n. Of medium size, somewhat oblique, well and compactly inflated; beaks broad, not much prominent, slightly flattened on top, or rounded, without appendages; upper margin moderately curved, with projecting angles where passing into the supero-anterior and posterior slopes which are well marked, rather long, straight, the former steep, the latter nearly perpendicular; scutum and scutellum marked in some specimens; surface with irregular, slight striæ and lines of growth, dullish to slightly shining; color straw to yellowish, reddish or brownish-horn, generally with irregular, lighter and darker, concentric zones; shell rather stout, slightly translucent, nacre whitish, muscle insertions well marked, hinge moderately stout, as compared with typical *compressum*, median

part (plate) rather long and slightly curved; cardinal teeth small and rather defective,[1] of the right, the posterior end is small, simple, the anterior small, low and nearly obsolete, the left anterior short, somewhat massive, the posterior oblique, short, slight and not projecting over the level of the valve-edge, lateral teeth at strong angles to the plate, the right ones little elevated, the cusps of the left rounded; ligament stout, covered in younger, partially or quite uncovered in adult specimens.

Size: long. 4, alt. 3.8, diam. 2.8 mill. (average).

Habitat: Blue Lake, Muskegon co., Michigan, collected by Dr. Kirkland, in good numbers, remarkably uniform.

This is certainly a remarkable form, and has rather the significance of a species, yet seems to be connected with other forms of *P. compressum.*

Var. *coosaense* n. Of medium size, straw to light horn colored; in shape near the typical form, with rather posterior, narrow, elevated beaks bearing appendages; superior margin somewhat less curved and rather long, the supero-anterior slope somewhat more remote from the beaks; surface with fine to very fine striæ, dull to slightly shining. Shell and hinge rather strong.

Hab.: Georgia and Alabama, along the Coosa river (collected by Smith, sent by B. Walker).

In younger to two-thirds grown specimens, the features of this form are especially well marked: the outlines rather angular, all margins little curved, while full-grown examples are approaching the typical form, except as to surface sculpture.

Var. *contrarium* n. Of medium size, well inflated, moderately oblique; outlines various from near those of *coosaense* and the typical form, though less angular, to rounded, nearly oblong or oval, with only the supero-anterior slope more or less marked; beaks generally less posterior, moderately elevated, rather narrow, with a small, more or less flattened area on top, and a slight ridge or even small appendage; surface with rather fine, crowded, sharp, regular striæ, dull; color pale to grayish horn, often with a light zone along the margins; shell and hinge rather stout. This Pisidium, although rather variable in itself, and probably connected with other forms, marks an interesting contrast to *coosaense* as well as to the type, and *laevigatum*, etc.

Alabama: Attalla, Calera, Ebenezer Church, Montevallo. (Smith collected, B. Walker sent.)

Var. *smithii* n. Of rather good size, little inequipartite, somewhat oblique, moderately to rather well inflated, more so near the beaks, while the lower parts of the disks are rather flat; outlines rather angular, with the angles more or less rounded, superior and inferior margins moderately curved, the superior rather long; supero-anterior slope nearly straight, steep, posterior part subtruncate; beaks not

[1] In several specimens examined.

much behind the middle, prominent, rather narrow, more or less flattened on top, with ridges or slight appendages; surface with rather crowded, sharp, regular striæ, dullish; color from light horn, in the younger, to brownish; light chestnut in adult specimens.

Hab.: Shoal creek, Alabama (Hinkley).

This form is mainly characterized by its beaks being less posterior than in most others, and, as it seems, by its brownish color.

The above are a few of the more marked forms of the very polymorphous *P. compressum* Pr. More have been noticed, and some of them will probably also have to be named and described; besides, more will be brought up with new materials.

Pisidium fallax Sterki var. *mite* n. Rather smaller than the typical form, beaks without appendages, or slightly flattened on top; shell and hinge slighter.

Hab.: Grand river, Michigan (Dr. Kirkland), Nimishillen creek, Canton, Ohio (Sterki).

Var. *errans* Sterki. Has been published as var. *septentrionale* Sterki. (The NAUTILUS, XII., p. 78.) The name, being preoccupied,[1] had to be changed. This well-characterized Pisidium has been seen from northern Maine, northern Michigan, Minnesota and Keewatin. (McInnes Col., Whiteaves sent.)

Pisidium punctatum Sterki var. *armatum* n. Higher, and often larger, than the typical form, beaks very prominent, with strong appendages, which give the mussel quite a different shape and appearance.

Hab.: Tuscarawas river, Ohio (Sterki), and other places.

Var. *simplex* n. Beaks without appendages, rounded or slightly flattened on top; striation slighter; mussel sometimes smaller than the typical form.

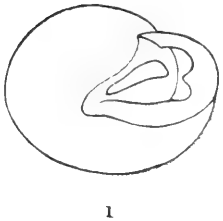
Hab.: Joliet, Illinois (Ferriss, Handwerk), Carp Lake near Mackinaw, Michigan (Walker), Fox River, Wisconsin (Marston).

(*To be continued.*)

GENERAL NOTES.

MASSACHUSETTS SLUGS.—I am indebted to Mr. John Ritchie, Jr., for two lots of slugs collected in the vicinity of Boston. The first lot included *Arion subfuscus*, Draparnand, of the form called *cinereo-fuscus*, Drap., and *Limax maximus*, L., of three forms, the first nearly typical, the second var. *obscurus*, Moquin-Tandon, and the third var. *cellarius*, Moquin-Tandon. A series received to-day, collected by Mr. Abner Hatfield at Jamaica Plain, includes *A. subfuscus*, v. *cinereo-fuscus*, *L. maximus* and *Agriolimux agrestis*. The *A. agrestis* unfortunately are dead and somewhat spoiled, but they are of the dark and reddish forms, not the very pale kinds so common in England. I was glad to confirm the Boston *Arion* as *A. subfuscus*. T. D. A. COCKERELL.

[1] T. Prime, Cat. of 1895, "undescribed."



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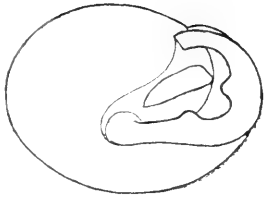

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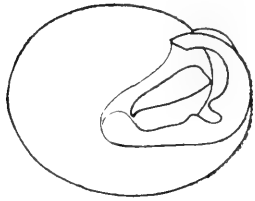

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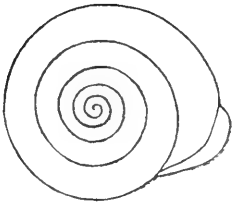

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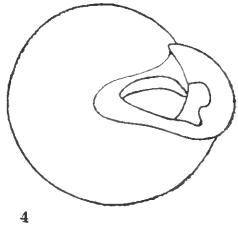

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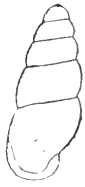

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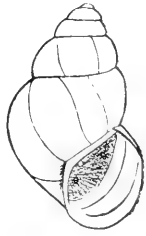

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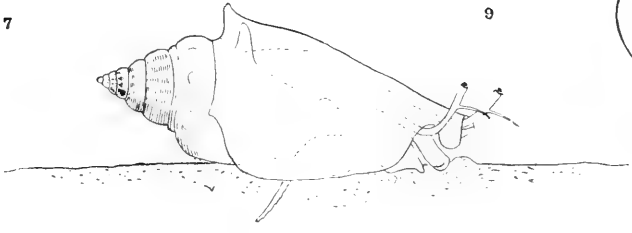

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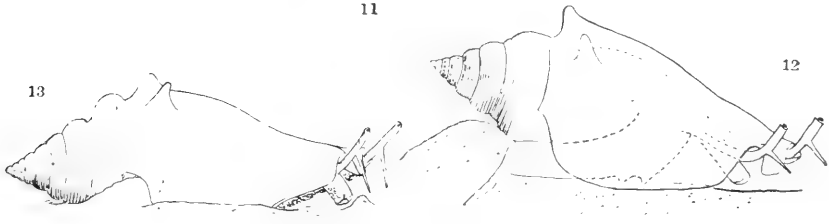

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CLAPP: NEW ALABAMA MOLLUSKS.
COLTON: STROMBUS PUGILIS.

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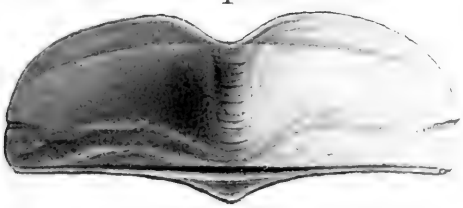

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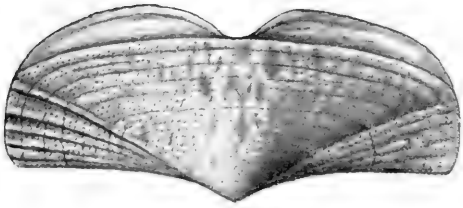

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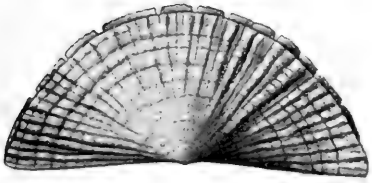

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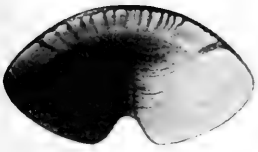

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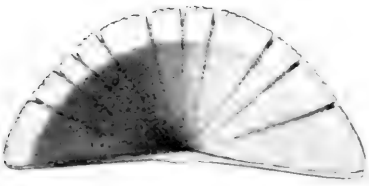

DALL: TONICELLA BLANEYI.

THE NAUTILUS.

VOL. XIX. DECEMBER, 1905. No. 8.

SOME NOTES ON LIVING STROMBUS PUGILIS.

BY HAROLD SELLERS COLTON.

In the latter part of January a severe norther cast many individuals of *Strombus pugilis* upon the beach of Sand Key near Clearwater Harbor, Florida. I sent many north to Dr. Burnett Smith, of the University of Pennsylvania, who had intended to determine if there was a case of sexual dimorphism in this species. Circumstances preventing him from touching the material for the present, he persuaded me to work upon it. The results of my measurements were published in the March NAUTILUS. As the natural history of the Mollusca is so little known, I hope a few notes of my observations will not be out of place.

Strombus pugilis is very hardy and easily transported. I expressed alive twenty-five individuals in a starch box. Each one I wrapped in dry newspaper; two weeks afterward, and a week and a half after they had rested in a warm room, a number were yet alive and none had as yet begun to decompose. Another lot I packed in damp seaweed and four days afterward I unpacked them and placed them in an aquarium in Philadelphia. They started to crawl about at once. When I left Philadelphia in the early part of June one was yet alive. Several were killed by the starfish and the others lived for four months and then died from unknown causes.

I had occasion to break open a number of the shells with a hammer in order to remove the soft parts for anatomical purposes. This I found a very difficult task. The shell is so resisting that many blows in the same place were required to make even a small hole. This

great strength of shell shows how well they are protected to withstand the surf of the exposed beach.

On such a beach *Strombus pugilis* is the most common visible Gasteropod in the winter. Others may be abundant at other seasons of the year. I found none alive nor did I find a dead shell within the still waters of Clearwater Harbor, although the flats and bottom were composed of sand as is the outside beach; and a series of extremely low tides allowed me to traverse miles of bottom not ordinarily exposed at low tide. Since they are cast up by the surf in large numbers in a storm they must be abundant just beyond the breaker line.

Within the mantle cavity I found a species of oyster crab that Miss Rathbun has given the name of *Pinnotheres strombi*. A commensal of this sort I believe is unique in a Gasteropod shell.

Every collection of tropical marine shells contains the shells of Strombus. The bright colors exhibited by most of the species are perhaps its chief attraction. Its activity when alive is noted all through the literature. Not alone are its movements described but pages are covered with beautiful colored drawings of the animal. Most of the activities have been described from animals under abnormal conditions, and the drawings made from animals out of the water. Nowhere can I find a sketch nor a description of the animal in a living attitude.

Locomotion in Strombus and its allies is peculiar. This is due to the structure of the foot. The operculum has changed from an organ of protection to one of locomotion. Situated as in most Gasterpods on the dorsal surface of the metapodium, it is peculiar because it is joined to the foot by about one-third of its surface. The two-thirds free extends downward and in a posterior direction, with its slender point turned toward the left side. The propodium and mesopodium compose one-sixth the ventral surface of the foot, the rest is metapodium.

I quote from the voyage of the "Astrolabe:" "Le form particulier de leur pied ne permet pas de marcher comme les Gasteropodes. Ne pouvent pas ramper ils sautent en prenant un point fixè sur le sol à l'aide de leur opercule." Adams in the voyage of the "Samarang" describes their method of locomotion as rolling over and over. Both of these observations are founded on fact; the former was observed in the water and the latter on land.

By placing them very close to the glass of the aquarium I was able to observe their movements with some detail. When preparing to move they extend their propodium in an anterior direction, at the same time contracting their metapodium (Plate III, fig. 11). They bend the anterior end of their propodium down into the sand, and as the natural position of the operculum is downward and backward at an angle, when the metapodium is thrust out, the operculum sinks into the sand. With the propodium and operculum as anchors the heavy shell is slid forward (Plate III, fig. 12). Sometimes I have seen them project the end of their metapodium out as far as the tip of the spire. The movement is about an inch and a half per step. The track is represented by a series of little ridges. There is a depression on the edge of the lip of the aperture that would on a superficial examination seem to correspond to the anterior siphon canal that is found in many Gasteropods. Through this groove the right eye-stalk protrudes, and the left eye-stalk comes through the true groove of the anterior siphon canal, although no fold of the mantle extends beyond the interior of the shell. (Plate III, fig. 13.)

The sight of this mollusk is remarked on in almost every account of it. It was my own experience that they would draw within their shell whenever I came within four feet of the aquarium. They also react to a jar. They react definitely when a solid object is passed between them and the source of light. Just how keen their sight really is I was unable to determine.

All the time I had them in the aquarium I never succeeded in getting one to eat. I tried fresh oyster meat and oysters that were opened and placed in salt water for two or three days. I also tried raw beef. It is described as a "buzzard among mollusks," but I was not able to observe it feed. When crawling in the sand it swings its proboscis from side to side like an elephant, sometimes dipping the tip into the sand and working its powerful radula. But I could never observe the presence of food of any kind. In the four months I had them in captivity they did not seem to waste away appreciably.

Strombus is a very interesting mollusk, and would repay study in several fields. Its hardiness assures its easy transportation, and it will live months in confinement. Its eye is wonderfully well adapted to study the histology of the Gasteropod eye, as it can be preserved without distortion. The large size, abundance and bright colors of the shell make it a conspicuous object on the beach.

LITERATURE.

Adams. Voyage of the Samarang.

Arnold, 1901. Sea Beach at Ebb Tide, p. 375.

Colton, 1905. NAUTILUS, April, vol. xviii, p. 138. Sexual Dimorphism in Strombus pugilis Linné.

Fluck, 1905. NAUTILUS, July, vol. xix, p. 32. Shell-Collecting on the Mosquito Coast of Nicaragua.

Quay and Gamard, 1834. Voyage de l'Astrolabe, vol. iii, p. 55–60.

Rathbun, 1905. Proc. Acad. Nat. Sci., Phila., vol. lvii, part ii, p. 371. Description of a New Species of Commensal Crab.

Souleyet, 1852. Voyage de la Bonite, vol. xii, p. 164.

A NEW CHITON FROM THE NEW ENGLAND COAST.

BY WILLIAM HEALEY DALL.

Mr. Dwight Blaney of Boston, while dredging in twenty fathoms off Ironbound Island on the Maine coast, was fortunate enough to discover a species of Chiton which, after comparison with Northeast American and North European species, appears to be new.

Seven species of Chitonidæ are known from the coast of New England in less than 100 fathoms. All these have been known for many years. One Arctic species is reported from the Gulf of St. Lawrence and may reach the Maine coast. Besides these there are two species known only from abyssal water in the North Atlantic, not from the coast and not properly belonging to the New England fauna. It is therefore a matter of more than common interest to have a new species discovered, and, because the circulation of the Proceedings of the Biological Society of Washington may probably not reach the mass of malacologists, it was thought desirable to reprint the diagnosis here and add to it a careful illustration of the type.

TONICELLA BLANEYI Dall. Plate IV. Proc. Biol. Soc. Wash., xviii, 1905, pp. 203–4, Sept. 2, 1905.

Shell of a deep rose-color, with fine white lineations and reticular markings; girdle brown, apparently naked, but exhibiting under high magnification a microscopic granulation with a row of small spinules at the extreme edge, as in *T. marmorea;* the coloration of

the valves outside, in the type specimen, is fairly uniform but probably more or less variable among individuals; the valves inside are of a deep rose-pink, paler toward the edges; surface minutely more or less quincuncially punctate, but this is visible only when magnified; the sculpture consists of (on the midvalves usually three) radial riblets with a tendency to bifurcate or break up into segments distally; there are no distinctly marked areas on the midvalves, but the part of the valves which bears what in many chitons are called the lateral areas, in this species carries two or three, sometimes bifurcate, thread-like ribs which are flattened above and rarely reach the mucro of the valve, being usually evanescent dorsally; there are also more or less deeply impressed lines of growth; the median part of the valves is nearly smooth except for the microscopic punctation; anterior valve semicircular, with numerous, more or less irregular, radial riblets that resemble those on the midvalves; the eaves are conspicuously spongy; the insertion plates are blunt, crenulate at the edge, but not radially striate; the anterior valve in the type has 10, but would seem normally to have either 9 or 11 slits, as one seems missing or in excess, on one side; the midvalves have one slit on each side, their anterior lamellæ are nearly continuous across the dorsal sinus; the posterior valve is small, without a mucro, the incremental lines strong, the ribbing obsolete or nearly so; in the type, while there is not a posterior sinus like that of *Chætopleura*, there is a certain flattening and the insertion plates bordering this part of the valve are poorly developed; there are 7–9 slits between which the distal edges of the plates are more or less irregularly crenate; in the dried specimen the muzzle has a prominent "veil" or tegumentary margin; the ctenidia number about 15 on each side and extend forward on each side of the foot to the fourth valve; length over all (dry), 13mm.; width, 8 mm.; dorsal angle, 120°.

Dredged in 20 fathoms off Ironbound Island, Frenchman's Bay, near Mt. Desert Island, Maine.

From *Trachydermon ruber*, *Tonicella marmorea*, and similar species, this form can be at once distinguished by the ribbing. If the type specimen be characteristic in its color, the pattern and hue would be equally distinctive. In *T. ruber* the girdle is pubescent and parti-colored; in *T. marmorea* and the present species it is of a uniform brown. The type specimen has been generously donated to the U. S. National Museum.

The species seems somewhat intermediate between *Tonicella* and *Trachydermon*, with a leaning toward the former, while it seems to be most nearly related specifically to *Tonicella marmorea* of Fabricus.

Explanation of Plate IV.

Fig. 1. Middle valve, interior, from below; 2. The same valve from above; 3. Front valve from above; 6. The same valve from below; 4. The tail valve from above; 5. The same valve from below; owing to the spongy condition of the margin the artist has slightly exaggerated some of the vertical striæ so that they are liable to be taken for true notches, the number of which is as stated in the diagnosis above. All the figures are considerably magnified, and to a uniform scale.

A NEW BRACKISH-WATER SNAIL FROM NEW ENGLAND.

BY HENRY A. PILSBRY.

Mr. Owen Bryant collected at Cohasset, Massachusetts, the past summer, specimens of an Amnicoloid snail which appears to be undescribed. It was found living in company with *Paludestrina minuta* (*Rissoa minuta* of authors) and *Odostomia impressa*.

Paludestrina salsa n. sp. Pl. III, fig. 10.

Shell very thin, perforate, oblong-conic, about the shape of *Amnicola lustrica;* corneous-gray or a little greenish; the surface having the luster of a dull silk, very finely striatulate, weakly decussated with faint spiral striæ.

Whorls $5\frac{1}{2}$, moderately convex, with the suture impressed but not so deep as is usual in *Amnicola* or *Paludestrina*. Aperture ovate, a little less than half as long as the shell, subvertical. Peristome thin and sharp, a little sinuous, the outer lip being somewhat retracted below its upper insertion; columellar margin concave, thin; the inner margin adnate, thin and straightened for a short distance near the upper angle of the aperture. Length 3.1, diam. 2, length of aperture 1.5 mm.

Cohasset, Mass. Cotypes in collections of the A. N. S. Phila. (no. 90445), Boston Society of Natural History, and Owen Bryant.

Compared with the common *P. minuta* (Totten), this new species differs in its more broadly conic shape, less deep sutures and larger

last whorl and aperture. Moreover, the apex, in all the specimens seen, is perfect, while *P. minuta* is almost invariably eroded above, several whorls being lost from the tip in adult specimens.

CARYCHIUM NANNODES N. SP.

BY GEO. H. CLAPP.

In shape this species (Plate III, figs. 7, 8, 9) resembles *C. exile*, being long and slender, but differs in being absolutely smooth, *without any trace of growth lines*, even when magnified 60 diameters; under high magnification the surface shows a faint granulation; color waxy-white, transparent, the columellar fold showing distinctly through the shell; whorls about $4\frac{1}{2}$, regularly tapering from the body-whorl to the apex; sutures deep, whorls slightly shouldered; lip wide and well reflected especially at the columella where it forms a distinct umbilical chink, outer curve of lip decidedly flattened, hardly thickened within; viewed from the back the lip is more squared below than in *exile* and *exiguum;* upper columellar fold of good size, lower one almost obsolete.

Length 1.4, diameter 0.5 mm.

Collected by Herbert H. Smith on Monte Sano, about 5 miles east of Huntsville, Ala. "Abundant among leaves in a shady ditch in damp forest near the top." (H. H. S.) Altitude about 1600 ft.

Types No. 5401 of my collection and cotypes in collections of Acad. Nat. Sci., Bryant Walker and T. H. Aldrich.

This is a most distinct species, as its size alone at once separates it from all of the other American representatives of the genus.

With this species Mr. Smith also found some *C. exile*, which agree with the northern shells, except that they are more coarsely ribbed. They are beautiful shells under the microscope.

IS COCHLIOPA ROWELLI A CALIFORNIAN SHELL?

BY H. A. PILSBRY.

Cochliopa rowelli is a small, solid umbilicate snail, somewhat heliciform or *Valvata*-shaped, and with an operculum like *Fluminicola* or *Amnicola*. It was described by Tryon from specimens received

from Gabb, who stated that Mr. J. Rowell, well known as a conchologist, found them in Clear Lake, California. Specimens are in the collections of the Academy of Natural Sciences and the Smithsonian Institution labeled as from this place; and Binney (Land and Freshwater Shells of N. A., part iii, p. 73) gives no other information. So far as I know, no other writer on Californian shells has noticed the species. Its status as a member of our fauna has rested for forty years only upon the information given by Gabb.

In the collection of the Academy there are also specimens of the same species from *Panama*, received from the late Dr. Wesley Newcomb. The other described species of the genus *Cochliopa*, some four in number, are from Central America.

As the occurrence of the genus in California waters is a matter of some importance from a zoögeographic standpoint, we would ask all collectors in Central California to give what information they can upon it, whether relating to the original finding of the snail or to its present distribution. The experience of any who have collected in Clear Lake will be of interest, whether the species in question has been found or not.

PUBLICATIONS RECEIVED.

Shells of Portland and Vicinity.—This is the title of an article by J. W. Mighels, which appeared in the Portland Tribune, 1841, page 64. The exact date of publication is not given on the clipping, which was found by Mr. Owen Bryant in an old book purchased in Boston. It probably represents the first catalogue ever published of the shells of Maine. A few remarks commending the study of conchology, and soliciting exchanges, is followed by a list, without notes, containing about 154 species, exclusive of the barnacles, etc., arranged according to the Lamarckian system. C. W. J.

The Oyster.—A popular summary of a scientific study. By Wm. K. Brooks, Ph. D. (The John Hopkins Press, Baltimore.) One of the most interesting and readable books pertaining to the mollusca that has ever been published. It points out clearly the possibilities of oyster culture, the anatomy and development of the oyster; artificial cultivation; the cause of the decline of the oyster industry and the remedy. C. W. J.

Land and Fresh-Water Mollusks of Alaska and Adjoining Regions. By William H. Dall (vol. xiii of the Harriman Alaska Expedition. The scope of this handsomely printed volume of 171 + xii pp. is as follows: "The first object of this work is to sum up the known molluscan fauna of the land and fresh waters of Alaska. This has involved an examination not only of the species obtained within the political boundaries of Alaska, but also those of the adjacent regions to the west, east and south. The result is that, for North America north of latitude 49° north, the work includes a summary of our present knowledge of the mollusks, deduced in part from the literature and in larger part from material actually examined. To this is added a briefer examination of the mollusk fauna of the adjacent parts of eastern Siberia, which has to some extent modified that of Alaska."

Four faunas are recognized as influencing the Alaskan non-marine mollusks: that of northern Canada, that of the northern Pacific States of the U. S., and in a much less degree the fauna of northeastern Asia, and the Holarctic group of mollusks common to all northern regions. From all sources, 65 species of land and freshwater mollusks are known from within the boundaries of Alaska. In the list of species, references are restricted to original descriptions and records of occurrence in the boreal region. Most of the species are illustrated by text figures from the works of Binney and Prime, a feature largely adding to the usefulness and attractiveness of the work. Besides records from the literature, a great mass of new data is presented. Frequently vast areas are added to the known distribution of our species, supplying numerous localities where before only isolated or frequently doubtful records existed. The amount of new information is so great that no attempt to condense it here would be satisfactory. A few interesting points about particular species may be mentioned. *Epiphragmophora fidelis* and *Polygyra columbiana* are the only large Helices which actually reach Alaska, though a good many others are recorded from north of 49°. The figure of *P. monodon* (p. 26) represents *P. m. fraterna*. It is reported from Moose Factory, James Bay. *Vertigo arctica* Wallenb. is given as from Port Clarence, collected by the Vega Expedition, and *V. krauseana* Reinh. from Chilkat Inlet, Alaska. The name *Vitrea radiatula* Alder is preferred for *V. hammonis*, and many Alaskan localities are given. An addition to the American fauna is

Vitrea nitidula Drap., from Fort Resolution, Great Slave Lake. The name *Euconulus trochiformis* Montagu is used in place of *E. fulvus* Müll., in my opinion improperly. The unusual distribution of *Succinea grosvenori* Lea, from Louisiana to Fort Simpson on the upper Mackenzie, is noticed. I was also impressed with the disregard of this snail for altitude or latitude some time ago, when studying the Texan forms, yet could find no character in the shells to separate southern from northern individuals. *Succinea chrysis*, "the commonest and largest land shell of the boreal American region," is reported from many places from the Mackenzie river west. A synonym which Dr. Dall seems to have overlooked is *S. rotundata* Sowerby, Conch. Icon. xviii, pl. 11, f. 78 (1872). This name would have precedence if it were not preoccupied.

In the Lymnæidæ an interesting and valuable discussion of the generic and subgeneric synonymy of the groups is given. No attempt is made to distinguish the races of *L. stagnalis*, of which several have in recent years been brought into use by some of our students. *Lymnæa atkaensis* Dall, from Atka, Aleutian chain, is figured. The name of this species was given as *atkinensis* by Clessin in the *Conchylien Cabinet*, p. 390. The difficult group of *L. mighelsi*, *emarginata*, *binneyi*, *randolphi*, etc., is discussed at some length; and the synonymy given will prove interesting to those who have worked with these perplexing forms.

The generic and subgeneric synonymy of *Planorbis* is discussed at length, and long-needed rectifications in the nomenclature are made. Say's original spelling of *P. exacuous* is restored in place of the emended form *exacutus*. *Planorbis opercularis* Gld. includes as varieties *planulatus* Coop., *centervillensis* Tryon and *oregonensis* Van. *Planorbis nathorsti* Westerl., described from Greenland, is recognized from Labrador. A new section, *Haldemanina*, is proposed for *Segmentina wheatleyi* Lea.

In the *Unionidæ*, the northwestern *Margaritana margaritifera* is recognized as var. *falcata* Gld. It differs from the typical form by the purple nacre. It has invaded the head-waters of the Missouri in Montana, and occurs also in Alaska. The new species and varieties are as follows, most of them are illustrated on two handsome heliotype plates:

Polygyra germana var. *megasoma*. "More than four times the size of the typical *germana*, but otherwise quite similar. Northern California" (p. 26).

Circinoria vancouverensis var. *chocolata.* "A variety of a dark chocolate-brown color, otherwise like the ordinary form, was found rather commonly at Sitka."

Vitrina alaskana Dall, new name for *V. pfeifferi* Newc., "not *V. pfeifferi* Deshayes in Fér. Limaçons, 1822." I have been unable to trace any *V. pfeifferi* in Férussac's work which is cited without page reference as above. *Vitrina* is not recognized as a genus in that work, which so far as I recollect was published before Deshayes had begun publishing on land shells. It would be well to await fuller data proving preoccupation before rejecting Newcomb's well-known name for this species.

Oreohelix strigosa var. *stantoni.* Dwarfed, measuring in maximum diam. 10, min. 8.5, height 8 mm., with about 5 whorls, umbilicus 1 mm. Assiniboia, 33 miles s.-e. of Medicine Hat., near top of Cypress Hills, alt. 4700 ft.

Lymnæa petersi Dall. Koyukuk River, north of the Yukon, in Alaska. A delicate species of the typical group of Lymnæa, 16 mm. long.

Lymnæa (*binneyi* var.?) *preblei* Dall. A large and peculiar form from Manitoba and Keewatin, 37–38 mm. long.

Lymnæa perpolita Dall. A small, dark, smooth and polished form from Nushagak, Bristol Bay, Alaska.

Lymnæa anticostiana Dall. Pleistocene marl of Marl Lake, Anticosti Island.

Planorbis campanulatus var. *rudentis* Dall. Wider and flatter than the type. Knee Lake, Keewatin.

P. exacuous var. *megas* Dall. Whitish, and larger than the typical form. Manitoba.

Segmentina (*Planorbula*) *christyi* Dall. Manitoba. Larger, flatter and more sharply sculptured than *S. armigera* Say.

Valvata (*sincera* var.?) *nylanderi* Dall. Aroostook Co., Maine.

Valvata lewisi var. *helicoidea* Dall. With typical *lewisi* especially northwestward. More depressed, with the last half whorl more peripherally diverted.

The work will take a place hitherto unfilled in America, that of a standard fauna of the region north of the United States boundary. It is a pleasure to add that the mechanical execution, paper, typography and press-work, are worthy of the subject-matter, and are a credit to the publishers, Messrs. Doubleday, Page & Co.

H. A. P.

NOTES.

Achatina gracilior Boettger.—This fine species described from Camroon in the Nachrichtsblatt for this year, p. 167, pl. 7, f. 1, 2 (issued about Nov. 1, 1905), seems to be quite identical with *A. papyracea* var. *adelinæ* Pils., Manual of Conchology, part 67, p. 118, pl. 20, f. 4, 5 (issued March 1, 1905).

Physa rhomboidea.—The name *Physa rhomboidea* was originally applied by Meek and Hayden (Proc. Acad. Nat. Sci. Phila., 1856) to a Cretaceous fossil. Hence *P. rhymboidea* Crandall becomes a homonym. It does not seem necessary to propose a new name since Miss Springer's recent paper in Proc. Acad. Nat. Sci. Phila., (1902 p. 513) indicates that it is not essentially different from *P. humerosa*. —T. D. A. Cockerell.

November snails.—At noon of Nov. 21, I was out for an hour, to look after some mollusks, along a dry, gravelly bank exposed to the sun nearly all day, during summer. A few trees, shrubs and herbage were shading part of it. We had had severe frosts night after night, and the soil was usually frozen till late in the forenoon. Under boards, bricks and stones, the following mollusks were found apparently none the worse from being frozen in most of the time.

Agriolimax campestris Say, several hundred specimens, some of them only half grown, others young, only a few millimeters long; newly laid ova were found, and one containing a nearly mature embryo. Two specimens were seen in the characteristic attitude ready for copulation. Freshly deposited ova have also been found in the earliest spring days, some years ago.

Zonitoides arboreus Say, common.

Patula striatella Anth., common, more at shaded places. *Vallonia* about 40 specimens, 33 of which were *costata* Müll., 5 *pulchella* Müll. and 2 *excentrica* St. In general *V. pulchella*, and also *excentrica* are found in comparatively larger numbers, or exclusively in more shaded and damp localities.

Bifidaria armifera Say, several under a tree; but often it is found at exposed dry localities.

Succinea avara Say, common.

Succinea aetusa Lea, one specimen, nearly full grown, another rather small.— V. Sterki.


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The Nautilus.

Vol. XIX. JANUARY, 1906. No. 9.

NEW AND LITTLE KNOWN SPECIES OF AMNICOLIDAE.

BY BRYANT WALKER.

Most of the following species were found by Mr. A. A. Hinkley of Du Bois, Illinois, while on a collecting trip through Tennessee, Mississippi and Alabama, in the fall of 1904. A few others received from different sources have also been included.

SOMATOGYRUS SUBSTRIATUS, n. sp. Pl. 5, fig. 1.

Shell subglobose, imperforate, shining, light greenish-yellow, lightly but distinctly striate, spire somewhat elevated, apex obtuse. Whorls 4–4½, those of the spire prominent and roundly shouldered; body-whorl large and well rounded; suture deeply impressed. Aperture large, quite oblique, suborbicular, slightly emarginate at the base and somewhat roundly projecting at the juncture of the lip with the base of the columella; lip thin, projecting above and drawn back below. Slightly thickened within. Columella rather narrow, with a heavy rounded callous, which is thinner on the body-whorl and separated below by a narrow axial groove.

Alt. (apex eroded) 6, diam. 4 mm.

Types (No. 22370 Coll. Walker) from the Tennessee River at Florence, Ala. Also Tombigbee River at Columbus, Miss. Cotypes in the collections of the Academy of Natural Sciences and A. A. Hinkley.

This is one of the largest species of the genus, being exceeded in size only by *S. subglobosus*. It is a well marked form, very much like a small *Fluminicola nuttalliana* Lea, in appearance, and is easily

distinguished by its size, elevation of spire and striate surface. It occurred in considerable abundance at both localities.

SOMATOGYRUS HUMEROSUS, n. sp. Pl. 5, fig. 2.

Shell small, subglobular, imperforate, pale-green, smooth, shining; spire prominent, short, sub-conic with a small, obtuse apex. Whorls $3\frac{1}{2}$, roundly shouldered above and flattened toward the suture, body inflated, somewhat flattened on the periphery and at the base; suture deeply impressed. Aperture large, subcircular, slightly emarginate below. Lip thickened throughout, the callus rounding out to a sharp edge. Columella concave, with a heavy, flat callus which extends from one extremity of the lip to the other, and entirely covers the umbilicus.

Alt. 4, diam. 3.75 mm.

Types (No. 22372 Coll. Walker) from the Tennessee River at Florence, Ala. Cotypes in the collection of the Academy of Natural Sciences and A. A. Hinkley.

The only species to which this can be compared is the *S. crassus* from the Coosa. It differs, however, in being less solid and more globular, in the heavily shouldered whorls and the flattening of the periphery and base.

SOMATOGYRUS QUADRATUS, n. sp. Pl. 5, figs. 3 and 4.

Shell subglobose, turbinate, imperforate, thick, solid, greenish-yellow, smooth, except for fine lines of growth. Spire elevated, obtuse, whorls $3\frac{1}{2}$, strongly and roundly shouldered, flattened above and on the sides; body-whorl large, quadrate, sometimes somewhat swollen above. Aperture rounded but not expanded. Columella with a very heavy, rather narrow, flattened callus which extends over the parietal wall and is separated below the axis from the body-whorl by a deep axial groove. Lip sharp, heavily thickened within; its insertion on the parietal wall is below the periphery.

Alt. (fig. 3, apex eroded) 4, diam. 3 mm.

Alt. (fig. 4, apex eroded) 4.25, diam. 3.5 mm.

Types (No. 22373 Coll. Walker) from the Tennessee River, Florence, Ala. Also Shoal Creek at the same place. Cotypes in the collections of the Academy of Natural Sciences and A. A. Hinkley.

This species is closely allied to *S. georgianus*, but differs uniformly in being smaller and imperforate, in the flattened, heavily-shouldered whorls and smaller aperture. As shown by the figures there is con-

siderable variation in the shape, some examples being almost subcylindrical, while others are more inflated toward the shoulder. This is perhaps a sexual difference, and has been noticed in one or two other species.

SOMATOGYRUS STRENGI Pilsbry and Walker, n. sp. Pl. 5, fig. 5.

Shell small, globose, umbilicate, pale green, smooth, with very fine lines of growth. Spire short, depressed, flattened at the apex. Whorls 3, convex, slightly flattened toward the suture, which is well impressed; body-whorl large, inflated. Aperture broadly ovate, angled above and rounded below. Lip sharp, somewhat roundly expanded at its juncture with the base of the columella. Columella concave, narrow; columellar callus flattened, extending over the parietal wall, separated below by a well-defined axial groove.

Alt. 3, diam. 3 mm.

Types (No. 22374 Coll. Walker) from the Tennessee River, Florence, Ala. Also Shoal Creek at the same place and Bridgeport, Ala. Cotypes in the collections of the Academy of Natural Sciences and A. A. Hinkley. This very distinct little species was found in considerable abundance at both localities at Florence. It is the Tennessean analogue of the Coosan *S. umbilicatus*, but differs in the depressed spire, more inflated form, flattened columella and axial groove.

A single immature example of this species from Bridgeport, Ala., received from Mr. L. H. Streng, of Grand Rapids, Mich., has been in the collection of the Academy for several years, but has been withheld from publication until further material could be had. Dr. Pilsbry and myself unite in naming this interesting form after Mr. Streng, who for more than fifty years has been actively interested in conchology, and who is the last survivor of the group of collectors that for many years made Grand Rapids the scientific centre of the State.

SOMATOGYRUS BIANGULATUS, n. sp. Pl. 5, fig. 6.

Shell small, obtusely-conic, turbiniform, umbilicate, light greenish-yellow, smooth, lines of growth very fine, spire elevated, flattened at the apex. Whorls $3\frac{1}{2}$, regularly increasing, angularly shouldered above, flattened above and below the shoulder; body-whorl moderately large, biangulate, shoulder flattened, sloping obliquely from the

suture to the superior angle, which is quite obtuse, periphery carinate, the whorl being almost straight between the two angles, obliquely flattened below. Aperture moderate, subcircular; slightly modified by the angle of the body-whorl, and slightly expanded at its juncture with the columella. Columella very narrow, rounded; columellar callus not very heavy, thin and transparent on the parietal wall.

Alt. 3, diam. 2.75 mm.

Tennessee River, Florence, Ala. Types (No. 22376 Coll. Walker). Cotypes in collection of A. A. Hinkley.

Only two specimens of this remarkable little species were found. But it is so entirely distinct from all the known species that I have no hesitation in describing it. With the exception of *S. aldrichi*, herein described, it is the only carinate species known.

SOMATOGYRUS EXCAVATUS, n. sp. Pl. 5, fig. 7.

Shell small, globosely-conic, imperforate, rather thick, solid, pale green, smooth, lines of growth very fine. Spire short, conic, obtuse; whorls $3\frac{1}{2}$; those of the spire convex, with a well-impressed suture; body-whorl rather inflated, convexly rounded. Aperture subcircular, slightly angled above and broadly rounded below. Columella very concave, with a moderately wide, heavy, flat callus, which extends over the parietal wall, and below the axis is separated by a wide axial groove. Lip simple, but thickened within and somewhat emarginate below.

Alt. $3\frac{1}{2}$, diam. 3 mm.

Shoal Creek, Florence, Ala. Types (No. 22378 Coll. Walker). Cotypes in the collections of the Academy of Natural Sciences and A. A. Hinkley. A solid little species, distinguished by its globosely conic shape, thickened lip and axial groove.

(*To be continued.*)

A NEW TERTIARY PLANORBIS.

BY T. D. A. COCKERELL.

PLANORBIS FLORISSANTENSIS, n. sp.

Diameter about $2\frac{2}{3}$ mm., flattish, with about $4\frac{1}{4}$ slightly convex whorls, the last rapidly enlarging, much in the manner of *P. albus*,

Müller; color very pale; sculpture weak, consisting of fine lines of growth crossing the whorls somewhat obliquely, the more distinct ones on the last whorl occurring at rather regular intervals, some 55 micromillemeters apart. Diameter of last whorl about three times that of penultimate ones.

Hab.—Oligocene beds at Florissant, Colorado, collected by Judge J. Henderson and Dr. F. Ramalley, of the University of Colorado, 1905. The exact locality is southwest of Florissant, in plant-bearing beds, containing among other things *Planera longifolia*, Lx. On the same slab as the *Planorbis* is a small *Sphaerium*, badly crushed and broken. The *Planorbis* is not very well preserved, but I believe that it will be readily recognized from the above description. Of the species belonging to the same geological period, it is most like *P. æqualis* White, from Wyoming; but that species appears to be more convex, and, with the same number of whorls, is at least twice as large. I take it that *P. florissantensis* is a *Gyraulus*, which *P. æqualis* does not seem to be. It is rather curious that several of the fossil species of *Planorbis* found in America remind one rather of European forms, than of those living in this country to-day.* Possibly the dominant *Planorbis* of modern America may represent in part an invasion from the south, which has displaced some of the older types.

Scudder (Tertiary Insects of N. America, p. 31), mentions a *Planorbis* from Florissant, probably the species now described.

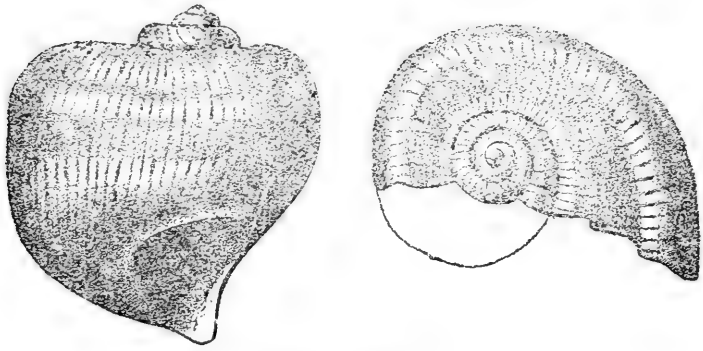
AN ORDOVICIAN GASTROPOD RETAINING COLOR MARKINGS.

BY PERCY E. RAYMOND.

While examining some small fossils collected in the Chazy, (lower Ordovician), limestone at Valcour Island, New York, the writer was surprised to find two small specimens of *Straparollina harpa* Hudson, which retain with remarkable distinctness the lines of color markings and possibly some trace of the original colors. The specimens are very small, the larger being less than one quarter of an inch in diameter. The body color of the shells is a light yellow, which is the prevailing color of the fossils in the particular stratum from which these specimens were taken. Around the top of the body-whorl, ad-

* Thus, *P. cirratus* White is extremely suggestive of *P. vortex* and *P. spirorbis;* other species recall *P. contortus.*

joining the suture, is a narrow, brownish gray band. Below it is a band of the yellow body color, and then, about the middle of the whorl, another brownish-gray band, more deeply colored than the one on the top of the whorl. Below this principal band is another light yellow band, and adjoining the umbilicus, the color is orange. The position of these bands is shown on the accompanying figures.



Straparollina harpa Hudson, × 10.

The yellow color is undoubtedly due to the iron of the decomposed limestone from which the fossils were obtained, but the brown tints may give some hint of the original coloring of the revolving bands.

These are probably the oldest shells on which color markings have been observed, dating as they do, from Middle Chazy times, (*Maclurites magna* fauna). The oldest instances of color preservation previously recorded in America are those reported by Professor O. C. Marsh, and Dr. Theodore G. White. Professor Marsh described (Proc. Am. Assoc. Adv. Sci. xvi, p. 326, 1868) certain markings on the shell of a specimen of *Endoceras* (*Cameroceras*) *proteiforme* Hall from the Trenton formation in New York. Dr. White mentions (Trans. N. Y. Acad. Sci. vol. xv, p. 85, 1896) two specimens of *Holopea symmetrica* Hall from the Black River formation of the Rathbone Brook, N. Y., section, which preserved the original shell material, and one showed the iridescent lustre of pearl.

Quite a number of cases of color preservation have been recorded from the Devonian and Carboniferous, but examples from the older formations are exceedingly rare.

Carnegie Museum, Pittsburgh, Pa.

SHELLS OF PRINCE EDWARD ISLAND.

BY GEO. H. CHADWICK.

The following list has been compiled from data supplied by Mr. Charles Ives, of Miscouche, an intelligent resident student of the natural history of Prince Edward Island. The asterisk indicates that specimens have been examined by me.

* *Urosalpinx cinerea* Say. Northumberland Strait, deep water, quite rare, but large.

* *Purpura lapillus* Linn. Carleton Head, plentiful.

Nassa trivittata Say. Northumberland Strait, rocky bottom in deep water.

Ilyanassa obsoleta Say. Bedeque Bay, very abundant on mud flats.

* *Lunatia heros* Say. Bedeque Bay and Northumberland Strait, abundant.

* *Lunatia triseriata* Say. Bedeque Bay, common. (The fine suites of these two forms fully support Mr. Ives' contention that they are distinct, as maintained by many writers, notably Dr. Gould.) The dead shells of *Lunatia heros* usually contain * *Eupagurus acadianus* Benedict.

* *Crepidula fornicata* Say. Bedeque Bay, common.

* *Crepidula plana* Say. Bedeque Bay, common in Natica shells.

* *Turbonilla interrupta* Totten, var. *fulvocincta*, Jeffreys. Bedeque Bay, very rare.

Litorina littorea Linn. Bedeque Bay, very abundant.

Litorina palliata Say. Carleton Head, Northumberland Strait.

* *Tornatina canaliculata* Say. Bedeque Bay, not common.

Planorbis trivolvis Say. "Wright's mill-pond."

* *Ensis directus* Conrad. Everywhere plentiful in sandbanks and shoals.

* *Cyrtodaria siliqua* Spengler. Off Richmond Bay, common in codfish.

* *Mya arenaria* Linn. Bedeque Bay, abundant.

* *Pandora gouldiana* Dall. Bedeque and Richmond Bays, scarce.

* *Spisula solidissima* Dillw., var. *curta* Gould (?). Bedeque Bay, not very numerous; formerly abundant.

Venus mercenaria Linn. Bedeque and Richmond Bays, plentiful.

* *Petricola pholadiformis* Lamarck. Bedeque Bay, very rare.

* *Anodonta cataracta* Say. Brook south of Bedeque Bay, common

* *Anodonta marginata* Say. With preceding and at Barlows, common.

* *Mytilus edulis* Linn., var. Bedeque and Richmond Bays, on oyster beds.

Modiolus modiolus Linn. Northumberland Strait, rare and in deep water.

* *Modiolus demissus* Dillw., var. *plicatulus* Lam. Abundant in all salt-marshes.

Ostrea virginica Gmel. Bedeque and Richmond Bays, very abundant.

Pecten gibbus L., var. *borealis* Say. Richmond Bay and Northumberland Strait, not very abundant.

NOTE ON SOME FORGOTTEN MOLLUSK-NAMES.

BY WILLIAM H. DALL.

In preparing my report on the land and fresh-water mollusks of Alaska and adjoining regions for the Harriman Expedition series (now published), I searched the available literature for data on the nomenclature of *Planorbis*, and supposed I had gathered references to all names which had been applied to members of that group above the rank of species. A chance remark by von Martens caught my eye while searching the Malakozoölogische Blätter a few days ago for something else, and following up the clue, I came upon a group of names given by Benson in 1841, but not published until 1855, which do not occur in any nomenclator I have been able to examine. As it seems eminently desirable that such mavericks should be duly recorded, even when they do not supersede others more familiar, I take that duty upon myself.

In the Journal of the Asiatic Society of Bengal, volume xxiv, part 2, 1855, is published a report on the shells of Chusan which had been prepared in 1841, but never before put in type. It contains certain new generic names which have found their way into the nomenclators, viz., *Incilaria*, *Batillaria* and *Laguncula*. In addition to these there is a revision of the subdivisions of the genus *Planorbis*, to which I have never seen any reference, and von Martens seems to have been the only person who has ever cited any of the names there given, and he mentions only *Helicorbis*.

They are as follows: *Helicorbis* Benson, subgenus of *Planorbis*, to which are referred *Pl. nitidus* of Gray's Turton, *Pl. hemisphærula*, and *Pl. umbilicalis* Benson; this group is equivalent to *Hippeutis* Agassiz, 1837. *Trochorbis* Benson is based on *Pl. trochoides* Benson, which is a typical *Segmentina*, well figured by Hanley and Theobald in the Conchologia Indica, p. 18, pl. xxxix, figs. 4–6, 1876. As *Segmentina* dates from 1817, it follows that Benson's name is synonymous. Lastly *Omalodiscus* Benson is proposed ostensibly for the group called by Swainson *Spirorbis* (1840, not *Spirorbis* Daudin, *Vermes*, 1800), but the species mentioned under it belong respectively to *Tropidiscus* Stein, 1850, and *Gyraulus* Agassiz, 1837. If we regard the contents of the group as wrongfully referred to it and take the name merely as a substitution for the preoccupied *Spirorbis* (of which the type was *Pl. rotundatus* Poiret), it may be applied to a valid section of *Planorbis*, but if we regard the contents only, the name must be considered a synonym. Under *Helicorbis* the only species for which a figure is cited is *Pl. nitidus* of Gray's Turton (=*fontanus* Lightfoot) which was already the type of Agassiz's *Hippeutis*, 1837. The others also belong to *Hippeutis*, but approach more nearly in form to *Drepanotrema* Crosse and Fischer, 1880.

While referring to this paper of Benson's it may be mentioned that his genus *Laguncula*, which is described in it, and has been generally referred to the *Assimineidæ*, but I believe never figured, resembles a very young thin-shelled *Lanatia*, with a thin horny pauci-spiral operculum recalling that of *Chondropoma*. On the whole I suspect it more nearly approaches *Cremnoconchus* than *Assiminea*, and may eventually be referred to the *Litorinidæ*. It cannot properly be referred to the *Viviparidæ*, where it was placed by H. and A. Adams, and has none of the shell characters of *Assiminea*. The aperture, while slightly expanded, does not show, in specimens sent from China by Hungerford, anything which may be strictly termed a reflected peristome, and there is no thickened ledge inside the mouth or shelly deposit on the operculum.

SAMUEL HART WRIGHT.

We regret to announce the death of Dr. Samuel Hart Wright, father of Mr. Berlin H. Wright. Doctor Wright was born Febru

ary 18, 1825, and died at his home in Penn Yan, N. Y., October 7, 1905.

"At the age of twenty, while struggling to gain a livelihood from the soil, the subject of this sketch had the fires of educational enthusiasm lighted. Two carpenters employed on the farm carried books on astronomy and mathematics in their chests and brought them out nights for study and discussion. Participation in this evening and noon-hour work resulted in a fixed determination by the boy to possess books of this character and to master them. Books accompanied him into the field; when the horses were resting new problems were fixed in the mind and when following the horses the solutions were worked out mentally.

"When added responsibilities began with wife and family, increased effort was put forth and directed towards mathematical astronomy. In 1848 after three years of close application, the first set of astronomical tables was brought out, but no purchaser found. This was repeated for 1849 and again for 1850, when they were sold to the *New York Tribune*—the first 'Whig Almanac.' Thereafter the business increased. In 1876 his son, Berlin H. Wright succeeded to this business, and other branches of science claimed increased attention, especially microscopy. Meanwhile, he studied medicine and was a practitioner until 1870, when deafness came upon him.

"The study of botany was begun in 1856 and he became an authority in this branch, as the great herbarium he left testifies. During the last two decades, the study of pure mathematics claimed most of his time, though he did much in surveying. In pursuit of recreation, with his son and grandsons he became enthusiastic in geology and conchology.

"A large library of standard reference works along all these lines and in general literature was brought together. Among these he spent his last years and was happy."

Mr. Wright contributed a number of interesting articles on the Unionidæ of the Southern States, among which may be mentioned: "Notes upon the Unionidæ of Southern Florida," (*The Conchologist's Exchange*, vol. ii); "Unionidæ of Georgia, Alabama, South Carolina, and Louisiana in South Florida," (THE NAUTILUS, vol. iv), and "Contribution to the Knowledge of United States Unionidæ," (THE NAUTILUS, vols. x and xi). In the latter paper seven new species were described. C. W. J.

NOTES.

CANADIAN OYSTERS.—It is reported from Halifax that there is danger that the famous oyster-beds of Prince Edward Island, which supply the Malpeques, the great favorites in the leading Canadian markets, will be wholly exhausted in ten years at the present rate of fishing.

This is in part due to the fact that nearly all the Canadian oysters are shipped in the shell. In the United States the fishermen shell a great many of the oysters and return the shells to the beds, which is a distinct aid to propagation.

The Canadian government is exerting itself in restocking the oyster beds which, however, are being depleted rapidly.—*Boston Globe.*

PALUDESTRINA SALSA, Pils., described in the December NAUTILUS, occurs abundantly at Branford, Conn. At one locality, 3 miles from the Sound where a brook enters the marsh it occurs on stones and decaying vegetable matter. The form here is more slender than the type. Another locality reveals it in ditches in the marsh near the railroad. Here it is larger than the Cohasset form, and it occurs on the vegetation floating in the ditch.—HENRY W. WINKLEY.

NOTE ON VITRINA PFEIFFERI DESHAYES. This species is cited in Pfeiffer's Mon. Heliceorum Viventium, vol. iii, p. 7, 1853. I did not look it up further, but added the date, which Dr. Pilsbry's critical eye detected as improbable, under the impression that the citation referred to Ferussac's "Prodrome" of 1822. On a second inspection I suspect that Pfeiffer's "Fer. Lim." refers to the "Histoire des Moll. Terrestres," a work not accessible to me here, but to which Deshayes made contributions, 1839–41.* Deshayes gives exactly the same references as Pfeiffer, in his MS. catalogue of *Vitrina* in my possession, and as the name had entered into literature a second time, as early as 1853, there can be no doubt as to its being prior to Newcomb's *pfeifferi* of 1861.

I may add for the benefit of those who may like to make correc-

* The name *Vitrina pfeifferi* was proposed by Deshayes in Férussac's *Histoire*, ii, p. 96[24], 1851, in the text under *V. angularis*, for some figures in Férussac, plate 8 F, pp. 18–22, of a *Vitrina* supposed to be new, but which Deshayes had never seen. There is no statement of locality. It was omitted from the index of the work, and has not been recognized by any subsequent author. The figures look like almost any *Vitrina*.—ED.

tions in their private copies of the "Land and Fresh Water Mollusks of Alaska," that, since it was stereotyped, it has come to my knowledge that Benson proposed some new names for subdivisions of the genus *Planorbis* as early as 1855, which he seems afterward to have abandoned and which have not been included in the Nomenclators. They were published in the Journal of the Asiatic Society of Bengal, and two of them appear to be prior to names adopted by me in the work above cited. *Omolodiscus* Benson, will therefore take the place of *Paraspera* Dall (l. c., p. 82), and *Helicorbis* Benson, of *Drepanotrema* Crosse and Fischer, 1880.—Wm. H. Dall.

PUBLICATIONS RECEIVED.

Some West American Shells, including a new variety of *Corbula luteola* Cpr., and two new varieties of Gastropods. By Mrs. M. Burton Williamson. (Bull. of the South. Cal. Acad. of Sciences, Vol. iv, No. 8, p. 118.) This interesting paper adds several species to Prof. Keep's list, making the number of species to date from the West Coast 1,377. *Corbula luteola* var. *rosea*, *Drillia moesta* var. *maculata*, and *Calliostoma canaliculatum* var. *parvum*, are described as new.

On a Large Example of Megalatractus aruanus L. By Charles Hedley. (Records of the Australian Museum, Vol. vi, p. 98, pl. 21 and 22.) This large shell, which the author says "appears to be the largest recent Gastropod," has a weight of ten pounds twelve ounces, with a length of $22\frac{3}{4}$ inches, the loss of the styliform embryo, etc., curtailing its total length by $\frac{3}{4}$ of an inch. We beg to state that this Australian giant has a rival on our Florida coast, *Fasciolaria gigantea* Kiener. I have seen a living specimen of this shell measuring 23 inches in length. Mr. Chas. T. Simpson, in his "Contributions to the Mollusca of Florida" (Proc. Davenport Acad. Nat. Sci., v, 51), says: "On the Keys I have seen dead shells two feet in length. The largest Gastropod in the world." C. W. J.

Molluscs and Brachiopods of Ballynakill and Bofin Harbors, County Galway, and of the Deep Water off the West and Southwest Coasts of Ireland. By E. R. Sykes. (Ann. Rep. Fish., Ireland, 1902–03, Pl. ii, App. iii [1905].) An interesting faunal list, with copious notes on the various species.

THE NAUTILUS.

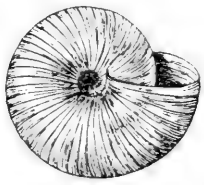
VOL. XIX. FEBRUARY, 1906. NO. 10.

VITREA RHOADSI AND SUCCINEA RETUSA MAGISTER.

BY HENRY A. PILSBRY.

Illustrations of the two species named below have recently been prepared for Mr. Bryant Walker's hand book of the Mollusca of Michigan. We are indebted to Mr. Walker for the use of these figures here, in advance of his own publication.

FIG. 1.



VITREA RHOADSI Pils. Fig. 1.

The figures represent one of the cotypes from White Pond, Warren Co., N. J. (NAUTILUS, xii, 101). Mr. Walker has extended the range by identifying the species from Michigan, Ontario, Virginia, and other places (NAUTILUS, xiv, 8). Specimens have been sent from Buckfield, Oxford Co., Maine, by Mr. John A. Allen.

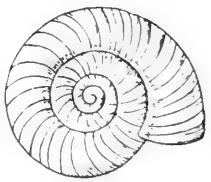
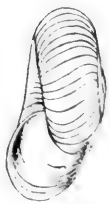


FIG. 2.

SUCCINEA RETUSA MAGISTER Pils. Fig. 2.

One of the cotypes from Rock Island, Ill., is here figured. This fine, large form attains the size of *S. concordialis*. The latter differs from it by having a very full, sack-like base. Described in NAUTILUS, xii, 103.



SHELL-BEARING MOLLUSCA OF FRENCHMAN'S BAY, MAINE.

BY DWIGHT BLANEY.

In addition to the one hundred and twenty-seven species and five varieties of Mollusca collected in Frenchman's Bay, Maine, by the writer during 1901–4 (a list of which was published in the Proceedings of the Boston Society of Natural History, vol. 32, no. 2, pp. 23–41, 1904), the following six species (one of which is new to science) and two varieties were added during the summer of 1905, making a total of one hundred and thirty-three (133 plus 7 varieties) species and seven varieties from this locality.

Astarte quadrans Gould.

One valve, identified by Dr. W. H. Dall, dredged off Great Head, Ironbound Island.

Astarte portlandica Mighels.

Many valves, and a few live specimens dredged off Heron Island on shelly bottom, 10 fath. From study of these specimens Dr. Dall writes us that he now thinks this "a good species as described by Mighels in 1843, provided a larger series of '*A. quadrans*' than I have been able to consult does not show gradations between the two species."

Cochlodesma leanum Couthouy.

Two valves dredged off Seal Cove, Ironbound Island, about 15 fath. This shell which is commonly found much further south will probably be found alive in the warmer waters up the bay.

Sipho stimpsoni Mörch, var. *liratulus* Verrill.

A few have been dredged the past few years at the same stations as the "*stimpsoni*," but were only lately identified for us by Prof. Verrill and Miss Bush. They were all young specimens.

Columbella (Astyris) *dissimilis* Stimpson.

Columbella zonalis Linsley.

Two specimens dredged off the Spar Landing, Ironbound Island, 15 fath., shelly bottom, October, 1905. One alive.

Crepidula fornicata (Linné).

Found on stones of Soward's Island at very low water. Verrill,

U. S. Fish Comm., p. 650, 1871–72, says: "Has not been found east of the Kennebec River, Maine.

Solariella obscura (Couth.), var. *bella* Verk.

Machaeroplax obscura var. *bella* Verrill, Trans. Conn. Acad. v, p. 531. A few dredged off Ironbound Island, and identified for us by Prof. Verrill and Miss Bush. "Variety '*bella*' is the predominant form at Eastport, Me., and in the Bay of Fundy."—Verrill, *op. cit.*

Tonicella blaneyi Dall.

For description see Pro. Biol. Soc., Wash., vol. xviii, p. 203, and NAUTILUS, vol. xix, no. 8, p. 88, pl. iv, 1905. Dredged near station 22, in about 20 fathoms.

The following species, whose occurrence in Frenchman's Bay was based on the finding of dead specimens or valves, have since been found alive:

Thracia truncata Mighels and Adams.

Pandora (*Clidiophora*) *gouldiana* Dall. Off Ryefield Point and Heron Island; 10 fathoms.

Ensis directus (Conrad). Off Ryefield Point, 10–15 fathoms; shelly mud. Our live specimens usually cut in two by the dredge.

Velutina zonata Gould. Off Ryefield Point, Aug., 1905.

Marsenina glabra (Couth.) Station 19, 20 fathoms. Verrill, *op. cit.*, p. 5, 7, says: "This species is not uncommon at Eastport, Me."

DESCRIPTION OF NEW SPECIES OF ACHATINELLIDAE FROM THE HAWAIIAN ISLANDS.

BY D. D. BALDWIN.

Partulina flemingi, n. sp.

Shell dextral, minutely perforated, somewhat solid, elongately conical, apex acute; surface shining, striated with delicate incremental striæ, and under a lens exhibiting very close delicate decussating spiral lines which extend almost to the apex. Color white or brownish-white, with two dark-brown bands, one bordering the suture, and one at the periphery continued on the spire just above the suture; in many examples the sutural band is absent. Whorls 6, narrowly

margined above, somewhat convex; suture moderately impressed. Aperture oblique, oval, white, the outside band visible within. Peristome acute, slightly thickened within, dark-brown, the columellar margin reflexed over the minute perforation. Columella terminating in a strong, plaited, pinkish-brown, projecting tooth.

Length, 19; diam., 9 mm.

Habitat, Nahiku, East Maui.

Animal when extended in motion as long as the shell. Mantle intensely black with a narrow white band encircling the outer edge. Foot above and below very light-brown, granulated above. Tentacles long and slender, slate color.

There occurs also a pure-white form of the shell without any bands.

We dedicate this shell to Mr. D. T. Fleming of Maui, to whom science is indebted for its discovery.

Partulina lemmoni, n. sp.

Shell sinistral, imperforate, solid, acuminately ovate conic, apex acute; surface shining, striated with fine growth-lines, and under a lens showing close, delicate, decussating spiral striæ; nuclear whorls smooth. Color white, variously striped with numerous dark-brown lines and bands, the constant ones being two broad bands, one encircling the base, and the other at the periphery, continued on the middle whorls above and below the suture, obsolete above; apex white. Whorls 7, narrowly margined above, convex; sutures deeply impressed. Aperture oblique, oval, white, exhibiting the outside coloring within. Peristome acute, thickened within, narrowly reflexed. Columella terminating in a long, flexuous, white plait.

Length, 23; diam., 11½ mm.

Habitat, Nahiku, East Maui.

Animal in motion as long as the shell. Mantle brownish-black, mottled with white streaks, with a broad yellowish-brown border somewhat interrupted. Foot above and below very light-brown. Tentacles slate color.

Named in honor of Mr. N. E. Lemmon, of Nahiku, who discovered it.

Partulina carnicolor, n. sp.

Shell dextral, minutely perforated, solid, acuminately oval conic, apex subacute; surface lusterless, marked with delicate incremental

striæ, and under a lens exhibiting a fine pattern of decussating spiral striæ; nuclear whorls faintly decussated. Of a uniform brown color, a narrow white line below the periphery, which enters the aperture, and a very narrow white line traversing the suture. Whorls 6, slightly marginate above, a little convex; suture lightly impressed. Aperture oblique, oval, livid-white, showing the exterior coloring within. Peristome acute, expanded, columellar column broadly reflexed. Columella white, terminating in a well developed, flexuous fold.

Length, 25 ; diam., 14 mm.

Habitat, Nahiku, East Maui.

Partulina kaaeana, n. sp.

Shell sinistral, subperforated, solid, globose, with a conical spire, apex subacute; surface rather lusterless, covered with rather coarse, wavy growth-lines, and under a lens exhibiting close and delicate decussating spiral lines; nuclear whorls faintly decussated. Color ashy-brown, with a light brown band just below the periphery and entering the aperture; whole surface covered with minute longitudinal white flecks or streaks; apex tessellated white and brown. Whorls 6, not margined above, flatly convex; suture lightly impressed. Aperture a little oblique, oval, livid-white, showing the outside coloring within. Peristome acute, slightly thickened within, expanded, columellar margin reflexed, light brown on both face and the reverse. Columella white, terminating in a strong, plaited, projecting tooth.

Length, 21; diam., 13 mm.

Habitat, Mt. Helu, 4000 ft. alt., West Maui.

Animal extended in motion longer than the shell. Mantle brownish-black, with outer edge bordered with a narrow white line. Foot below and side light slate color. Head above and tentacles dark slate and granulated.

This shell was found on a mountain-peak quite isolated from the main mountain mass of West Maui. We dedicate it to Mr. W. F. Kaae, who seems to have been the only one in quest of shells who has ventured to climb this lonely peak. He found the shell in company with *Perdicella ornata* Nc. a species supposed long since to have become extinct.

(*To be continued.*)

NEW AND LITTLE KNOWN SPECIES OF AMNICOLIDAE.

BY BRYANT WALKER.

SOMATOGYRUS TENNESSEENSIS n. sp. Pl. 5, fig. 8.

Shell subglobose, perforate, greenish-yellow, smooth with fine lines of growth. Spire short, obtuse; whorls $3\frac{1}{2}$, those of the spires depressed, rounded, with an impressed suture; body-whorl large, inflated, regularly rounded. Aperture large, transversely expanded, sub-triangular, broadly angled above, and somewhat flattened below. Columella narrow with a moderately heavy, rounded, callus, which extends over the parietal wall and, below the minute umbilicus, is separated by a wide axial groove. Lip thick and sharp.

Alt. $4\frac{1}{2}$, diam. 4.25 mm.

Shoal Creek, Florence, Tenn. Types (No. 22377 Coll. Walker). Cotypes in the collections of the Academy of Natural Sciences and A. A. Hinkley.

This species was at first taken to be a form of Conrad's *S. pumilus*. But on removing the animal it was found to differ so radically in the character of the columella as to forbid its reference to that species. Compared with the specimens of that form from Cahatchee Creek, Ala., while of a similar contour, it differs in being larger, thinner, with a more expanded aperture, and in the narrow, rounded columella.

SOMATOGYRUS ALDRICHI, n. sp. Pl. 5, fig. 9.

Shell subglobular, perforate, greenish-yellow, smooth, with very fine, but distinct, lines of growth. Spire very short, depressed, obtusely rounded. Whorls $3\frac{1}{2}$, those of the spire slightly convex with an impressed suture ; body-whorl very large, inflated, with a strong carina in front below the periphery, which emerges from below the upper insertion of the lip, and continues about two-thirds around the whorl, where it gradually disappears, not reaching the lip ; the upper portion of the whorl above the carina is regularly, but not strongly convex, but below it is obliquely flattened toward the impressed base of the axis. Aperture large, subcircular, obtusely angled above and regularly rounded below. Columella concave, with a broad, heavy, flat callus, which extends over the parietal wall, and is separated below the perforation by a broad axial groove. Lip sharp, thickened within as it approaches the base of the columella

Alt. 3½, diam. 3½ mm.

Types (No. 21944 Coll. Walker), from the Coosa River, Chilton Co., Ala. Also Catawba River, Ala. Cotypes in the collection of T. H. Aldrich. A single specimen of this extraordinary species was detected in a set of *S. georgianus* from the Catawba River, in the Lewis collection, when my former paper on *Somatogyrus* (Naut., 17, p. 140), was in preparation. But it was of such unusual form that it seemed more likely to be a monstrosity than a distinct species. Recently, however, Mr. T. H. Aldrich has submitted a set from the Coosa, which are remarkably uniform, and leave no doubt but that it is entitled to specific recognition. The discovery by Mr. Hinkley of another but very distinct carinated form in the Tennessee River at nearly the same time is an interesting coincidence, and, like the similar case of *S. umbilicatus* and *strengi*, affords a striking example of evolution along parallel lines in two different drainage systems.

SOMATOGYRUS PUMILUS (Conrad). Pl. 5, fig. 10.

Conrad's original description of this species is very meagre and no dimensions are given. His figure subsequently published in the American Journal of Conchology V, Pl. 15, fig. 5, is on too small a scale to be entirely satisfactory. Fortunately, however, his type has been preserved in the collection of the Philadelphia Academy of Natural Sciences, and until now has been the only specimen known. Recently Mr. T. H. Aldrich has submitted a small form from Cahatchee Creek, Shelby Co., Ala., which seemed to be very similar. Dr. Pilsbry has kindly compared them with the type and writes "they are not quite *pumilus*, as the columella is decidedly too wide and calloused." A careful comparison made during a recent visit to Philadelphia, however, satisfied us both that these specimens could not be distinguished from Conrad's species. In the absence of topotypes, it seems desirable to describe and figure the Cahatchee form for comparison with the new species that have recently been described from the same region.

Shell small, sub-globular, imperforate, thick, solid, pale-green, becoming somewhat yellowish towards the aperture, smooth, with very fine growth-lines. Spire depressed, obtuse, whorls probably 3–3½ (apex eroded), those of the spire slightly convex with a well impressed suture; body-whorl large, inflated, regularly rounded. Aperture subcircular, broadly angled above, regularly rounded below,

columella concave with a heavy, broad, flat callus which extends over the parietal wall, and separated below the axis by a rather wide axial groove. Lip simple but thickened within, especially below.

Alt. $3\frac{1}{2}$, diam. $3\frac{1}{2}$ mm.

This species is distinguished from other described species with an axial groove by its small size and sub-globular shape. It is most closely related to *S. tennesseensis*, but differs in being smaller, more globular; more solid, smaller aperture, narrower axial groove, and broad, flat columella. *S. excavatus*, which is about the same size, is too entirely different in shape to be confounded with it.

SOMATOGYRUS PENNSYLVANICUS Walker. Pl. 5, figs. 17 and 18.

In the Spring of 1905, I collected a few specimens of this species under stones at the upper end of Island Park in the Potomac River at Harper's Ferry, Va. The occurrence of this species in a different drainage system is of interest. The shells are rather larger than those of the original lot from Columbia, Pa., and exhibit the two forms noticed in *S. virginica* and *quadrata*. The dimensions of the specimens figured are:

Fig. 17, alt. 3.75, diam. 2.5 mm.

Fig. 18, alt. 4, diam. 3 mm.

PYRGULOPSIS MISSISSIPPIENSIS (Pils.). Pl. 5, fig. 15.

Pyrgula scalariformis mississippiensis Pils., American Naturalist, January, 1886, p. 75.

Pyrgulopsis mississippiensis Call and Pilsbry, May, 1886.

One of the most interesting discoveries made by Mr. Hinkley during his trip was the finding of this species living in great numbers in Shoal Creek near Florence, Ala. This is the first time the species has been found alive; the original specimens having been all dead shells. We are thus enabled to supply two particulars in which the original description was necessarily defective. The epidermis is of a clear yellowish-horn color and the operculum agrees with the generic diagnosis in being "ovate, thin, corneous, spiral, with the polar point well forward and approximating the columella." The apices of all the mature Shoal Creek specimens were eroded.

AMNICOLA PILSBRYI, n. sp. Pl. 5, figs. 11 and 16.

Shell very small, umbilicate, globose, conic; light horn-colored,

smooth, with faint growth-lines; spire somewhat elevated, apex obtuse; whorls $3\frac{1}{2}$–4, regularly rounded and somewhat inflated; body-whorl large; suture well impressed. Aperture subcircular, slightly angled above; peristome nearly continuous, being appressed to the body-whorl for only a short distance.

Fig. 11. Alt. 2.25, diam. 2 mm.

Fig. 16. Alt. 2.25, diam. 1.75 mm.

Types (No. 3354 Coll. Walker) from Rockford, Ills. Also from Meyer's Lake, Canton and the Ohio Canal, New Philadelphia, O. Cotypes in the collection of the Academy of Natural Sciences.

This little species in years past must have been largely distributed both as *Lyogyrus grana* and *Amnicola parva*, as I have received it under these names from several different sources. From the former it differs generically, and from the latter in its much smaller size and regularly rounded whorls. It is in general appearance very much like a minute *A. limosa*, but can at once be separated by its diminutive size. As in many species of *Amnicola*, there are two forms, one more slender than the other. From *A. walkeri* (pl. 5, fig. 12, cotype, High Island Harbor, Mich.), which is about the same size, it differs in being more globose, with less convex whorls, the suture being not so deeply impressed, larger aperture and the appression of the inner lip to the body-whorl. Named in honor of Dr. H. A. Pilsbry.

Amnicola augustina Pils. Pl. 5, figs. 13 and 14.

Mr. Hinkley collected this species at Tuscumbia, Ala. Dr. Pilsbry, who kindly compared specimens with the types, writes: "It seems to me too close to *augustina* to be specifically separable, though there are differences. Your shells have the whorls a trifle less convex, the sutures therefore somewhat less deeply constricting, and the narrow phase (males?) is narrower than the corresponding form in *augustina*, but I would prefer to attribute what differences there are to local causes."

As *A. augustina* has not been figured, and the discovery of Mr. Hinkley not only widely extends its range, but adds a new species to the fauna of Alabama, it seems of sufficient interest to figure the Alabama form and to record its occurrence at Tuscumbia.

Fig. 13. Alt. 3, diam. 2 mm.

Fig. 14. Alt. 3.25, diam. 2.25 mm.

NEW VARIETIES OF NORTH AMERICAN PISIDIA.—2.

BY V. STERKI.

(*Continued.*)

Pisidium variabile Pr. var. *brevius* n. Much shorter than the usual form, oblique, moderately to well inflated, beaks comparatively large, generally slightly flattened on top; color darker; so far as known, the mussels are usually smaller. This Pisidium is considerably different from the "typical" form, and an analogue of *P. compressum* var. *confertum.*

Hab.: Michigan: Houghton Lake; Gogebic Lake and Slate River to same, Carp River and Lake, Ontonagon Co., Walker; Crystal Lake (Dr. Kirkland); Minnesota: Clear Water Lake (Sargent); Keewatin: Attawapiskat River (McInnes, sent by Whiteaves).

Var. *hybridum* n. Smaller than average *variabile,* of nearly the same shape; but the shape of the beaks, surface appearance, color and opacity of the shell are those of *Pis. æquilaterale* Pr. This is an interesting form, and might be taken for a hybrid between the two species, both of which were found at the same places; but it is markedly constant, so far as known.

Vicinity of Mohawk, N. Y.: Wide Water Canal (Jas. Lewis collection, now Mr. Bryant Walker's), Chepachet Pond (received from Mr. H. E. Sargent).

There are some other forms of *Pis. variabile,* rather characteristic and constant, and with more material will probably prove real varieties. Even the more typical form is rather variable with respect to size, shape, striation, color, thickness of shell and hinge.

Pisidium noveboracense Pr. The form regarded as typical seems to be common in New York, Pennsylvania and Ohio, prevalent in springs and small brooks. But the species is almost endlessly variable and seems to readily respond, in that respect, to various kinds of habitat, so that it often seems impossible to decide whether a certain form has to be ranged under it or not. But there are a number of forms characteristic and more or less constant, and must be described as varieties.

Var. expansum, n. Anterior part of the mussel higher; superoanterior slope more curved, anterior end more rounded; posteroinferior curve generally broader; outlines in general more rounded; more regularly inflated, beaks less prominent, young specimens less

inflated comparatively, and of characteristic shape; surface with very fine, more regular striation, and generally more even dullish; color grayish to brownish, whitish to straw-colored in the young but soon changing.

Various places in Michigan: Grand river, Lamberton creek, a small stream, etc. (Kent co., Dr. Kirkland); a very similar form from a ditch on Cameron Run near Alexandria, Va. (Sterki).

Var. elevatum, n. Smaller than the type, shorter, well inflated, anterior part higher, anterior end more rounded; superior margin, slightly or scarcely curved with sharply projecting angles before and behind, which are, however obsolete in some specimens; color straw to yellowish-horn. This is quite a characteristic form but seems connected with the type by intermediate specimens.

Creek and pond at Castalia, Erie co., Ohio (Sterki), Joliet, Ill. (Ferris and Handwerk); similar forms from other places.

Var. *quadrulum* n. Smaller, slighter, of more quadrate outlines but with no sharp projecting angles; supero-anterior slope rather steep; beaks not much prominent; surface with rather fine, somewhat irregular striæ; color pale to grayish-horn; shell thin and somewhat translucent, hinge rather slight.

This Pisidium appeared to be distinct from *noveboracense;* yet intermediate forms may be found. It is a form of ditches and marshes, and widely distributed, as it seems; quite common, *e. g.*, in the vicinity of New Philadelphia, Ohio (Sterki).

A larger form, stouter, higher, more inflated, with the shell scarcely translucent, was called *proclive;* it may prove to be a real variety. Ditches, New Philadelphia, O., and similar forms from other places.

Var. *lineatum* n. Smaller, shorter, somewhat oblique, moderately inflated, especially so towards the inferior margin, somewhat triangular in outlines; beaks narrow, little prominent; surface with rather fine, subregular striæ, and usually with a few fine lines, dark lines of growth; color straw to yellowish, horn to reddish; shell and hinge rather slight.

Reed Lake, Michigan (Dr. Kirkland), and similar forms from elsewhere. This is somewhat analogous to *Pis. compressum* var. *rostratum*, of the same lake, and it may be noted that the same is inhabited by nearly typical forms as well as several rather different forms, or varieties of both species; at least one of each has not been described here.

Var. *fraternum*, n. Less elevated; superior and inferior margins slightly curved, and the former long; beaks not much prominent; surface with irregular, shallow striæ, shining; color horn to yellowish-horn, usually in irregular, alternating zones, also more or less translucent. In its surface appearance it resembles the "eastern form" of *Pis. abditum* Hald.

New Philadelphia, and Akron, Ohio (Sterki); similar but smaller forms from Kent Co., Mich. (Dr. Kirkland).

Var. *alabamense*, n. Higher; beaks quite prominent; superior margin more curved and sloping down into the anterior and posterior without or with slightly prominent, rounded angles; mussel rather large and well, regularly inflated; surface with rather sharp, subregular striæ, slightly shining to dull, and microscopically rugulose; color yellowish to grayish-horn; size, long. 6, alt. 5, diam. 4.6 mm., a few even larger, but most specimens are smaller.

Hab.: Alabama, along the Coosa river, common (H. H. Smith), Tennessee river (Sargent, Hinkley), Columbus, Mississippi (Hinkley).

This Pisidium is rather variable. While most specimens are as described, and appear to represent a distinct species, others approach the "typical" New York and Ohio form in shape.

NOTES AND NEWS.

A New Locality for Planorbis nautileus Linne.—While identifying a lot of shells recently for Dr. William A. Nason of Algonquin, Illinois, a single specimen of *Planorbis nautileus* was discovered in a lot of other small Planorbes,—*parvus*, *albus*, *deflectus*. The single specimen is rather large, $2\frac{1}{2}$ mill. in diameter, and the ribs on the base of the shell, which give it its strong nautiloid appearance, are very large and distinct. The flat upper surface is also conspicuous. This habitat, Algonquin, Illinois, adds a new southern and western locality to the range of this interesting species.—Frank Collins Baker.

Errata.—Nautilus. Jan. 1906. p. 101, line 5, for "ones" read "one;" p. 101, line 7, for "Ramalley read "Ramaley."—T. D. A. Cockerell.

THE NAUTILUS.

VOL. XIX. MARCH, 1906. No. 11.

ON BIFIDARIA PENTODON AND ITS ALLIES.

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

The group of *B. pentodon* has been for many years the subject of much perplexity to conchologists, on account of the great variability of the shells in size, shape, and dentition of the aperture. It is easy to select forms which seem perfectly distinct species, but when large series are examined, there is always a residuum of intermediate specimens which can as well be placed in one as another of the selected groups. The difficulty is increased by the fact that practically all of the forms occur over the whole area of the group, though one or another of them may predominate in any given locality. This led Dr. Gould to the conclusion that *P. curvidens* and *tappaniana* are forms of *pentodon* (Boston Journal N. H. IV, 1844, p. 35), an opinion adopted by Binney, and commonly prevalent until recent years, when Dr. Sterki revived *curvidens*. It is the purpose of this article to ascertain the exact forms which have been described, and to show by figures the various modifications of form.

In all the forms the shell is of a white-corneous color and the teeth within the lip stand upon a white callus, in this respect differing from *B. pilsbryana* of the Southwest.

The following names have been applied to the group:

1. *Vertigo pentodon* Say, 1821.
2. *Pupa curvidens* Gld., 1841.
3. *Pupa tappaniana* Ward, C. B. Adams, 1842.
4. *Pupa tappiana* Ward, Pfr., 1842.
5. *Pupa cincinnatiensis* Judge, 1878.
6. *Pupilla floridana* Dall, 1885.

7. *Pupa montanella* Ckll., 1889.
8. *Pupa curvidens* var. *gracilis* Sterki, 1890.
9. *Pupa pentodon* for f. *curta* Sterki, 1894.

The original descriptions of these forms are given below, most of them in full, while of others (nos. 4–6) only the important parts are quoted.

Having examined many hundreds of specimens from all parts of the range of the species in question, it appears that there is intergradation throughout the series in a small proportion of specimens; but the vast majority of specimens fall into two groups which may be given the nominal rank of species, the proposed classification standing as follows:

B. pentodon (Say). Synonyms, *cincinnatiensis*, *curta*, *montanella*. "Form" *curvidens*, including *floridana*.

Var. *gracilis* St.

B. tappaniana (C. B. Ad.). Synonyms, *tappiana* Pfr., *pentodon* auct.

NOTE.—The figures are all drawn to one scale (× 13.8), and any may be accurately measured by plotting on paper a scale with the lines 13.8 mm. apart; each space then representing 1 mm. Thus fig. 1 is 1.8 mm. long.

BIFIDARIA PENTODON (Say). Figures 1 to 41. Fig. 1 is typical.

The shell is small, varying from conic to subcylindric in shape. Teeth typically 5, of which the parietal, columellar and lower palatal are larger and compressed, the lower palatal entering a little more deeply than its fellows in the outer margin; but often subcolumellar, basal, and interpalatal denticles are developed. Figs. 1 to 8 are from Maine specimens, showing the ordinary variations. The development of a crest behind the lip varies a good deal, from weak to very strong, with all intergrades. *P. cincinnatiensis* (fig. 35, a cotype) is a small form of *pentodon*.

The increase in number of accessory denticles or teeth culminates in the form named *curvidens*, represented in figs. 9 to 15, also 3, 6, 32 and perhaps some others, as there is absolutely no line to be drawn between *pentodon* and *curvidens*. The number of teeth varies from 5 to 9 in perfectly adult shells of the same gathering from one spot. The development of an infraparietal denticle is also extremely variable in many lots, as in that from Buckfield, Me., figs. 1 to 4, 8. *P. floridana* (fig. 9, a cotype from the author) is absolutely identical with *curvidens*.

It may be stated as proven that some colonies consist of "pentodon" and intermediate forms; some of "pentodon," intermediate and "curvidens" forms; and some of the intermediate and "curvidens" forms. We have found no large gathering of wholly typical *pentodon* or entirely *curvidens*. Either form may be found with a low or high crest—this being usually more constant in any one colony than the number of teeth or the size and shape of the shell. The only theory upon which *curvidens* could be retained as a species or subspecies would be to assume that two species are living in a state of hybridism—an assumption which seems to us baseless.

Bifidaria pentodon gracilis Sterki. Figs. 16 to 27.

This is usually larger, more cylindric, with 5 teeth, though perfectly mature shells may have as few as 3 (figs. 19, 26,) or as many as 6 or 7 (figs. 16, 18, 21). It was originally described from New Philadelphia, Ohio, but those figured are from Alabama; figs. 16, 17, 21 to 27 from around Wetumpka, 18, 19, from Woodville, 20 from Big Wills Valley, coll. by H. H. Smith and H. E. Sargent. None of them has an infraparietal denticle.

While this race seems to be tangibly differentiated in the hill region of Alabama, specimens may be selected from other lots of *pentodon* which could not possibly be distinguished if mixed with the Ala. shells; for instance fig. 31, Henry Co., Ind., and fig. 33, Des Moines, Ia., both taken from lots varying in shape from long and cylindric to shorter and more conic.

The original descriptions of forms referred to *pentodon* here follow.

"*V. pentodon. Shell* dextral, subovate, whitish horn-color; *apex* obtuse; *whorls* five, glabrous, convex; *suture* not very deeply impressed; *aperture* semioval; *labium* two-toothed, of which a single very prominent one is on the middle of the transverse portion or true labium, and the other is remote, much smaller and placed in the basal angle of the columella; *labrum* regularly arcuated, tridentate, tooth nearest the base very small and placed near the smaller tooth of the columella, the two others larger, subequal; umbilicus distinct. Length less than one-tenth of an inch.

"Animal. Tentacula two, rather long and thick, cylindrical-obconic, retractile, with a rounded oculiferous extremity; two hardly elevated truncated tubercles instead of the anterior tentacula; *foot* white; *head* and neck, as far as the mantle, black.

"Inhabits Pennsylvania. The lower tooth of the labrum is sometimes obsolete." (Say, Journ. Acad. Nat. Sciences Phila., vol. 2, 1821, p. 376.)

NOTE.—*This is not the comparatively large and conic multidentate form commonly known in recent years as pentodon;* but a five- or six-toothed form which has hitherto been referred to *curvidens.*

"*Pupa curvidens.* Shell minute, ovate, but much elongated, of a spermaceti-white color; whorls five, convex, smooth, gradually diminishing to an obtuse apex; suture deeply impressed, aperture subtriangular, with the front and outer angles rounded, and the outer lip curved inwards, so as almost to make the aperture heart-shaped; the transverse margin is straight, and slightly oblique; the inner lip is also nearly straight, so that these two form a rightangle at their junction; lip widely reflected, flattened, white; throat armed with nine teeth; the longest, somewhat curved to the left, compressed and pointed, is situated on the middle of the transverse lip, and has a small one seated at its left side; at the front, nearly opposite the large tooth, almost as large and inclined to the left also, is a quadrangular, blunt tooth, more slightly curved; on the left margin are three teeth, of which the upper one is larger, and about the size of the basal tooth, of a blunt quadrangular figure; the other two are minute; on the outer lip are also three teeth, of which the two upper are very small and pyramidal; umbilicus open. Length $\frac{1}{15}$ inch, breadth $\frac{1}{40}$ inch.

"This minute species I first found under a loose stone on the ledges at Phillips Point, Lynn, near the Ocean House. * * * * Four of the teeth are very small, and would scarcely be discerned without being highly magnified, and they seem to be seated farther within the aperture; the small one on the transverse lip, the basal one, and the upper one on the right lip are liable to be wanting. So far as I can ascertain, it has not been previously described, unless several of the teeth have been overlooked. It is nearest allied to *P. pentodon*" (Gould, Report on the Invertebrata of Massachusetts, 1841, p. 189, f. 120).

"*Pupa cincinnatiensis* Judge. * * * peristome simple, heavily thickened near the margin, the callus extending over the parietal wall; aperture contracted by five prominent denticles, seated on the callus, one prominent on the parietal wall, two on the columella, the

lower being the smaller of the two, and two on the outer portion of the peristome, more deeply seated in the throat, and occasionally one or two very minute rudiments on the peristome. Length 1.56, diam. 84 mm. This shell is found on both sides of the Ohio River, near Cincinnati." (Judge, The Quarterly Journ. of Conch., p. 343, 1878.)

"*Pupilla floridana* Dall. * * * subcylindrical * * * teeth about 9, of which there are generally 3 larger than the rest, their tips nearly meeting and their bases mutually nearly equidistant; one is on the pillar, one on the body-whorl, and one on the anterior margin; on either side of the latter are two generally subequal, much smaller denticles. Lon. 1.6, lat. .75 mm. Archer, Alachua Co., Fla." (Dall, Proc. U. S. Nat. Museum, Vol. 8, 1885, p. 261, pl. 17, f. 11.)

The figure seems to have two teeth on the parietal wall, two on the columella and five in the palatal region. This is practically identical with the arrangement described under *curvidens*.

"*Pupa montanella*. A minute *Leucochila* which I have found very sparingly at about 8400 feet in West Custer Co. (Colorado), to which I have given the name *P. montanella* sp. nov., but do not describe it pending further investigations." (Ckll., The Journ. of Conch., Leeds, Vol. vi, 1889, p. 63.)

"*P. montanella*, indicated on the same page as *P. coloradensis*, proves to be a form of *P. pentodon*." (Ckll., The Brit. Nat., 1891, p. 101.)

Since no definition of any kind has been published, this name becomes an absolute synonym of *B. pentodon*.

"*Pupa curvidens* var. *gracilis*. On a gravelly bank at New Philadelphia, Ohio, there is a peculiar form of our species; long, slender, nearly cylindrical, with only 5 typical lamellæ, no accessory ones. * * * I thought it not out of place to name it var. *gracilis*." (Dr. V. Sterki, NAUTILUS, iii, 1890, p. 119.)

"*Pupa curvidens gracilis* Sterki. Scarce. New Philadelphia. A peculiar form intermediate in shape between the type and *Pupa holzingeri* Sterki. It has also been seen from Rhode Island, Tennessee and Alabama." (Sterki, The Land and Fresh-water Mollusca in the Vicinity of New Philadelphia. A contribution to the Nat. Hist. of Tuscarawas Co., Ohio, 1894.)

"*Pupa pentodon* f. *curta*. Examples from wet places are small

and short ovoid (f. curta)." (Sterki, Land and Fresh-water Mollusca in the Vicinity of New Philadelphia, etc., p. 5, 1894.)

BIFIDARIA TAPPANIANA (C. B. Adams). Figs. 42 to 53.

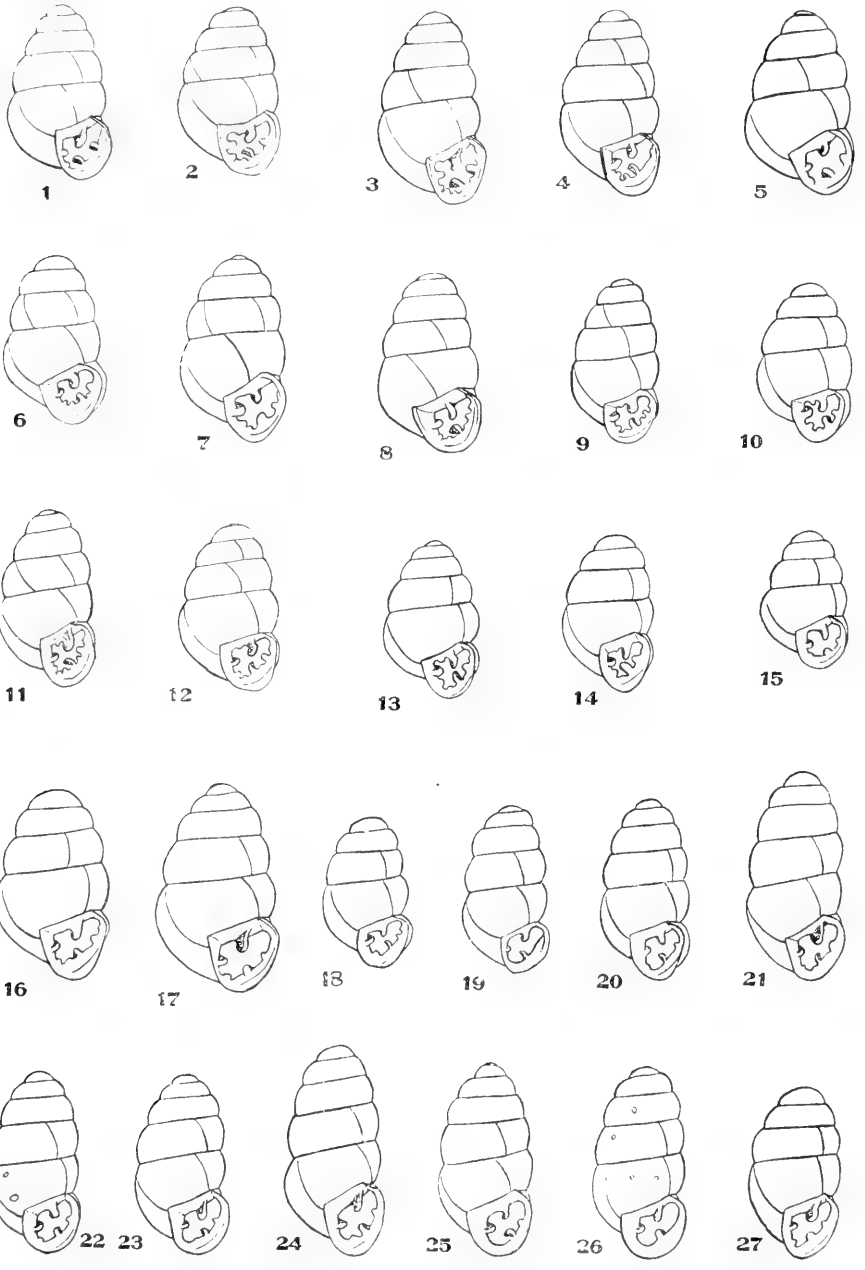
The shell is larger than *pentodon*, markedly conic though obtuse; only one tooth on the parietal wall, usually 6 on the columellar, basal and outer margins, those on the latter standing on a strong rib. Lower palatal tooth usually not so long and entering as in *B. pentodon*.

Distribution, Ontario to the Gulf of Mexico, west to Iowa and Kansas, southwest to Arizona, but not known from the southeastern Atlantic States, Virginia to Florida.

This is the form now everywhere known as "*pentodon* Say." It is often a difficult question, upon which no two experts might agree, whether to refer a certain specimen to *tappaniana* or to some form of *pentodon*, since while the larger size and globose-conic shape are characteristic of *tappaniana*, yet intermediate sizes and shapes occur occasionally, so that we disclaim any intention of setting up a definite boundary between the forms. It can only be claimed that the great majority of lots are quite readily separable. The variations in size and shape are well shown in the figures. Figs. 42, 43, Philadelphia; 44, Buckfield, Me.; 45, Ithaca, N. Y.; 46–48, Duchess Co., N. Y.; 49–52, Washington, D. C.; 53, Oak Creek, Arizona. The original description follows:

"*Pupa tappaniana* Ward, inedit. Shell very small, pale horn-color, translucent, tapering above the penultimate whorl; whorls a little more than five, convex, with a well-impressed suture; aperture sub-orbicular (the penult. whorl cutting off about one-third of the circle), about one-third of the length of the shell; margin sharp, with a narrow contraction in the submargin, beneath which is a thickening within, on which are the labial teeth; teeth eight, five primary and three secondary; of the former the largest is on the penultimate whorl, the next largest on the left side of the aperture; at the base, beginning at the left hand, is a primary, then a secondary, a primary, a secondary, a primary and another secondary, extending nearly to the upper extremity of the right margin; the last three primaries are not constant in size; umbilicus open. Length 0.08 inch; breadth 0.05 inch.

"This species is easily distinguished from the preceding (*P. contracta*) by its teeth." (*C. B. Adams*, History of Vermont, Z. Thompson, 1842, p. 158.)



Bifidaria pentodon. 1–4, 8. Buckfield, Me.; 5. Woodland, Me.; 6. Fairfield, Me.: 7. Westbrook, Me.: 9. Alachua Co., Fla.; 10. Volusia Co., Fla.; 11. San Marcos, Tex.; 12. Comal Co., Tex.; 13, 16, 17. Wetumpka, Ala.: 14, 15, 20. Near Valley Head, Ala.; 18, 19. Woodville, Ala.: 21–27. Wetumpka, Ala.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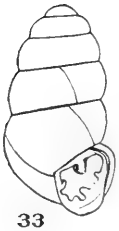
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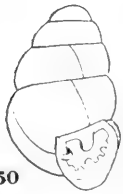
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Bifidaria pentodon. 28, 29. Troy, N. Y.; 30. Greenwich, N. Y.; 31, 37. Henry Co. Ind.; 32. Ocean City, N. J.; 33. Des Moines, Ia.; 34, 35. New Philadelphia, O.; 36. Cincinnati, O.; 38. Miami, Fla.; 39. Des Moines, Ia.; 40. Jasper Co., Mo.; 41. Silver Lake, Kans.

Bifidaria tappaniana. 42, 43. Philadelphia, Pa.; 44. Buckfield, Me.; 45. Ithaca, N. Y.; 46–48. Duchess Co., N. Y.; 49–52. Washington, D. C.; 53. Oak Creek, Ariz.

It is not known whether this description was published before or after the following, both appearing in 1842. This is the comparatively large shell commonly known as *P. pentodon*, and figured as such in Binney's *Manual.*

"*Pupa tappiana* (Ward) Pfr. * * * conical-ovate, with 1 strong parietal tooth, 1 columellar, 4 or 5 smaller on outer lip; length 2, diam. $1\frac{1}{4}$ mm. Vermont." (*Pfr.*, Symbolæ ad Hist. Heliceorum, ii (1842), p. 55.)

This may well be considered a synonym of *tappaniana* Ad.

Plate VI.

Bifidaria pentodon (Say).

Figures 1–4. Buckfield, Maine. John A. Allen, Acad. Nat. Sci. No. 87304.

5. Woodland, Maine. O. Nylander. No. 58249.

6. Fairfield, Maine. J. H. Thomson. No. 58248.

7. Westbrook, Maine. A. D. Brown Collec. (Bolles). No. 4263.

8. Buckfield, Maine. John A. Allen. No. 87307.

9. Cotype of *P. floridana* Dall. Alachua Co., Fla. W. H. Dall. No. 58242.

10. Mt. Taylor, S. of Volusia, Volusia Co., Fla. H. A. Pilsbry. No. 72769.

11. Drift of Sinking Spring, San Marcos, Texas. H. A. Pilsbry. No. 90454.

12. Drift of Guadalupe R., 4 m. above New Braunfels, Texas. H. A. Pilsbry. No. 90456.

13. Wetumpka, Alabama. H. H. Smith. No. 87151.

14, 15. Near Valley Head, Alabama. H. H. Smith. No. 90451.

16, 17. Near Wetumpka, Alabama. H. H. Smith. No. 90458,

18, 19. Woodville, Alabama. H. E. Sargent. No. 66901.

20. Big Wills Walley, 2 m. S. of Valley Head, Alabama. H. H. Smith. No. 90453.

21–27. Near Wetumpka, Alabama. H. H. Smith. No. 90425.

Plate VII.

Bifidaria pentodon (Say).

Figures 28, 29. Troy. New York. T. H. Aldrich. A. N. S., No. 58251.

30. Greenwich, New York. T. Bland. No. 3924.

31. Henry Co., Indiana. R. Walton Collec. No. 58240.

32. Ocean City, New Jersey. H. A. Pilsbry. No. 72709.

33. Near Des Moines, Iowa. T. Van Hyning. No. 88439.

34, 35. Near New Philadelphia, Ohio. Dr. V. Sterki. No. 58239.

36. *P. cincinnatiensis* Judge. Cincinnati, Ohio. Wm. Doherty. No. 58244.

37. Henry Co., Indiana. R. Walton Collec. No. 58240.
38. Miami, Florida. S. N. Rhoads. No. 58253.
39. Des Moines, Iowa. T. Van Hyning. No. 79641.
40. Jasper Co., Missouri. M. A. Mitchell. No. 58254.
41. Silver Lake, Kansas. J. B. Quintard. No. 58246.

Bifidaria tappaniana (Ad.).

42. School Lane, Germantown, Philadelphia, Pa. R. Walton. No. 58250.
43. West Fairmount Park, near Chamounix, Philadelphia, Pa. Vanatta. No. 58224.
44. Buckfield, Maine. John A. Allen. No. 58219.
45. Ithaca, New York. No. 62486.
46–48. Upper Red Hook, Duchess Co., New York. W. S. Teator. No. 58218.
49–52. Washington, D. C. E. Lehnert. A. N. S., No. 58225.
53. Drift of Oak Creek, Page's Ranch, Oak Creek, Arizona. E. H. Ashman. No. 82925.

DREDGING IN FRENCHMAN'S BAY, MAINE.

BY DWIGHT BLANEY.

Professor Edward Forbes has said, in speaking of the underwater world, "The difficulties which attend the inquiry add to the zest of the research; and there is a charm in travelling mentally over the hills and valleys buried inaccessibly beneath their thick atmosphere of brine."

There are other pleasures, however, associated with what we call the "adventure" of dredging—as dredging for shells, like many another adventure is full of surprises—and suggests untold possibilities in the way of new discoveries. One never knows what treasures will be in the next haul, and the most discouraging day still leaves us with enthusiasm for the next trip. We indeed believe that it matters little how poor a haul may be: each trip always yields us something of interest. Any day we may come upon a colony of some species we have looked upon as rare—and the next haul the dredge may disclose fine live specimens of species previously found dead.

For several seasons the *Mesalia erosa*, (Couth.) was represented in our collection by a single dead and much eroded specimen, until one lucky day we came upon a colony of them, fine large live ones. The shells were quite crimson in color, and the animals so tenacious

of life as to live for days in salt water, giving us good opportunity to make drawings of them under the microscope.

Another shell which we had looked upon as rare, and whose sculptured whorls we had always admired, is the *Scala grœnlandica* (Perry). Last summer we found it in comparative abundance in one locality. Our boat being out of repair, we made a number of hauls from the ledges, well out toward the sea. One of us would take the dredge out about one hundred yards from shore and drop it, while the others on the rocks would laboriously pull it in. The haul thus radiating from one spot would cover quite an area, varying of course in depth. On this bottom, composed of quantities of fragments of barnacles scraped from the ledges by the ice in previous winters, we found a number of interesting northern species, among which was the *Scala* above mentioned. The barnacle fragments formed a most excellent protective background for this species, and it required sharp eyes to pick them out after the material had been washed over.

Associated with the *Scala* was the *Menestho striatula* (Couth.), which was equally hard to pick out from among the broken shells. As many as thirty specimens of *Scala* would be found in each haul of the dredge, and the *Menestho* proved to be also common here.

Here we also found the *Bela bicarinata* (Couth.) and a great many of the *Cylichna alba* (Brown).

One of the unexpected surprises occurred one day, when in making a haul in deep water, our precious dredge caught in some obstacle which came to the surface with great reluctance. It proved to be a "gang" of lobster traps, which had been carried off into deep water and so lost. It was duly recognized and claimed by one of our men, who had lost it the previous winter. On the stones with which each trap was weighted, we found many specimens of *Chitons;* the *Trachydermon ruber* (Linne), the *T. albus* (Linne), and a few *Tonicella marmorea* (Fabr.), also a number of *Lepeta cæca* (Müller). It is interesting to note, in relation to the last species, that Gould in his "Invertebrata of Massachusetts," 1st edition, 1841, says: "Only three specimens of this shell are yet known." This is repeated in the edition of 1870. We have found it, however, fairly common.

Another surprise in our dredging was to come upon the "Dumping Ground" of the Bar Harbor Refuse Scow.. On this spot Bar Harbor has deposited its refuse for some years. The lighter material being carried out by the tide and the heavier sinking to the bottom

to become encrusted with the red nullipore—*Lithothamnion polymorphum*—broken bottles, bones, broken china, and similar refuse forming good hiding-places for many shells. The *Chitons* mentioned above, and the *Solariella obscura* (Couth.), also the pretty *Margarites grœnlandica* (Gmelin) and the *Margarites cinerea* (Couth.) are found at this spot. The past year has seen a renewal of the industry of dredging the great scallops *Pecten magellanicus* (Gmelin). Many natives have fitted good-sized sailboats with power, and with power-dories and large, chain-meshed dredges have given the bottom of the Bay a good scraping. This industry has paid well for a while, but the increasing number of boats devoted to this work is beginning to tell on the supply, and it is bound to give out shortly.

SHELLS OF GRANT, VALENCIA CO., NEW MEXICO.

BY H. A. PILSBRY.

During a brief stop at this place, which is on the Santa Fé Pacific R. R., near the western boundary of New Mexico, above the middle of the Territory, Messrs. Albert and Joshua Baily, Jr., of this city, collected a series of shells, including several forms of considerable interest. The specimens of *Lymnæa bulimoides* are a very globose and short-spired variety, which I have before received from Prof. Cockerell and others. It will be described as var. *cockerelli* in a paper on Southwestern Mollusca now about to be published.

Valvata humeralis is a Mexican species, new to the fauna of the United States, and its occurrence so far north of the Mexican boundary leads us to expect it in suitable places over a considerable territory within our limits. It is quite unlike *V. virens* of the Rocky Mountain region, having more in common with the northern *V. sincera* Say. The list follows:

Zonitoides arborea (Say).
Z. minuscula (Binn.).
Pyramidula striatella (Anth.).
Helicodiscus parallelus (Say).
Vallonia gracilicosta (Reinh.).
V. cyclophorella (Anc.).
Pupoides marginatus (Say).
P. hordaceus (Gabb.).
Pupilla muscorum (L.).
P. blandi (Morse).
P. syngenes dextroversa (Pils. & Van.).
Bifidaria pellucida hordeacella (Pils.).
Vertigo ovata (Say).
V. coloradoensis arizonensis (Pils. & Van.).
Cochlicopa lubrica (Müll.).
Succinea grosvenori (Lea).
Lymnæa bulimoides cockerelli (Pils.).
Planorbis parvus (Say).
Physa sp. undet., not adult.
Valvata humeralis (Say).

ON A NEW FLORIDIAN CALLIOSTOMA.

BY WILLIAM HEALEY DALL.

In March, 1903, the U. S. Fish Commission steamer Fish Hawk obtained some casts of the dredge in the straits of Florida. This material has recently been turned over to the National Museum, and proves to contain several items of interest. At Station 7511, in 45 fathoms, off Fowey Rocks, was dredged a species of *Calliostoma* which appears to be new; at Station 7516 fragments of *Oniscidia dennisoni* were obtained, with a specimen of *Scala* (*Acrilla*) *retifera* Dall, 28 mm. in length, and at Station 7511 a fine specimen of the rare *Subula floridana* Dall, described originally from the Blake dredgings. As it has been shown that the name *Eutrochus* Adams is preoccupied, I replace it by *Leiotrochus* Conrad, 1863, typified by *L. distans* Conrad, of which the type has turned up in the National Museum (see Trans. Wagner Inst., iii, pp. 399 and 402), and proves to be a mature specimen of the shell named *Trochus conus* by H. C. Lea in 1845. *Astele* Swainson, 1855, seems to be more closely related to *Solariella*, and is described as "with no columella," the inner lip being simple and arcuate. Conrad's diagnosis is incorrect, as the reader will see by referring to the above-mentioned data. His type is smooth, with, in the adult, a narrow, deep umbilicus and a distinct Calliostomoid pillar. Owing to Conrad's contradictory diagnosis of 1863, I hesitated, in 1892, to accept his name, but as things now stand it seems necessary to do it or to propose a new one. The description of the species is as follows:

Calliostoma (Leiotrochus) marionæ n. sp.

Shell acutely conic, with the sides of the spire slightly concave, ten-whorled, brilliantly polished, color a rich brick-red, mottled near the periphery with whitish flammules; nucleus translucent white, tilted obliquely; sculpture, on the subsequent four or five whorls, of five (5) granular, spiral ridges, separated only by narrow incised lines, with a more conspicuous ridge just above the suture; subsequently the ridges become flattened, wider and more or less spirally striate on their tops, while the original five incised lines retain a darker color than the rest of the surface; the suture is not strongly marked, and runs just below the periphery of the preceding whorl; base slightly convex, with ten or eleven similar incised spiral lines

stronger toward the umbilicus, where the interspaces become feebly nodulous, the last one on the brink of the umbilicus more strongly so; umbilicus moderately large, funicular, its walls white, smooth, and slightly excavated just within the basal margin; pillar white, thin, arcuate, ending in a blunt projection separated by a small notch from the basal margin of the aperture, which, with the outer lip, is thin and sharp; throat pearly, without lirations or callus on the body. Alt. of shell 19.0, max. diam. 18.0; diam. of umbilicus 2.5, min. diam. of base 16.0 mm.

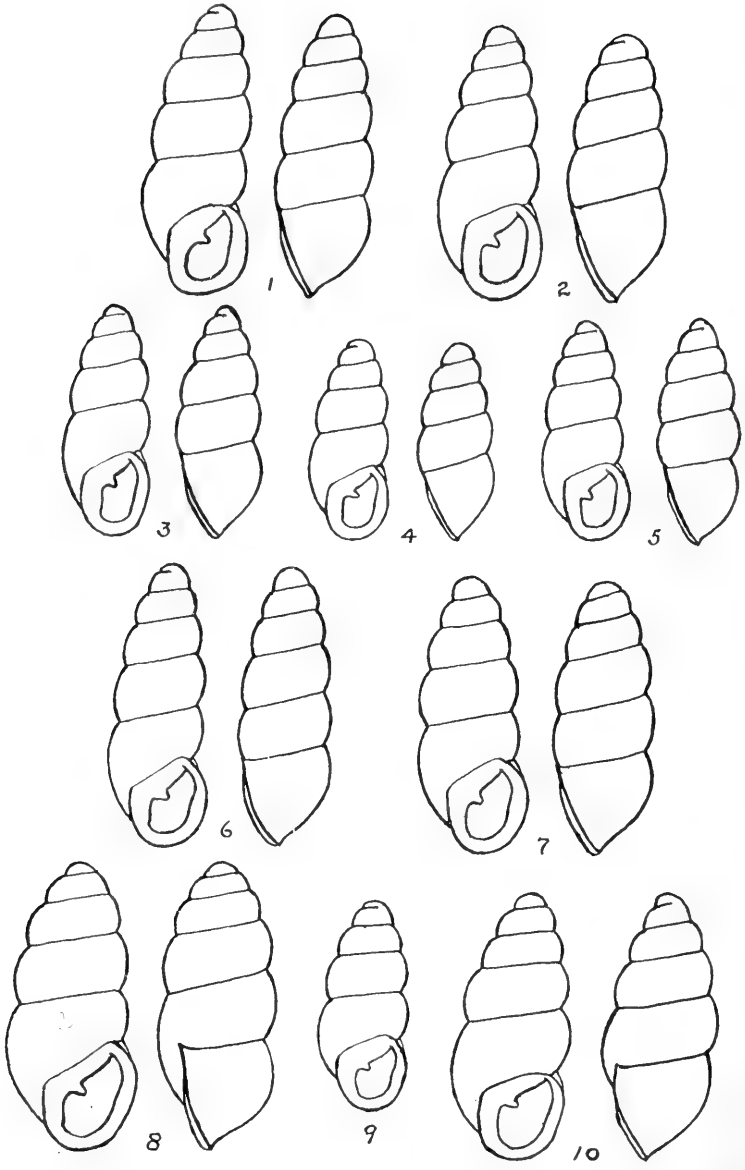
The periphery is subangulate, becoming rounded in the adult. The operculum is thin, horny, multi-spiral, with about 14 whorls. The animal is of a reddish color somewhat like the shell, the sides of the foot granular, the muzzle concentrically wrinkled, the tentacles long and slender, with no epicephalic veil between them; the eyes large and black, on short but distinct peduncles, behind and above the tentacles; epipodial lobes with papillose edges and two or three more elongate processes on each side, but none project from the opercular lobe; the foot is short and rather blunt behind. As contracted from immersion in alcohol, the tentacles and epipodial processes seem smooth, and show no such ciliation as is figured by Adams in *Calliostoma*, while the absence of the "veil" is noteworthy.

Altogether, though not very large, this is one of the most attractive East American species, both in form and coloration. Only one specimen has yet been obtained, No. 187233, U. S. Nat. Mus. register.

Note on Trivia acutidentata Gask.—A few years ago, among a few shells obtained by me in San Francisco on board a schooner direct from the Galapagos Islands, I found one beach-worn *Trivia* which puzzled me, as it differed widely from any species then known to me. Upon a recent careful reading of the original description of *Trivia acutidentata* Gask., I find that this specimen corresponds exactly to Gaskoin's description.

This species, thus far unfigured, was described (Proc. Z. S., 1835, p. 201) from a single worn specimen collected by Cuming in the Bay of Guayaquil, and which, after description, was broken into unrecognizable fragments. As the locality of my specimen is also substantially the same, it would seem that this long-lost species has at this late day been again found.—Fred L. Button.

Feeding Habits and Growth of Venus mercenaria. By Jas. L. Kellogg (N. Y. State Museum, Bull. 71). A very interesting and instructive paper illustrated by four plates.—C. W. J.



Figs. 1, 2, 6, 7. Carychium exile canadense.
Figs. 8, 9. Carychium exiguum.

Figs. 3, 4, 5. Carychium exile.
Fig. 10. C. stygium.

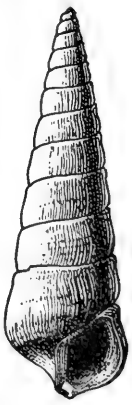
THE NAUTILUS.

VOL. XIX. APRIL, 1906. No. 12.

NOTE ON A NEW VARIETY OF CERITHIDEA SACRATA GLD., FROM SAN DIEGO, CAL.

BY S. S. BERRY.

There is present in several Californian collections, and also in the National Museum and elsewhere, a form of the common *Cerithidea sacrata* Gould, which is "peculiar in appearance, and might be none the worse for a mutational name" (*Dall*). It differs from the ordinary form, with which it intergrades, by being smooth, or nearly so, and more tapering, as shown in the accompanying figure. It is quite heavy and solid, and in my specimens the callus of the aperture is of a lighter and browner tint than is usual, and the aperture is smaller and less inflated. Length 30 mm. The original *C. sacrata* was pretty smooth, but for convenience in designating this form, especially as opposed to the heavily ribbed var. *pullata* Gould, the name *hyporhyssa* is here suggested. All the specimens seen are from San Diego, although it doubtless occurs elsewhere.



Stanford University, Feb. 10, 1906.

ADDITIONAL NOTES ON BIFIDARIA PENTODON AND B. TAPPANIANA.

BY V. STERKI.

We are indebted to Messrs. Vanatta and Pilsbry for their *exposé* of these species and their forms, in the March NAUTILUS. The essence of it is that what we called *B. pentodon* Say is really *tappaniana* Ad., and the forms ranged under *curvidens* are *pentodon* Say.

After once more looking over part of my materials[1] and the critical forms, I find occasion for a few notes which it may be permitted to add.

The form *curta* does not belong to *pentodon*,[2] but to *tappaniana*. In some places it has almost the significance of a variety. The shells of *pentodon* from wet situations are usually also more ventricose, ovoid, than those from more elevated and comparatively dry stations.

Fresh, good shells of *pentodon* from many places are glassy, transparent, colorless, while others are of a horny or milky hue; those of *tappaniana* are more generally so. *B. pentodon* from some places has no callus or a very slight one in the palate.

The "parietal" lamella in both species and all forms is really composite,[3] *i. e.*, composed of the parietal and angular, although the latter is generally quite small, a mere appendage of the former, especially in *tappaniana*, while in many specimens of *pentodon* it is quite distinct, and in some the whole lamella is even bifid, somewhat like that of *B. holzingeri*.

The habits of the two species are rather different, and they are not often found associated. Thus *B. pentodon* is common among moss and grass in forest and on open slopes, even steep, stony and rocky hillsides, where *tappaniana* is hardly ever found. The latter is prevalent in low, damp places, under wood, etc.

One feature of interest may be mentioned here. Like those of

[1] About 250 entries on the two species.

[2] The names in the following are used in the sense of Vanatta and Pilsbry in the article referred to.

[3] *Conf.* Pilsbry and Vanatta, A Partial Revision of the Pupae of the United States, Proc. Acad. Nat. Sc., Phila., 1900, p. 593, key (*Vertigopsis*). In some figures on the plates VI and VII in the NAUTILUS, the angular is shown, *e. g.*, Figs. 3, 12, 21, 27, 32.

B. armifera and *contracta*, the shells of many specimens, especially of *pentodon*, are covered with mucus and dirt, often completely, and frequently forming a somewhat irregular ridge along the middle of the whorls. This is not accidental, but evidently done by the animal on purpose, probably for additional protection against drought.

DESCRIPTION OF NEW SPECIES OF ACHATINELLIDAE FROM THE HAWAIIAN ISLANDS.

BY D. D. BALDWIN.

Partulina cooperi, n. sp.

Shell dextral, very minutely perforated, rather thin, acuminately ovate conic, apex acute; surface shining, striated with fine growth-lines and under a strong lens exhibiting very close and minute decussating spiral striæ, which extend to the apex. Color light yellowish-brown, sometimes dark reddish-brown, variously banded; the constant characters being a white band at the periphery, a black line traversing the suture, with two white lines one above and one below the suture, all three lines extending to the tip of the apex. Whorls 6, somewhat convex, narrowly margined above, suture well impressed. Aperture oblique, oval, white within. Peristome brown, acute, slightly, thickened within, basal and columellar margins narrowly reflexed. Columella terminating in a strong, flexuous tubercle, tinged with reddish-brown.

Length, 17; diam. 9½ mm.

Hana, East Maui.

Named in honor of Mr. G. O. Cooper of Hana, to whom we are indebted for the discovery of both this and the following species.

Partulina fulvicans, n. sp.

Shell dextral or sinistral, very minutely perforated, rather thin, acuminately ovate conic, apex subacute; surface shining, marked with delicate incremental striæ, nuder a lens exhibiting extremely close, minute decussating spiral striæ; unclear whorls faintly cross-lined. Color very light yellow, or sometimes white with one or two light yellowish transverse lines; a conspicuous dark band near the apex. Whorls 6, somewhat convex, narrowly margined above;

suture well impressed. Aperture oblique, oval, white within. Peristome acute, slightly thickened within, columellar margin narrowly reflexed. Columella terminating in a strong, white, flexuous fold.

Length, 18½; diam. 10½ mm.

Habitat, Kipahulu valley, Hana, East Maui.

The sinistral variety may prove to be a distinct species.

The molluscan life of this rather secluded valley has only recently been explored.

Newcombia carinella, n. sp.

Shell dextral, very minutely perforated, solid, acuminately turrited, apex subacute; surface lusterless, rather coarsely and irregularly wrinkled by growth striæ, and covered with numerous rather prominent decussating spiral striæ which extend to the apex, with a cord-like carination at the periphery. Color white and brown, alternating in irregular longitudinal undulations, upper whorls with regular white and brown tessellations; apex light brown. Whorls 6, slightly convex; suture lightly impressed; the suture of second and third whorls are margined by the continuation of the peripheral keel or cord. Aperture oblique, oval, livid-white or light-brown within. Peristome light-brown, acute, very lightly thickened within, columellar margin reflexed over the small perforation. Columella very slightly developed, plain and smooth.

Length, 15; diam., 6½ mm.

Habitat, Nahiku, East Maui.

Amastra montana, n. sp.

Shell dextral, imperforate, rather thin, ovately conical, apex acute; surface lustreless, sculptured with fine incremental lines; the nuclear whorls finely radiately sulcated. Color light-brown, covered with a dark fugacious epidermis. Whorls 6, the upper ones slightly convex, the last one somewhat inflated, forming the larger part of the shell. Aperture a little oblique, elongately oval, white within. Peristome simple and thin. Columella terminating in a thin, arched, lamellar plait.

Lenth, 14; diam., 9½ mm.

Habitat, Mt. Kukui, summit of West Maui, 6,000 ft. alt.

Animal in motion as long as the shell. Mantle dark-brown with a light-brown border. Foot and tentacles almost black. Head above coarsely granulated.

This species was found in company with *Laminella alexandri*, Newc. at an altitude incongenial to most Achatinellidæ species.

Amastra rubristoma, n. sp.

Shell dextral, imperforate, solid, elongately ovate-conic, apex acute; surface striated with irregular growth striæ; nuclear whorls radiately sulcated. Color reddish-brown, sometimes almost white, upper whorls darker; generally covered with a dark fugacious epidermis. Whorls 7, convex, suture well impressed. Aperture a little oblique, oval, red within, sometimes livid-white. Peristome acute, very slightly thickened within. Columella terminating in a strong arched lamellar plait, tinged with red.

Length, 19½; diam., 12 mm.

Habitat, Island of Lanai.

This species was discovered by Mr. D. Thaanum of Hilo, Hawaii, who has done much to encourage the study of Hawaiian land fauna.

Amastra seminuda, n. sp.

Shell dextral, imperforate, solid, ovate, spire convexly conical, apex acute; surface covered with rather irregular growth striæ, the embryonic whorls finely radiately sulcated. Color white or light-brown, lower half of body-whorl covered with a densely black epidermis, rest of the shell destitute of epidermis. Whorls 5, slightly convex, suture moderately impressed. Aperture a little oblique, sublunate, white within. Peristome acute, thickened within, not reflexed. Columella terminating in a broad, thin, arched, lamellar plait.

Length, 14; diam., 9 mm.

Habitat, Waikolu, Is. of Molokai.

Amastra conica, n. sp.

Shell fossil, dextral, minutely perforated, thin, elongately conical, apex acute; surface sculptured with fine growth lines, apical whorls radiately sulcated. Color of living shell unknown. Whorls 7, convex; suture well impressed. Aperture oblique, oval. Peristome simple, very thin. Columella terminating in a slightly developed fold.

Length, 15½; diam., 8 mm.

Habitat, Hamakua, Island of Hawaii.

This and the following species were discovered by Prof. H. W. Henshaw of Washington, D. C. He found them in deposits of fossilized shells at a place called Mana. The existence of living examples of either of these species now, or within any recent period, is highly improbable.

Amastra (*Laminella*) *sinistrorsa*, n. sp.

Shell fossil, sinistral, imperforate, thin, acuminately turrited, spire conical; apex subacute; surface sculptured with delicate growth lines, embryonic whorls radiately sulcated. Color of living shell unknown. Whorls 6, convex, suture well impressed. Aperture oblique, sinuately oval. Peristome simple, very thin. Columella terminating in a slightly developed lamellar plait.

Length, 14½; diam., 6½ mm.

Habitat, Hamakua, Island of Hawaii.

Amastra (*Laminella*) *læva*, n. sp.

Shell sinistral, imperforate, rather thin, conically turrited, apex acute; surface striated with fine incremental lines, embryonic whorls with delicate radiating sulcations, color brown, with irregular patches of a dark fugacious epidermis. Whorls 6, somewhat convex; suture well impressed. Aperture oblique, oval, livid-white within. Peristome simple and thin. Columella terminating in a thin lamellar plait.

Length, 12; diam., 5 mm.

Habitat, Haleakala Mt., East Maui.

This species is the counterpart of *Laminella soror*, Nc. found on West Maui, but the latter is a larger and more obese shell.

NOTES ON CARYCHIUM AND DESCRIPTION OF A NEW VARIETY.

BY GEO. H. CLAPP.

In examining a series of *Carychium* recently, I noticed that there is a large northern race of *C. exile* Lea which is found from Maine to Winnipeg, Manitoba, the latter being the most western point from which I have material. It differs from typical *exile* by its greater size, which is very constant throughout its range. Topotypes of *C. exile* from Wissahickon Creek, Philadelphia, Pa., kindly loaned me

for examination by Dr. H. A. Pilsbry, measure 1.70 x .6 mm., and the lot from Kent, O., from which Dr. Pilsbry defined this species, NAUTILUS, Vol. VIII, p. 63, measure 1.75 x .6 mm.

The average size of *C. exile* from a large series of measurements may be put down as 1.75 x .6 mm.

The northern race is, so far as I have seen, confined to the so-called "Canadian Zone," and I therefore propose the name *C. exile canadense* for this variety, taking shells collected at Kennebunkport, Me., as the types. These measure 2.1 x .75 mm., which is about the average size. The series of measurements below show the slight variation in this variety:

Kennebunkport, Me. (types), 2.1 x .75 mm.
Islesboro, Me., 2.15 x .75 mm.
Aroostook Co., Me., 2.00 x .75 mm.
Hartland, Vt., 2.0 to 2.10 mm. long.
Bobcaygeon, Ont., Can., 2.00 x .70 mm.
Ottawa, Ont., Can., 2.10 x .65 mm.
Winnipeg, Manitoba, 2.05 x .75 mm.
Huron Mtn., Marquette Co., Mich., 2.05 x .75.
Lime Id., Chippewa Co., Mich., 2.0 to 2.1 mm. long.
Gogebic Lake, Ontanogen Co., Mich., 2.0 to 2.1 mm. long.
White Earth Lake, Minn., 2.1 mm. long.

The Ottawa shells are the most slender that I have seen.

All of the Michigan *C. exile* in the collection of Mr. Bryant Walker are var. *canadense* with the exception of one lot from Shelby, Macomb Co., which measures 1.75 to 1.80 mm., and a lot from Saginaw where they run from 1.7 to 1.9 mm.

The only southern shells which I have seen approaching var. *canadense* in size is a lot collected by Herbert H. Smith in mountain forests near Princeton, Ala. These measure 1.90 x .70 mm., and are unusually heavily ribbed, but other shells collected in the same general locality are typical *exile*.

Plate VIII, where the figures are magnified 18 diameters, shows the difference in size very plainly.

C. exiguum also appears to run somewhat larger in the North, but as there is more variation in this species than in *exile*, the northern race is not well defined. The average size of *exiguum* is about 1.75 x .75 mm., but there is a wide variation as shown by measurements given below:

Valley Head, Ala., 1.55 x .65 mm.
Lemon City, Fla., 1.60 x .70 mm.
Staten Island, N. Y., 1.65 x .75 mm.
Edgeworth, Pa., 1.70 x .75 mm.
Des Moines, Iowa, 1.85 x .75 mm.
Iowa City, Iowa, 1.80 x .70 mm.
Crooked Lake, Emmet Co., Mich., 1.75 to 1.85 mm.
Kennebunkport, Me., 1.85 x .80 mm.
Pigeon Lake, Ont., Can., 1.90 x .80 mm.
Orono, Me., 1.80 to 1.90 mm.
Ann Arbor, Mich., 1.65 to 2.00 mm.
Huron Mtn., Marquette Co., Mich., 2.15 x .85 mm.

These figures seem to indicate an increase in size in the north, but the Ann Arbor lot shows almost as much variation as in the balance of the range. The Huron Mountain shells are unusually large, much larger in fact than any others seen from Michigan, and their size is probably due to favorable environment as in other parts of the state typical shells are found.

EXPLANATION OF PLATE VIII.

Fig. 1. Carychium exile canadense n. v., Kennebunkport, Me., 2.1 x .75 mm.

Fig. 2. Carychium exile canadense n. v., Winnipeg, Manitoba, 2.05 x .75 mm.

Fig. 3. Carychium exile Lea, topotype, Wissahickon Cr., Phila., Pa., 1.70 x .60 mm.

Fig. 4. Carychium exile Lea, Mt. Vernon, Va., 1.50 x .55 mm.

Fig. 5. Carychium exile Lea, Edgeworth, Pa., 1.75 x .60 mm.

Fig. 6. Carychium exile canadense n. v., Ottawa, Ont., Can., 2.10 x .65 mm.

Fig. 7. Carychium exile canadense n. v., Huron Mtn., Marquette Co., Mich., 2.05 x .75 mm.

Fig. 8. Carychium exiguum Say, Huron Mtn., Marquette Co., Mich., 2.15 x .85 mm.

Fig. 9. Carychium exiguum Say, Valley Head, Ala., 1.55x.65 mm.

Fig. 10. Carychium stygium Call, cotype, Mammoth Cave, Ky., 2.00 x .85 mm.

A NEW SUBSPECIES OF POLYGYRA MULTILINEATA SAY.

BY WM. A. NASON.

Polygyra multilineata algonquinensis n. subsp.

The shell is smaller than *multilineata*, color varying from white translucent to dark horn or chestnut, banded with reddish brown or unicolorous, rather thin and fragile, peristome moderately reflected, white.

Greater diameter 17 mm., 32 specimens.
Greater diameter 17.5 mm., 24 specimens.
Greater diameter 18 mm., 72 specimens.
Greater diameter 18.5 mm., 41 specimens.
Greater diameter 19 mm., 54 specimens.

Algonquin, McHenry Co., Illinois.

Cotypes in collections of Bryant Walker, Acad. Nat. Sci. Phila., Chicago Academy of Sciences, and Arthur F. Gray.

All the specimens collected were examined, 284 in number, and their average size is expressed in the above table of measurements. The largest specimens found were three which measured 21 mm. in greater diameter, and the two smallest specimens only measured 14.50 mm. in greater diameter. No larger specimens than those mentioned were found in the region, although the ground was well explored for many years.

The specimens were all found in crevices and hollows about the roots of a clump of willows, growing in a marshy and boggy place. Associated with them were numerous specimens of *Polygyra monodon* Rack., *Succinea ovalis* Say, *Pomatiopsis lapidaria* Say, *Pyramidula striatella* Anth., and other moisture-loving land shells.

A comparison made with 48 specimens of *P. multilineata* from Ohio, Michigan, and other localities, in my collection, showed great difference in measurements. 33 specimens of this series measured 22 mm. to 24 mm. in greater diameter, and only two specimens were as small as 21 mm. in diameter.

The uniformity of size of the variety *algonquinensis*, the fact that no other forms or sizes of the species were found in this region, and the fact that they breed true, for the series was the result of three years' collecting on the same small space of ground, entitles this shell to varietal rank. And also, the perfect development of all the characters, as found in the normal *P. multilineata*, and the fact that this

new subspecies is not in any way pathological, confirms the claim. The smallest forms mentioned above are as well characterized and symmetrical as the largest forms.

An interesting fact in regard to the specific value of the bands in this variety is exhibited by two or three specimens. In these the shell is unicolorous until half-grown, and banded from that point to the reflected lip. And one specimen is the reverse in this respect, being banded when young, and later in its growth unicolorous. This would seem to indicate that the bands and color are not even a stable individual character.

LYMNAEA HINKLEYI N. SP.

BY FRANK COLLINS BAKER.

Shell varying from ovate to globose, very thin; color of periostracum light greenish-horn; surface dull to slightly shining, rough, the growth lines uneven and raised at intervals to form pseudo ribs; the surface is sometimes malleated and occasionally ornamented by five or six heavy spiral ridges; fine spiral, impressed lines present and very marked in some specimens; whorls 3 + (the apex invariably decollated), rounded, tumid in some specimens, the last whorl globose; spire of variable length but generally shorter than the aperture, broadly conic; sutures distinctly appressed and frequently distinctly impressed; aperture roundly ovate, not expanded, acutely narrowed at the posterior angle; outer lip thin, acute; inner lip very tightly appressed to the parietal wall, where it shows as a very thin wash of callus; the anterior part of the inner lip is reflected over the umbilicus, leaving a very small chink; axis slightly twisted, forming a distinct ascending plait.

Length 12, breadth 8.5, aperture length 8, breadth 5 mm.

Length 11.5, breadth 7.5, aperture length 7.25, breadth 4.5 mm.

Length 12, breadth 7.75, aperture length 7, breadth 4 mm.

Length 11, breadth 6.75, aperture length 6.25, breadth 3.75 mm.

Length 15.25, breadth 9.25, aperture length 10.5, breadth 5.5 mm.

Length 11, breadth 6.75, aperture length, 6.5, breadth 3.75 mm.

North fork Snake River, East Idaho. Collected by Mr. A. A. Hinkley in 1905. Types: Chicago Academy of Sciences; cotypes: Academy of Natural Sciences of Philadelphia, and Mr. A. A. Hinkley.

This is apparently a very distinct species and does not appear to be exactly comparable with any *Lymnæa*. It was thought to be *L. binneyi*, but the shell is very much smaller and thinner, with no umbilicus and without the acute spire of *binneyi*. It apparently belongs to the typical group of *Lymnæa* despite its globose shape, which might place it in *Radix*, excepting for the lack of the raised and continuous lips of the aperture. It has something of the aspect of a young *Bulimnea*.

I take great pleasure in naming this species in honor of Mr. A. A. Hinkley, of Du Bois, Illinois, in whose collection the shells were found.

NOTES.

NOTE ON SOME NAMES IN THE VOLUTIDÆ.—A revision in which I have been engaged for some time of the nomenclature and classification of the *Volutidæ*, has shown several errors which have attained a wide currency owing to the failure of authors to attend to the details of early publications on the subject. This has rendered it necessary to give new names to several groups, and to shift some names to groups agreeing with their original types, which had been neglected or lost sight of. Some of the more conspicuous instances are as follows:

Adelomelon Dall; new name for the dull-colored group of South American volutes usually called *Scaphella*, but not the *Scaphella* of Swainson, 1832. Type, *Voluta ancilla* Solander.

Harpulina Dall; new name for *Harpula* auct. non Swainson, 1832. Type, *Voluta arausaica* Solander, 1786.

Maculopeplum Dall; Type, *Voluta junonia*, Lamarck. This was originally included with the species of *Scaphella* by Swainson, whose type was *Scaphella undulata* Lam., but the American shell belongs to a totally different group from the enamelled species for which Swainson's genus was proposed. *Amoria* Gray, is probably a synonym of *Scaphella*.

Volutilithes Swainson, was proposed for the shells to which Fischer later gave the name of *Eopsephæa*. The type is *Voluta muricina* Lam. The shells typified by *Voluta spinosa*, and which are usually called *Volutilithes*, will probably take the name of *Plejona* Bolten, 1798.

When discussing the *Volutidæ* in the Wagner Inst. Transactions in 1890, I stated that I had not attempted to revise the nomenclature of the group at that time; but if I had been aware of the serious reformation needed in the accepted nomenclature, I should have felt obliged to undertake it without delay.—Wm. H. Dall.

PUBLICATIONS RECEIVED.

Loess Papers: The Loess of Nachez, Mississippi; The Loess and the Lansing Man; Loess and the Iowan Drift; Evidences (?) of Water-deposition of Loess. By B. Shimek (*Bull. Lab. Nat. Hist. Iowa State University*, V., no. 4). The question of the genesis of the loess of the Mississippi Valley has interested two generations of geologists. Until quite recently the great majority of American writers, and among them Prof. Shimek himself, ascribed its deposition to the action of water. Later studies by Shimek, covering exposures over practically the whole loess area, caused him to advocate the view that our loess is of Æolian origin. This thesis is discussed with great ability, and it is not possible here to give an adequate outline of the argument. It is shown that the highest and thickest deposits of loess lie along the larger streams, and their deposition by water would require vast inland lakes, of which there are no traces of shore-lines. The fine and homogeneous deposits containing fragile shells unbroken and unworn, are not such as would be deposited by aqueous action. Moreover, fluviatile shells are absent, the loess fossils being chiefly land shells, and exceptionally those of small pools. A great mass of evidence, geological and faunal, is brought forward to show that the loess is of the nature of an upland dune formation.

The argument for æolian origin from the fossil shells will be read with great interest by conchologists. Prof. Shimek's thorough knowledge of both the loess and the modern faunas enables him to deal hard blows to those who attempt to defend the aqueous theory on palæontologic grounds. The last essay of the series is a damaging critique of the papers of Prof. G. Frederick Wright and Luella A. Owen. There are fourteen excellent plates, two representing fossil land shells of the Nachez loess.

This brochure contains the most complete and authoritative exposition of the subject of loess formation in the English language, and will be invaluable to all students of the loess and its fossils.—H. A. P.

THE

NAUTILUS

A MONTHLY JOURNAL
DEVOTED TO THE INTERESTS OF
CONCHOLOGISTS

VOL. XX.

MAY, 1906, to APRIL, 1907.

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THE NAUTILUS.

VOL. XX. MAY, 1906. No. 1.

SHELL-COLLECTING ON THE MOSQUITO COAST OF NICARAGUA—VI.

BY W. H. FLUCK.

Tellina (*Eurytellina*) *angulosa* Gmel. Abundant on the beach all along the coast from Bluefields to Cape Gracias à Dios. The dead shells found were almost always in perfect condition, not even the hinge ligament injured. Live shells in the shallow water on quiet days. This is the most highly colored bivalve on the cost.

Tellina (*Cyclotellina*) *fausta* Donovan. Plentiful in the shallow water about the Man of War Keys.

Sanguinolaria (*Psammotella*) *operculata* Gmel. A common shell on the sandy beaches of the Mosquito Coast. Walpa Siksa is a good locality for it. This very beautiful shell is not as brilliant as *T. angulosa*, but is larger.

Sanguinolaria rosea Lam. This beautiful pink shell is by no means numerous along the east coast of Nicaragua. I searched the beach and shallow water almost daily for four years, but succeeded in finding four specimens only. It inhabits deep water, possibly. It is altogether too fragile to stand the pounding of the surf.

Asaphis deflorata Linn. Abundant in the shallow sea and pools at King's Keys and the other islands along the coast. It seems to be variable in color, being pink, cream, blue, and white.

Strigilla carnaria L. Very abundant. I found two sizes ; large, full-grown forms fairly plentiful, and young, brighter colored half-sized specimens, in large quantities. They occurred thus so regularly that I was persuaded they were two distinct species. I felt the more certain of this since in the larger forms the ligament was in

every case more deeply seated. However, both Mr. C. W. Johnson and Dr. W. H. Dall assured me that the smaller form was young and the larger "typical."

Iphigenia braziliensis Lam. My specimens, with the exception of a few dead shells, were found at or near the mouth of the Wawa river, where it is plentiful. It is a dweller of estuaries.

Donax denticulatus L. This is by far the most abundant bivalve on the Caribbean coast of Nicaragua. All the native children, Indian, Creole, as well as the Spanish speaking ones gather it in large basketfuls for the family larder. At low tide these beautiful "wedges" are to be seen all over the beach in favorable places, sitting up in the sand, thin end (posterior) down, with about one-third of the broad anterior exposed, the shell a little open and the siphons at work with every rush of the water as the waves come in and roll out. *Donax* is either stupid or without fear, for it seldom trys to escape by digging, on being approached, as do the *Solens*. The shell is very variable in color and radiations. I have a series of about 25, all different. Wounta Haulover.

Donax cayennensis Lam. Inhabits the same localities and the same sandy stations between tides as the former, but it is not anything like as numerous. It is a larger shell than *denticulatus*, with a more angular anterior ridge, and is more uniform in color, not varying much from pure white, although some specimens tend to bluish, yellow, or purple. Prinzapolka was the first locality at which I found this shell, but one always find them wherever *D. denticulatus* is to be had. A very good authority wrote me some time ago: "In going over the *Donacidæ* in the museum, I find no characters to separate Lamark's *Donax cayennensis* from the *Donax striata* L." I have never seen the latter form. Can these names be synonyms? Both *D. cayennensis* and *D. denticulatus* are called *ahi* by the native Indian population. The former they regard as the male and the latter as the female. *Ahi* means *dimple*. Is not that more beautiful than *wedge?*

Pitar (*Hysteroconcha*) *dione* L. Very abundant. I shall never forget finding my first specimen of this beautiful, sulcate, spinose shell. The Indian boy who was with me further increased the pleasure of the find by telling me that they were *manas*, *without number*. I soon found that he was not far from the truth. Wounta Haulover seems an ideal place for this species, the shore and bottom

being sandy, the sea open with no bars, and the only rocks too far out to be of any injury to their fragile spines. Wounta Haulover.

Chione cancellata. A variety. Much worn odd valves only. Wounta Haulover, on the beach.

Cyrena (*Polymesoda*) *panamensis* Prime. This is the common bivalve of all the lagoons along the Caribbean coast of Nicaragua. It is not always found in the mud, although in the Bluefields lagoon it thrives in that kind of a station. At Wounta Haulover it lives in the lagoon back from the sea, on a sandy bottom, while at Karata it is to be found on the gravel. I have eaten very good chowder made of *klito*, as the Indians call it. The umbones are always, so far as I have observed, corroded in adult specimens.

Tivela mactroides Born. This pretty little clam is quite common on the shore and in the shallow water along the open sea. The shell is solid and looks as though it might stand rougher water than it usually gets on the Mosquito Coast. Dr. Dall, in his "Synopsis of the Family Veneridae" is quite right in saying: "This species may be white, or chestnut-brown or with brown rays on a lighter ground." I have specimens that alternate with white and brown concentrically.

Echinochama arcinella L. A few dead shells, with one exception all left valves.

Chama congregata Conr. Dead shells everywhere on the beach, especially left valves attached to old *Pecten*, *Arca* or *Chione* shells.

Codakia orbicularis L. Plentiful about Man of War Keys; I also have a few from Pearl Key.

Arca umbonata Lam. Man of War Keys. I found but one specimen, although the Indian turtle-hunters, who frequent the Keys, told me that it was a very common shell at times.

Scapharca (*Cunearca*) *incongrua*, var. *braziliana* Lam. Wounta Haulover. Plentiful at all times on the beach, generally with hinge ligament perfect. Also found alive in the shallow water on quiet days.

Arca (*Argina*) *campechensis* Dillwyn. Walpa Siksa, on the sea-beach, both north and south of the river mouth.

Arca occidentalis Phil. Bilwi, just north of the Wawa river mouth, on the open beach.

Melina ephippium L. Man of War Keys. Abundant.

Pinna muricata L. I never found a living shell, but good specimens of dead ones were to be found at almost any time on the beach,

especially about the sand-bars and in the coves at and near the mouth of rivers, as at Wawa, Wounta, and Walpa Siksa.

Pecten dislocatus Say. Wounta Haulover. A few single valves.

Plicatula ramosa Lam. Wounta Haulover. Found attached to soft corals, sponges, and like marine growth. Numerous.

Ostrea virginica Gmel. A very abundant shell in all the lagoons and estuaries, not far from the sea. It seems to multiply very fast, filling up harbors and channels. It does not get as large as our northern oysters, possibly on account of the large quantities of fresh water that cover them for protracted periods during the rainy season.

Discinisca antillarum D'Orb. Wounta Haulover. I found six or eight on an old Pinna. These little brachiopods remind one of miniature Anomia simplex.

Helicina amoena Pfr. In native clearings in the forest along the Wounta (or Kukallaya) river, northwest of the village of Kukallaya.

Helicina dalli Bartsch. Near Wani, Nicaragua.

Nephronaias flucki Bartsch. From the Wounta river, a day's paddling by canoe to the northwest of the village of Kukallaya.

Streptostyla flucki Bartsch. Near Wani.

Neocyclotus (*Neocyclotus*) *chrysacme* Bartsch. Near Wani.

Chrondropoma callipeplum Bartsch. Near Wani.

The region about Wani is quite different from the low, sandy, coastal-plain. It takes many days' canoe paddling, according to the volume of water in the river, to reach it. It is in what the Indians call the "hill country."

The five last-named shells are new. Dr. Paul Bartsch, who has seen my entire collection, is at this writing publishing descriptions of them.

I have a few more Mosquito Coast shells which I might add to this list, but will not do so now. At some future time I shall ask for space for another article.

I am convinced that the shells I collected in the lowlands of eastern Nicaragua do not by any means exhaust the molluscan fauna of that region. The highlands of the interior, the mangrove swamps, rivers, lagoons, sea beaches, and the keys, all have treasures for the man who has time to search for them. As for myself, I picked up only such shells as I stumbled over in the strenuous pursuit of other duties.

A NEW CHINESE SITALA.

BY H. A. PILSBRY.

Sitala hangchowensis n. sp. Shell subperforate, trochiform with rounded periphery, pale brown, surface dull, smoothish, under the compound microscope showing dense, vertical striation, most distinct on the penultimate whorl, and very fine, close spiral impressed lines, the base distinctly striate spirally, with finer spirals in the intervals between coarser lines. Spire conic with nearly straight outlines. Whorls 6, decidedly convex, the last rounded peripherally and convex beneath. Aperture somewhat oblique, lunate, the margins thin and simple; columella concave below, vertical with reflexed edge above. Alt. 3.7, diam. 4.1 mm.

Hangchow, China. Types no. 91131 A. N. S. P., from no. 1074 of Mr. Hirase's collection.

It is not easy to decide whether this species should be considered a *Sitala* or a *Kaliella*, but on account of the fine spiral striation it probably accords best with the first. It is larger than *Kaliella depressa* and *K. monticola* Mlldff. with fewer whorls, 6 instead of $6\frac{1}{2}$, and it has a dull, not glossy surface.

NEW SPECIES OF PISIDIUM.

BY V. STERKI.

Pisidium proximum, n. sp. Mussel of medium size, moderately to rather well inflated, outlines oval without any projecting angles, posterior margin slightly subtruncate in some specimens, beaks somewhat posterior, rather broad to narrow, rounded, or their centers more or less flattened, with a ridge around the flattened area in some specimens; surface with irregular, fine to rather coarse striae and several lines of growth, shining, color light yellowish-horn to brownish; shell opaque to subtranslucent, thin; hinge slight, cardinal teeth of various shapes; ligament rather long.

Long. 5.6 alt. 4.8, diam. 3.4 m. (Wash.)

Long. 6 alt. 5 diam. 3.8 m. (B. C.)

Long. 4.1 alt. 3.5, diam. 2.5 m. (B. C.)

Habitat: Washington, British Columbia: Walla Walla sent by B. Walker, a good number of specimens deep horn to brownish,

beaks rather broad and moderately elevated; "a small pond, Second Summit, B. C., at alt., 6000 ft." (collected by O. W. Spreadborough, 1905, sent by J. F. Whiteaves), about eighty specimens; somewhat larger than the Walla Walla form, of light color becoming brownish over the beaks in older specimens, then with irregular, alternating zones of lighter and darker; the beaks are more elevated and in many specimens narrower. Although of rather different appearance, the two Pisidia seem to be of the same species. "Pond at head of North Fork of Caribou Creek, East of Burton City, West Kootenay, B. C." (by same); considerably smaller, but seem identical; the beaks are full and prominent, the disks rather flat towards the inferior margin.

This Pisidium is under doubt as to its affinities. While apparently somewhat like some forms of *abditum* Hald., it has also resemblance with a South American Pisidium which I take for *boliviense* Sturany. More materials from other places may help answering this question. Our Pacific Slope Pisidia, and more so those of Central and South America are still very insufficiently known.

THE MANATEE SNAIL BULIMULUS DORMANI.[1]

The sooty mould of the orange, *Meliola*, is one of the most serious results of white fly infestation of citrus groves, and is an element in the injury to various plants from aphids and from some of the scale insects, especially the Lecaniums, mealy-bugs, wax scales, and cottony cushion scale. The fungus is not itself a parasite on the plant, but a saprophyte, deriving its sustenance from the sweet honey dew secreted by these insects. The injury to the plant results from the smothering action of the fungus, the heavy coating of fungal threads interfering with the healthful action of sunlight on the leaves. The appearance of the various ornamental and hedge plants is also disfigured by the dark fungus. The sooty mould is especially bad following the white fly attack, owing to the large amount of honey dew secreted by these insects. As the white fly larvæ attach themselves to the under side of the leaves, the honey dew exuded by them falls to the top side of the leaves beneath, thus affording favorable opportunity for the growth of the fungus. So constant is the association

[1] Press Bulletin No. 59, Florida Agricultural Experiment Station. Department of Entomology.

of the fungus and the white fly that badly infested groves and hedges may be recognized at some distance by the heavily coated dark foliage. The fungus develops on the fruit as well as on the leaves and stem, and washing becomes necessary, resulting not only in an added expense, but also in increased danger of decay in shipping. In this connection the habits of the tree snail, *Bulimulus dormani*,[1] are of the greatest interest. This snail has been found in the orange groves in Manatee county feeding upon the sooty mould. Just how long the snail has been present on orange trees in this county it is impossible to say. It was observed as long as two years ago by Mr. F. D. Waite, at Palmetto. It seems to have been present in small numbers in other groves at this time, but attracted no further attention until the present summer. The snail is now widely distributed in Manatee county, occuring in many groves on both sides of the Manatee river. The work of the snails is very characteristic. When well started they occur in great numbers on the tree, spreading over it from base to top. Its favorite food seems to be the sooty mould. The fungus is cleaned from the leaves, stems, and fruit. The leaves thus cleaned have a glossy, shiny appearance as though free from white fly. The fruit thus cleaned has a better color and probably ripens earlier. In addition to the fungus, the snail takes algæ and some lichens from the stem and trunk, giving the trunk a much cleaner and fresher look. The trees that are cleaned stand out conspicuously from the surrounding trees by their bright foliage and clean trunks. The snails increase rapidly under favorable conditions. The eggs are probably deposited in protected places about the trunks of the trees, possibly also about the base of the tree under leaves and other rubbish. That the snails are capable of doing effective work, when present in sufficient numbers, has been shown in numerous groves in Manatee county during the present summer. Such trees in these groves as are well stocked with the snails have been thoroughly cleaned, the fruit not requiring washing.

The snails are of medium size, measuring when full grown, three-fourths to one inch in length. The shells are smooth, white, or corneous-white, and with about four bands of brown spots. Old

[1] This species is now placed in the genus *Drymæus*. A closely allied species, *D. dominicus* Rve. (*B. marielinus* Poey), is also common throughout southern Florida, and frequently confounded with *dormani*. It probably has similar feeding habits.—EDITORS.

shells have often a somewhat corroded surface, the bands becoming indistinct or absent. When the conditions are unfavorable, either cold or dry, the snails take refuge in the hollows of the trees or under leaves accumulated in the forks, or elsewhere, or under sacks at the base of the trees when these are provided. It thus becomes an easy matter to transfer them from tree to tree. A few snails placed by Mr. Wade Harrison in one of his trees in March, increased in such numbers as to free the tree of sooty mould by mid-summer of the same year. The snails are known to range with some variation from the mouth of the St. John's river on the north, to the Caloosahatchie river on the south. The species is probably native to Florida, as specimens in small numbers were observed about the hummocks and elsewhere as long as fifty years ago. Its habit of feeding on the sooty mould of the orange, however, was not known until within the past two years.

In view of the fondness of the snails for the injurious sooty mould fungus, it becomes of first importance to observe their treatment of the beneficial fungi. Among the fungi parasitic on orange insects there are four species of inestimable value to orange growers. These are the brown fungus well known as an effective parasite on the white fly larvæ; the red-pink fungus also parasitic on the white fly; the red fungus, and the gray-headed fungus, both parasitic on the common scales. The brown fungus so effective in control of the white fly, as is well-known, throws out spreading hyphæ for some distance around the body of the dead leaves. It seems that the snails occasionally feed to a limited extent on these spreading hyphæ, but evidently not enough to interfere with the spread of the fungus, since this fungus is doing particularly effective work in the groves in the Manatee region where the snails occur; the red-pink fungus is also abundant in the groves where the snails occur and is untouched by them. The snails have not been observed to feed on either the red or the gray fungi parasitic on the common orange scales, and it is probable that they have no taste for these parasitic fungi. Colonies of the snails are being started in parts of the State where the white fly injury is severe and where conditions seem favorable for the growth of the snail. It is desirable that close attention be given to the habits of the snail, as well as to means of protecting colonies against unfavorable conditions. A few sacks thrown around the tree seems to afford a needed protection against unusual cold. It is probable that sprays can not be used

on trees stocked with the snails without injury to the colony, for, although protected by the shell from the immediate effect, sufficient spray probably clings to the sooty mould on which they feed to destroy them. The beneficial parasitic fungi and the snails may be allowed to work together on unsprayed trees. The snail is here spoken of as the Manatee snail since while recorded as occurring in other parts of the State it was found working on the orange groves first in the Manatee region.

NOTES.

Collecting in the Everglades. I have recently returned from a collecting trip in the Everglades. Most of the collecting was done at a point where the Big Cypress Swamp and the Everglades meet, about 80 miles from Myers and 35 miles from Immokalee P. O. *Drymaeus dominicus* Reeve was found in the air-plants. Dead shells of *Glandina truncata* var. *minor*, were plentiful, but live ones scarce. A few *Zonitoides arboreus* were also found in air-plants. *Polygyra cereolus* var. *carpenteriana* and *uvulifera* I did not collect. Beautiful specimens of the glossy, dark, amber-colored *Physa cubensis* Pfr., were found on the under side of the leaves of water plants. *Planorbis intercalaris* Pils., and *P. tumidus* were very plentiful, the latter in the more shallow water. *Ancylus peninsulae* Pils. & Johns., was found on decayed wood in the Cypress Swamp. *Ampullaria depressa* is abundant on the edge of the Everglades. The shells are heaped around isolated cypress trees, where they are dropped by the hawks which feed upon them ; a bright yellow variety without bands is occasionally found. A small *Unio* was common in a stream near Immokalee.

A. G. Reynolds.

Output of American Pearls.—Dealers in American pearls state that the past season showed a diminished output of fine gems, but a gain in the traffic in baroques or pearl formations of irregular shapes.

The most valuable pearl discovered last season was taken from the Wabash river, near Mount Carmel, Ill. This was a pink-white gem of eighty grains, and is valued by its owner at $8000.

A pearl valued at $5000 was found in a mussel shell taken from the Skillet Fork river, Carmi, Ill. Other pearls, worth from $500 to $3000, were found last year; but such fortunate discoveries were considerably fewer in number than in former years.

Nearly every year witnesses a shifting of the pearl-hunting industry. The Kankakee river, Indiana, was the newest field last season, and some valuable gems were found there.

Of late, French buyers have been actively represented in the American market. The activity of these foreign buyers, together with the diminished supply, was largely responsible for the fact that prices at the close of the season ranged from 25 to 35 per cent. higher than they did a year before.

Despite the fact that American pearls now command a higher price than ever, the volume of business has shrunk because of the destruction of so many of the mussel beds.

In one year the output of the rivers of Arkansas was valued at $2,000,000. Last year, some experienced dealers assert, the value of the whole American product, exclusive of baroques, was not worth more than $500,000.

Dealers charge that many fine pearls are rendered valueless by the practice of button houses, and those who fish for them, of throwing mussels into hot-water vats, in order to open great quantities of shells rapidly. These button houses seek the mother-of-pearl in the shells.

Baroques, or pearls of irregular shapes, have attained a prominent place in commerce. Some of them have a sheen or opalescence equal to the quality of the finest gems.

Until recently, pearl hunters sought only symmetrical shapes, and the baroques were left as playthings for children along the streams, or were cast aside.

The influence of the "new art" originated a demand for these angular, irregular and eccentric formations.

Jewelers now use the baroques in making scarf pins, chrysanthemums, figures and ornaments.

The long and narrow shapes, especially, lend themselves with readiness to the jeweler's art. As many of these odd formations were found to have attractive color, lustre or iridescence, the public soon found a liking for them.—*North American.*

COCHLIOPA ROWELLI IN CALIFORNIA.—In response to an inquiry in the December NAUTILUS concerning the habitat of this species a single note has been received, referring to the original finding of the shell. It has apparently not been found since. The note follows: "*Cochliopa Rowelli*, was named from shells collected by me, near Baulinas Bay (not Clear Lake) Marin Co., California."—J. Rowell.

ON THE GENERIC NAME ANOSTOMA.—At the time I prepared a monograph of this genus (Man. of Conch., XIV, p. 109, 1901) I did not notice that two modifications of the same name were already in use: *Anostomus* Klein in Walbaum, Pet. Arted., Gen. Pisc., III, p. 659, 1792, and *Anastomus* Bonnaterre, Encycl. Méth., Ornith., p. xciii, 1790. Whether these conflict with the molluscan *Anostoma* depends upon whether the different spelling be held to constitute a different name—a question still in dispute. *Tomogeres* Montf. is the next name applied to the molluscan *Anostoma*.—H. A. P.

ON THE PATHOLOGY OF SPHÆRIUM.—Among thousands of *Sphærium solidulum* Pr., in company with several other species, from Des Moines, Iowa, collected and sent for examination by Mr. T. van Hyning, there were several dozen specimens of special interest, abnormal and evidently of a pathological nature. They were considerably smaller than the average, almost globular, the beaks being nearly as broad as in the normal form—apparently representing a distinct species. At the anterior margin of the shell there was a more or less marked scar, contiguous to the anterior adductor muscle and the lateral teeth. This was evidently caused in all specimens by one and the same agency, probably a parasite affecting the mantle edges in some way and thus causing the deformity of the shell. And the effect was not only local, as is evident by the fact that a coarse line of growth, from that place, all around both valves is noticeable in nearly all specimens thus affected, and the normal growth of the whole mussel was checked. Some larger specimens, of more or less irregular growth, show the same scar at the same place, in some instances only slightly marked.

Similar mussels have been noticed before, from other places, but never in such numbers. Also some *Pisidia* were seen similarly affected. It is hoped that fresh, living specimens will be obtained, in order to ascertain the cause of the deformity.—V. STERKI.

PUBLICATIONS RECEIVED.

CATALOGO DE LOS MOLUSCOS TESTÁCEOS DE LAS ISLAS FILIPINAS, JOLO Y MARIANAS. I, MOLUSCOS MARINOS, por J. G. Hidalgo, 1905, xvi + 408 pp. Since 1840, when the description of Cuming's rich collection was begun, the Philippines have been noted for the great number and beauty of their marine shells. A very large num-

ber of species was first described from there, and in critical researches on other Indo-Pacific faunas, constant reference to and comparison with Philippine topotypes is necessary. Several years ago Elera published a catalogue of the fauna, compiled from previous monographs, etc., but without new material or critical knowledge of the mollusks themselves. Dr. Hidalgo has given many years to the study of the Philippine fauna and has condensed his results in the catalogue before us. 3121 species are admitted, and 704 others, cited from the Philippines on insufficient grounds, are enumerated. Those species actually seen by the author are indicated by a *, and it will be noticed that a large majority are so marked. This gives the records an authenticity far beyond that of a mere compilation, and is a feature of special value since many of the former Philippine citations rested upon Cumingian records only. A figure of each species is cited. This is not only a convenience, but of great value as showing the exact form intended, a significant point in these days of nomenclature changes. In his views of specific limits, Hidalgo takes the middle course, conservative as Crosse and von Martens may be said to have been, but not reactionary as Tryon was in the earlier volumes of his *Manual*. The use of genera is open to some criticism, from the retention of names such as *Triton*, *Vertagus*, etc., now generally held to be untenable. The localities of each form are fully recorded, most of these records being new.

The typography of the volume is excellent. A portrait of the author is given as frontispiece.

Dr. Hidalgo proposes to give in the second part of the *Catalogo*, an enumeration of the land and fresh water mollusks. These catalogues do not replace the more extensive monograghic account of the fauna which is appearing at intervals in the handsomely illustrated *Obras Malacologicas* of the same author. The elaborate design of the latter renders its publication a work of many years. Meantime those interested in Indo-Pacific faunas will find the *Catalogo* one of the most useful of the many scholarly works we owe to the distinguished Professor of Malacology of the Madrid Museum. H. A. P.

Catalogue of the Land- and Fresh-Water Mollusca of Taiwan (Formosa).—By Henry A. Pilsbry and Y. Hirase (Proc. A. N. S., Phila., 1905). In the island of Formosa 128 species of land shells are now known, 28 of them described in this paper. There are 26 species of fresh water mollusks. The affinities of the mollusks are chiefly with those of China, though there is some affinity to the Ryukyuan fauna.

The Nautilus.

Vol. XX. JUNE, 1906. No. 2.

EPIPHRAGMOPHORA KELLETTII (FBS.) AND E. STEARNSIANA (GABB).

BY GEO. H. CLAPP.

Recent writers on American conchology have united these two species, the latter as a variety of the former, but a careful study of large series of both shows that Gabb was correct when he identified and named *stearnsiana* as a distinct species.

Forbes' original description of *Helix kellettii* was published in P. Z. S., 1850, p. 55, and the type is figured on Pl. IX, 2a, b. He was, however, badly mixed on his localities as he says: "Of the genus *Helix* there are nine species. Of these *H. townsendiana*, *nuttalliana* and *columbiana* are certainly from the neighborhood of the Columbia river. *Helix kellettii* and *pandoræ*, both new, are probably from the same country, though the box in which they were contained was marked 'Santa Barbara.' *Helix areolata* bears no indication of its locality."

Through the kindly offices of John Ponsonby, Esq., of London, England, I was enabled to enlist the services of Edgar A. Smith, Curator of Conchology, British Museum, and he sent me a colored drawing of the type, which agrees very closely with Forbes' figure, and at the same time he checked up Forbes' measurements and found them correct, but was unable to count 6 whorls, unless anything over 5 is called 6.

With this as a starting point and a large series of shells from Santa Catalina Is., and the mainland from San Diego to Rosario and Cedros (Cerros) Is., Lower California. I have tried to separate the two species with the following result:

In looking up the literature, I found that there was considerable diversity of opinion and that authors were not always careful to follow the original description. Binney in Terr. Moll. IV, 17, copied Forbes' description and remarks *verbatim* and copied Forbes' fig. 2b on his Pl. LXXVI, fig. 12.

Pfeiffer in Mon. Hel. Viv. III. 182 changed Forbes' description which gave the size as 22 x 19 x 19 m.m., whorls 6, to size 24 x 20 x 16 m.m., whorls 5.

Tryon in Mon. Terr. Moll. U. S., p. 66 (Am. Jour. Conch. II, 317, Pl. VI, fig. 1.) translates Forbes' description, but his fig. 1, Pl. VI looks as if it might have been drawn from a specimen of *E. arrosa marinensis*.

Binney in Terr. Moll. V, 361 translates Forbes' description *verbatim*, but figures a large depressed shell from Santa Catalina Is., fig. 242, and says:—"I am positive that it is correctly referred to *kelletti*." In his remarks he refers to the peculiar sculpture where he says:—"There are traces on different parts of each shell of three different kinds of sculpturing; the wrinkles of growth, revolving impressed lines, and a series of minute granulations running obliquely, sometimes almost perpendicularly, to the incremental wrinkles." This is an important observation.

This description and remarks are copied in Binney's Manual, pp. 149–150. There is a typographical error on p. 150 where he says that Forbes' original figure is copied in Terr. Moll. V; the reference should be to Vol. IV; Pl. LXXVI, fig. 12.

Without attempting to give a full bibliography it is only necessary to say that Cooper, Gabb, Newcomb, Carpenter, Stearns and Hemphill have all written on the subject in various publications.

Gabb published the description of *Helix stearnsiana* in Am. Jour. Conch. III, 235, Pl. 16, fig. 1. He gave the number of whorls as $5\frac{1}{2}$, but did not state the size. The type is in the collection of the Acad. Nat. Sciences of Philadelphia.

Binney and Bland in L. & F.–W. Sh., I, 177, changed Gabbs' description somewhat, giving the number of whorls as 5 and adding the size 22 x 17 x 12 mm. This attitude must be the *length of the axis*, as the flattest shell that I have seen is $15\frac{1}{2}$ mm. high, a single specimen, while the others run from 16 to $21\frac{1}{2}$ mm.

In Terr. Moll. V, 362, Binney repeated the description of L. & F–W. Sh. adding notes on the anatomy and comparing with that of

kellettii. This is copied *verbatim* in Manual Amer. Land Shells, p. 151.

In examining a large series of *kellettii* from Santa Catalina I found one shell which agrees exactly with Forbes' original description and figure, and the later figures sent me by Mr. Smith, in size and color, but it has 5 whorls instead of 6. *All* of this lot, about 90 shells, have the peculiar sculpture noted by Binney while *none* of the *stearnsiana* from the mainland of L. Cal. have it, and as Mr. Ponsonby informs me that this sculpture appears on Forbes' type, I think we can safely limit *kellettii* to Santa Catalina Is.

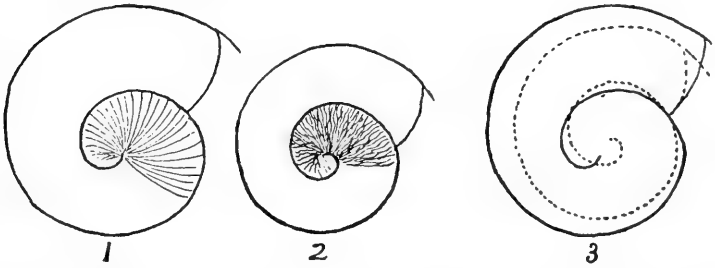


Fig. 1. Embryonic whorls of *E. kellettii* Fbs. "The isthmus," Santa Catalina I.; shell 26 mm. diam.

Fig. 2. *E. stearnsiana* Gabb, San Diego; shell 26 mm. diam.

Fig. 3 shows Fig. 1 superposed upon Fig. 2, the latter in stippled line. All figures × 10.

The sculpture of the embryonic whorls of the two species also indicates that they are distinct, that of *kellettii* consisting of very weak radial lines, *not waved*, so that the whorls appear almost *smooth*, while in *stearnsiana* it is a very closely set series of *wavy* lines, generally bifurcate at the suture, giving the surface a *granulated* appearance under low magnification. The accompanying figures show the difference in size of the embryonic shells of the two species, figs. 1, 2, and in fig. 3 the drawings are superimposed to bring out the difference more distinctly.

A series of 58 *kellettii* from Santa Catalina shows a variation in greater diameter of from 21½ to 27 mm., whorls from 5 to 5½. 26 *stearnsiana*, mostly from San Diego, vary from 20 to 25½ mm., greater diameter, whorls 5 to 6.

Figuring both series into percentages:—

Of 58 *kellettii* 27 or 46.5 per cent. have gr. diam. 25 to 26 mm.

Of 58 " 43 or 74.1 per cent. have gr. diam. 24 mm., and *over*.
Of 26 *stearnsiana* 12 or 46.1 per cent. have gr. diam. 23 to 24 mm.
Of 26 " 21 or 80.7 per cent. have gr. diam. 24 mm. and *under*.

Of 58 *kellettii* 56 or 96.5 per cent. have whorls 5 to 5 +.
Of 26 *stearnsiana* 19 or 73.1 per cent. whorls $5\frac{1}{2}$ to $5\frac{3}{4}$.

A series of 31 *kellettii*, selected by Hemphill to show variation in size, shape and color, but not included in above lot, are from $20\frac{1}{2}$ to 31 mm. gr. diam., whorls $4\frac{1}{2}$ to $5\frac{1}{3}$; 23 or 74.2 per cent.; one 24 mm. and over and 18 or 58.6 per cent. have 5 to 5 + whorls.

Summing up: *E. kellettii* is the species found on Santa Catalina Island, having a large embryonic shell with *smooth* whorls, surface of all the later whorls faintly granulated; generally *over* 24 mm., greatest diam.; whorls 5. (On the mainland at Pt. Vincent, Los Angeles Co., Hemphill found dead shells which agree exactly with those from Santa Catalina, but could find none alive). *E. stearnsiana* is confined to the mainland and the islands of Lower California. Embryonic shell smaller, sculptured with *wavy* lines giving it a granulated appearance, remaining whorls *smooth* except for lines of growth and sometimes faint revolving lines; greater diam. generally under 24 mm., whorls $5\frac{1}{2}$ to $5\frac{3}{4}$.

There is a wide variation in size, color and shape in both species and a number of the forms of *kellettii* have been named by Hemphill. Measurements below show largest, smallest, most elevated and most depressed of 89 *kellettii* and 26 *stearnsiana* in my collection.

E. kellettii, largest, 31 x 26 x 23 mm. whorls $5\frac{1}{4}$.
" smallest, $20\frac{1}{2}$ x $17\frac{1}{2}$ x $16\frac{1}{2}$ mm. whorls —5.
" elevated, 26 x $23\frac{1}{2}$ x 25 mm. whorls $5\frac{1}{3}$.
" depressed, 26 x 21 x 18 mm. whorls 5.

E. stearnsiana, largest, $25\frac{1}{2}$ x 22 x $21\frac{1}{2}$ mm. whorls 6.
" smallest, 20 x 17 x $15\frac{1}{2}$ mm. whorls 5 +.
" elevated, 21 x $20\frac{1}{2}$ x $20\frac{1}{2}$ mm. whorls $5\frac{1}{2}$.
" depressed, 23 x $19\frac{1}{2}$ x 16 mm. whorls $5\frac{1}{2}$.

MOLLUSKS OF OKLAHOMA.

BY JAS. H. FERRISS.

Few if any shells have been recorded from Oklahoma territory. No state or territory in the Union has figured so little in concholo-

gical literature. In 1897 I collected a few hours in Oklahoma City, obtaining the following species:

Polygyra texasiana (Moric).	Planorbis bicarinatus (Say).
Polygyra monodon (Rack.).	Planorbis parvus (Say).
Helicodiscus lineatus (Say).	Physa sp.
Zonitoides minuscula (Binn.).	Lampsilis anodontoides (Lea).
Zonitoides arborea (Say).	Lampsilis purpuratus (Lam.).
Zonitoides nitida (Müll.).	Lampsilis gracilis (Bar.).
Euconulus fulvus (Müll.).	Lampsilis parvus (Lea).
Strobilops affinis (Pils.).	Quadrula lachrymosa (Lea).
Pupoides marginatus (Say).	Quadrula pustulosus (Lea).
Bifidaria armigera (Say).	Tritogonia tuberculata (Bar.).
Bifidaria contracta (Say).	Symphynota complanata (Bar.).
Lymnæa probably techella(Hald.).	Sphærium sp.
Planorbis trivolvis (Say).	Pisidium sp.

NEW SPECIES OF PISIDIUM.

BY V. STERKI.

Pis. minusculum, n. sp. Mussel minute, slightly oblique, medium inflated; superior margin short, moderately curved, bounded by slightly projecting, rounded angles; supero-anterior and posterior slopes little curved or straight, posterior end rounded, anterior a rounded angle situated much below the median longitudinal line, inferior margin rather well curved; beakes slightly posterior, rather large, rounded or somewhat flattened, moderately projecting over the hinge margin; surface with very fine, slight striæ, somewhat shining, color pale horn, shell translucent; hinge rather stout, cardinal teeth: the right strongly curved, its posterior part much thicker and grooved, left anterior rather short, well curved, the posterior longer, oblique, curved; "laterals" strong, the outer ones in the right valve well formed; ligament, short, thick.

Long. 2.2, alt. 1.8, diam. 1.5 mill.

Habitat: Fox river, Wisconsin, collected by the late Geo. H. Marston; types in the collection of the University of Wisconsin and that of the Carnegie Museum.

A number of specimens of this little *Pisidium* was received in 1895 and then recognized as a new species, and again in 1904, when

the Marston collection was revised. In spite of its small size, it ranges under the group Rivulina, and has resemblance, in shape, with forms of *P. compressum* Pr. and with *handwerkii* St.; from the latter it is easily distinguished: it is smaller, more oblique, its beaks are comparatively broader, more posterior, and less elevated, its striæ much finer and slighter.

Pis. fragillimum, n. sp. Mussel rather small, inequipartite, oblique, well inflated; superior margin short, nearly straight, bounded by angles from which the supero-anterior and posterior slopes fall down nearly straight at first, then passing over the rounded anterior and posterior ends into the moderately curved inferior margin; anterior part longer than posterior and anterior end narrower; beaks somewhat broad and full, well projecting over the superior margin, flattened on top; surface with very fine striæ and a few slightly marked lines of growth, dullish, pale horn-colored; shell subtranslucent, very thin and fragile; hinge very slight, short, but well formed, plate narrow; cardinal teeth thin, lamellar, nearly straight and longitudinal, the right long, its posterior end not or slightly thicker, the left ones rather long, nearly parallel; " laterals " slight, thin, the anterior short, their cusps close to the cardinals, especially so the left which is high, sharp pointed, abrupt, the right comparatively large; the outer ones of the right valve small but distinct and rather long; ligament slight.

Long. 3, alt. 2.6, diam. 1.8 mill.

Habitat: Lake Geneva, Wisconsin, sent for examination by Mr. F. C. Baker. Types are in the collection of the Chicago Acad. Sc., and that of the Carnegie Museum.

Although only ten specimens were seen, this *Pisidium* is quite distinct by its shape and the formation of the hinge; the shell is the thinnest and most fragile yet seen in *Pisidia*. The mussel has some resemblance in shape with *P. walkeri* St., but is much smaller, shorter, especially its anterior part, the surface sculpture is finer and slighter, and the hinge is quite different. Its closer affinities are yet unknown.

Pis. levissimum, n. sp. Mussel small, somewhat elongate, slightly oblique, moderately inflated; superior margin moderately curved, posterior rounded, sometimes with a slightly projecting, rounded angle at the scutum; inferior slightly curved, supero-anterior slope, at some distance from the beaks, in some specimens straight or

nearly so, in others obsolete; beaks rather broad, rounded or slightly flattened, little prominent over the upper margin; surface with very fine, slight, irregular striæ, shining; color pale horn to light amber, shell translucent to transparent; hinge very slight, long, curved, plate narrow; cardinal teeth: the right rather long, straight or slightly curved, longitudinal, its posterior end more elevated, slightly thicker and projecting downward over the hinge plate, the left ones rather long, nearly longitudinal and parallel, lamellar, the posterior (upper) slightly curved; "lateral teeth": the posterior much longer than the anterior, slight, curved, the right not raised in a cusp, the left with a slight cusp, the right anterior with a rounded, the left with a sharp and abrupt cusp, outer ones in the right valve wanting, or a mere trace of the anterior; ligament slight.

Long. 2.5, alt. 2.0, diam. 1.4 m., the largest; average: 2.3 m. long.

Habitat: Elk Rapids, Michigan. About 300 specimens were seen, at all stages of growth, most of them dead and bleached shells, sent for examination by Mr. F. C. Baker. Types are in the collection of the Chicago Acad. Sc. and that of the Carnegie Museum.

In shape and appearance, this *Pisidium* resembles a form of *tenuissimum* St., but is much smaller and slighter, and the formation of the hinge is radically different, as ascertained on quite a number of specimens of both species. In fact, the "lateral teeth" are quite different from those of all other *Pisidia* seen.

Pisidium subrotundum, n. sp. Mussel small, moderately and regularly to rather well inflated; outlines oval to short oblong to nearly circular; superior margin straight or nearly so, as especially noticeable in younger specimens; beaks slightly posterior, rather broad (in most forms), moderately projecting over the hinge margin, thus completing the round outlines, except for the slightly projecting angles at the scutum and scutellum; surface with very fine, subregular to irregular striæ and usually a few well marked lines of growth, dullish to somewhat shining; color horn or light amber to straw to whitish; shell translucent (in the horn colored) to opaque (in the light colored specimens), thin; hinge slight and teeth small; ligament rather short and slight.

Long. 3.2, alt. 2.7, diam. 1.8 (100 : 84.4 : 56.3) average.

Long. 3.6, alt. 3, diam. 2.3 (100 : 83.3 : 63.9) Albany riv.

Long. 2.8, alt. 2.5, diam. 1.8 (100 : 89.3 : 64.3) Isle Royale.

Hab.: New England, Anticosti Is., to Michigan. Jupiter river,

Anticosti Is., Albany river, Ontario (W. McInnes ed., both sent by J. F. Whiteaves); "Vineyard," Pawtuxet, R. I., (J. F. Perry); several places in Aroostook co., Me., (O. P. Nylander); Pine river, Marquette co., and Oswald Lake, Mich. (B. Walker); Isle Royale, Mich. (University of Michigan; some other specimens from waters on the same island were under doubt). Specimens from Union springs, Ontonagon Co., Mich. (B. Walker), are of somewhat different shape: the beaks are more posterior and narrower, and the anterior end is less broadly rounded. One good specimen was among fossils from Arnold's Lake, Washtenaw Co., Mich. (B. Walker.)

Examples of this Pisidium had been in hand for years, unnamed, or a part doubtfully referred to other species. Since last year, several good lots from widely distant places came in and proved the species to be valid.

PISIDIUM FRIERSONI n. sp. Mussel rather small, moderately inflated, outlines somewhat angular; superior margin slightly curved or nearly straight, with projecting, rounded angles where passing into the supero-anterior and the posterior, which are well marked, and nearly straight, inferior moderately curved; beaks scarcely posterior, projecting over the hinge margin, rather narrow, with a somewhat flattened central area; surface with very fine, subregular striæ, dullish to somewhat shining, color pale horn to straw or whitish, shell translucent to opaque, thin, hinge comparatively rather stout; right cardinal tooth curved, its posterior end thicker and grooved, left anterior quite short, somewhat V-shaped, posterior rather short, rather steep oblique; outer laterals of the right valve distinct; ligament short.

Long. 4, alt. 3.5, diam. 2.5 mill.

Hab.: Louisiana, Texas, New Mexico, Colorado.—In 1899, Mr. L. G. Frierson sent me quite a number of specimens at all stages of growth, collected at Frierson, La.; they were regarded as representing a distinct species, but shelved. Since then I have seen the same from Dallas (Cincinnati Museum) and Comal Co., Tex., the Gallinas river, Las Vegas, N. Mex., and a few from Denver, Colo., (T. D. A. Cockerell).

The species seem to range under the group of *P. noveboracense* Pr., and so far as known, shows little variation. It has been named in honor of Mr. L. G. Frierson.

ERRATUM.—NAUTILUS, February issue, p. 119, line 2 from top: after *even*, there should be a comma.

New Philadelphia, Ohio.

A NEW SPHAERIUM FROM ILLINOIS.

FRANK COLLINS BAKER.

Sphærium stamineum forbesi nov. var.

Shell of good size, inflated, solid, subequilateral, trigonal; umbones much elevated, rounded, somewhat inflated, placed a little anterior of the center of the shell, marked by very fine, concentric lines of growth (sometimes coarser), the beaks very closely approximating; dorsal and ventral margins well rounded; anterior end flatly rounded, posterior end plough-shaped; both ends have a somewhat truncated appearance; umbonal slopes convexly rounded; surface inclined to be shining, lines of growth rather crowded, fine in typical specimens, coarser in others; color light greenish or yellowish-horn, lighter on the umbones, indistinctly rayed in some specimens; ligament weak, short, brownish in color; cardinal teeth similar in form and position to those of *stamineum*, the hinge-line not quite so thick as in *stamineum*; lateral teeth not quite so solid as in *stamineum*, the posterior laterals also being shorter, not reaching so high up into the arch of the hinge-plait, the comparative distance between the anterior and posterior laterals being greater in *forbesi* than in *stamineum*; muscle scars and pallial line rather distinct; nacre faint bluish-white, with occasional darker zones.

Length	14.50	; height	11.50	; breadth	8.00	mill.	types.
"	12.00	"	10.00	"	7.00	"	"
"	12.00	"	9.50	"	6.75	"	Havana.
"	11.00	"	8.50	"	6.50	"	"
"	11.50	"	8.00	"	6.50	"	"

Thompson's Lake, Fulton Co. (types); Matanzas Bay, Havana, Mason Co.; Little Fox River, White Co. Types:—Illinois State Laboratory of Natural History; topotypes, Chicago Academy of Sciences, Academy of Natural Sciences of Philadelphia.

This apparently distinct variety of *stamineum* may be known by its peculiar trigonal shape, plough-shaped posterior end and elevated, inflated umbones. The ventral and dorsal margins are much more rounded than in *stamineum* and the lateral teeth are farther apart. The umbonal sculpture is typically very fine, but is also as coarse as typical *stamineum* in some specimens.

The variety will probably prove to be a common form in many localities and will be easily recognized and separated from typical

stamineum. Twenty-two specimens from three localities show very little variation.

I take great pleasure in naming this variety in honor of Prof. S. A. Forbes, Director of the Illinois State Laboratory of Natural History.

LIST OF WISCONSIN SHELLS.

C. H. CHADWICK.

(*Continued*)

C. Fresh-water Univalves.

Carychium exiguum Say. Milwaukee.

" " *exile* H. C. Lea. Milwaukee.

Limnæa stagnalis appressa Say. Menomonee River; Oak Creek near South Milwaukee; Okauchee Lake and Delafield, Waukesha Co., Two Rivers, Manitowoc Co.; Lake Winnebago near High Cliff.

" *columella* Say. Mill-pond at Delafield, Waukesha Co.

" *megasoma* Say. Molas Creek, Manitowoc Co.

" *reflexa* Say. Milwaukee and vicinity (abundant); Oak Creek, South Milwaukee; Sand Ridge Creek, Kenosha Co.; Delafield, Waukesha Co.

" *palustris* Müller. Vicinity of Milwaukee; North shore of Lake Winnebago. ("*Var. michiganensis*" Walker is included).

" *catascopium* Say. Lake Michigan at Milwaukee.

" " var. approaching *L. emarginata* Say. Lake Mich.

" *caperata* Say. Vicinity of Milwaukee; Lake Winnebago.

" " *umbilicata* Adams. Milwaukee and southwestward; Sand Ridge Creek, Kenosha.

" *humilis* Say. Milwaukee (scarce).

" *desidiosa* Say. Milwaukee and vicinity (abundant); Two Rivers, Manitowoc Co.; North shore of Lake Winnebago.

Planorbis trivolvis Say. Milwaukee (common); Delafield and Okauchee, Waukesha Co.; Two Rivers, Manitowoc Co.

" *trivolvis* (large form). Molas Creek, Manitowoc Co.

Planorbis bicarinatus Say. Milwaukee and vic.; Golden Lake, Waukesha Co.; Little Cedar Lake, Washington Co., Lake Winnebago.

" *bicarinatus striatus* Baker. Milwaukee (fossil).

" *campanulatus* Say. Milwaukee and vicinity (common); Delafield, Okauchee and Golden Lake, Waukesha Co.; Little Cedar Lake, Washington Co.; Two Rivers, Manitowoc Co.; Crystal Lake near Elkhart Lake.

Planorbis hirsutus Gould. Two rivers, Manitowoc Co.

" *deflectus* Say. Vicinity of Milwaukee; Cedar Lake, Washington Co.; Two Rivers, Manitowoc Co.

" *parvus* Say. Milwaukee and southwestward.

Segmentina armigera Say. Milwaukee and southwestward; Two Rivers, Manitowoc Co.

Ancylus rivularis Say. Root River, Milwaukee Co.

" *paralellus* Hald., var. St. Martin's, Milwaukee Co.

" *shimeki* Pils. Near Wauwatosa, (one shell).

Physa sayii Tappan. Milwaukee; Golden Lake, Waukesha Co.; Lake Winnebago near High Cliff.

" *gyrina* Say. Vicinity of Milwaukee and southwestward (abundant;) Sand Ridge Creek near Kenosha; Two Rivers, Manitowoc Co.; Lake Winnebago.

" " *elliptica* Lea. Vicinity of Milwaukee.

" *integra* Haldeman. Milwaukee and vicinity (common;) Golden Lake, Waukesha Co.

Aplexa hypnorum Linne. Milwaukee.

Pleurocera subulare pallidum Lea (?) Lake Winnebago near High Cliff.

" *elevatum* Say. Milwaukee River at Lindwurm.

Goniobasis livescens Menke. Milwaukee River and Lake Michigan.

Amnicola limosa Say. Milwaukee River; Lake Michigan; Lake Winnebago near High Cliff.

" " *parva* Lea. Near Milwaukee.

" " *porata* Say. Lake Michigan at Milwaukee.

" *lustrica* Pils. Honey Creek near Layton Park, Milwaukee.

" *cincinnatiensis* Lea. Milwaukee and Menomonee rivers; Lake Winnebago near High Cliff.

" *emarginata* Küster. Lake Winnebago near High Cliff.

Somatogyrus subglobosus Say. Root River and Kinnikinnick River, Milwaukee Co.; Kenosha; Lake Winnebago.

Pomatiopsis lapidaria Say. Near Wauwatosa, Milwaukee Co.

Valvata tricarinata Say. Milwaukee and vicinity (abundant); Lake Winnebago.

" " *simplex* Gould. Lake Michigan at Milwaukee

" *bicarinata normalis* Walker? North Milwaukee.

" *sincera* Say. Near Milwaukee.

Vivipara contectoides W. G. B. Kinnikinnick River (one shell.)

Campeloma rufum Haldeman. Okauchee Lake, Waukesha Co.; Little Cedar Lake, Washington Co.; Lake Winnebago.

" *decisum* Say. Milwaukee and vicinity; Root River, Milwaukee Co.; Two Rivers, Manitowoc Co.; Lake Winnebago.

" *subsolidum* Anth. Milwaukee and vicinity; Oak Creek, South Milwaukee; Molas Creek, Manitowoc Co.

Lioplax subcarinata Say. Lenosha; Lake Winnebago.

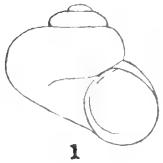
NOTES.

In the May number of the NAUTILUS in an extract from Bulletin 49, Florida Agricultural Experiment station, the writer stated that he did not know how long the Manatee snail (*Drymæus dormani*) had been living on orange trees in Manatee County.

I lived in that county near Bradentown from 1882 until 1886, and during all my residence there diligently collected the land, fresh-water and marine mollusks of that region. During my residence there I collected *Drymæus dormani* in moderate numbers living on the orange trees of a grove in hammock land west of Bradentown, and rarely on trees in a grove north of Manatee river. I also found a few specimens in the Foster Orange Grove south of Manatee. I found several hundred dead shells in the heavy hammock among live oaks north of the Manatee river, and rarely in the air pines on live oaks elsewhere, but I never considered it abundant anywhere.

It may be of interest to state that Mr. E. J. Brown, a neighbor of mine, has found a few specimens of the nearly allied species (*D. dominicus*) living on his grapefruit and orange trees, and two or three specimens of *D. multilineatus* on his trees. *Drymæus dominicus* is rather a scarce species in this region. CHAS. T. SIMPSON.

Little River, Florida, May 21, 1906.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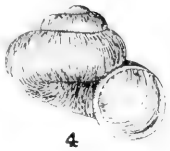
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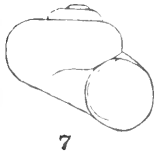
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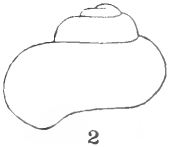
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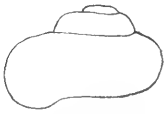
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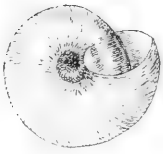
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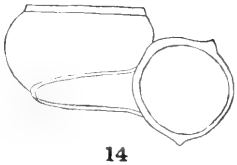
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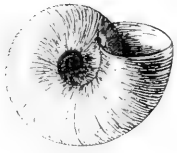
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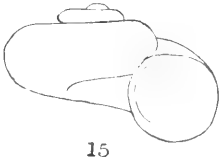
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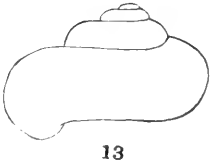
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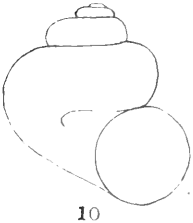
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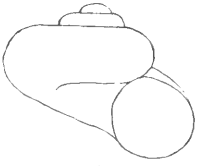
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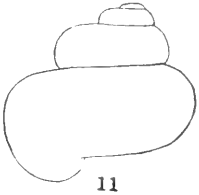
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WALKER, ON VALVATA.

THE NAUTILUS.

VOL. XX. JULY, 1906. No. 3.

NOTES ON VALVATA.

BY BRYANT WALKER.

In 1824 Say described an ecarinate form of *Valvata* from the "Northwest Territory" as *V. sincera.* In 1856 Dr. James Lewis described a somewhat similar shell from the Little Lakes, N. Y., as *V. striata.* W. G. Binney (L. & F. W. Shells III, 13.) in 1865, had "no doubt of its identity with *V. sincera.*" In this decision Dr. Lewis seems to have acquiesced as it is not mentioned at all in his "L. & F. W. Shells of New York" (1874), nor was it listed in his collection.

In 1868, however, A. O. Currier (Shell-bearing Moll. of Mich. p. 9.) declared Lewis' species to be a valid one and *striata* being preoccupied proposed for it the name of *lewisii.*

Binney's opinion seems to have generally prevailed among American conchologists until within the last year, when Dr. W. H. Dall (Alaska XIII, pp. 22 & 23) declared them to be specifically distinct.

From a critical study of several hundred specimens from more than fifty different localities, I have come to a similar conclusion, viz: that there are two distinct species which have hitherto passed as Say's *sincera.* The one, smaller, more elevated, with a smaller umbilicus, the other, larger, more depressed and widely umbilicated. Both vary in sculpture from being nearly smooth, with subobsolete striæ to very strongly sculptured forms in which the striæ are elevated in "thin, sharp lamellæ."

Owing to the prevalent confusion of the two forms, the existing

records afford but little information as to whether their distribution is the same or not. Taking them together, *sincera* is apparently a northern form ranging through Canada and the northern United States, from the Atlantic to the Pacific. Its range to the south seems comparatively restricted, especially in the eastern states, northern New York, Michigan, northern Illinois and Indiana, and Nebraska being apparently the southern limit, as it is not listed from Philadelphia (Shick) nor Allegheny Co., Pa. (Stupakoff), Cincinnati (Harper & Wetherby), nor Tuscarawas Co., Ohio (Sterki), nor in any of the Iowa, Missouri, Arkansas or Kansas lists. I am informed by Mr. F. C. Baker that the southern range (south to Georgia and Louisiana) attributed to this species in his "Mollusca of the Chicago Area," was a typographical error and should have been placed under *V. tricarinata*. In the extreme west, it would seem to range further south, as Dall quotes the broadly umbilicated form from the San Bernardino Mountains, Cal., and Utah. Ingersoll also (Rep. U. S. G. & G. Survey, 1874, p. 390) quotes *sincera* from Colorado and Utah. The only Utah specimens I have seen, are rather referable to *V. humeralis* Say, and it is possible that all these extreme southwestern citations should be revised.

VALVATA SINCERA Say, Pl. I, figs. 1–6.

As Say's type of *V. sincera* has not been preserved, in determining which of the two forms, which have hitherto passed under that name, is to be regarded as *sincera* we are necessarily restricted to his original description and figure (a very poor one) and such legitimate deductions as can be drawn from the circumstances under which his description was prepared, and his other writings. When Say described his new species in 1824, the only American species known to him was the typical *V. tricarinata* and his purpose was to differentiate these two forms. Owing, no doubt, to the striking and characteristic sculpture of *V. tricarinata*, Say omitted any description of general shape. He states that *V. sincera* is "subglobose-conic" and "very similar" to *tricarinata*, but with a "rather larger" umbilicus. And later in describing his *V. humeralis*, he states that it is "subglobose" and "more depressed" than *sincera*. It hardly seems possible that Say with his remarkable acumen and critical appreciation of minute differences, would have failed to call attention to the depressed form and very wide umbili-

cus in differentiating his new species from *tricarinata*, had he had before him a specimen of *lewisii*. Then too, his figure, whatever else may be said of it, was certainly never intended to represent a shell of that form. Say further describes his species as having the whorls "finely and regularly wrinkled across." An examination of Say's descriptions of other species, especially his earlier ones, will show that he commonly used the terms "wrinkles" and "wrinkled" in the same sense that today we would use striæ and striate. Thus *Polygyra albolabris*, *thyroides*, *profunda* and *sayii*, *Pyramidula solitaria*, *Circinaria concava* and *Bulimulus dealbatus* are characterized as "wrinkled." *Bulimulus multilatus* is "striated with regular elevated lines or wrinkles." And *Valvata humeralis* is stated to be "wrinkled across or rather with slightly raised lines."

Taking all these things into consideration, we should say that Say's *sincera* was a subglobose-conic shell, of about the same size and shape of *V. tricarinata*, but with a rather larger umbilicus and with accurately rounded, finely and regularly striated whorls. Shells answering very exactly to these requirements were collected by the Michigan Fish Commission in 1894, at High Island Harbor, Beaver Islands, Lake Michigan, and were listed as that species, though with no appreciation of its distinction from *lewisii* (Bull. Mich. Fish Com. No. 6, 99; Naut. IX, 5). And there would seem to be no reasonable objection to these being considered as typical examples of Say's species.

As shown by the figures (figs. 1–3) the general shape of the shell, with its "accurately rounded" whorls and round, deep umbilicus is in exact accord with the original diagnosis. The surface is sculptured with fine, close, regular, thread-like striæ, with a marked tendency in many examples to rise in thin, sharp ribs approximating to those of *nylanderi*. But in no instance are these more elevated ribs as strongly developed as in that form, nor are they so widely spaced. The specimen figured has $3\frac{3}{4}$ whorls and measures: Alt. 4, diam. 5 mm.

Many of the specimens have the apical whorls more or less deeply tinged with dull red, the rest of the shell is of a pale greenish, with the apical whorls nearly white in the unicolored examples.

There is some slight variation in height and correlated with that, in the width of the umbilicus, but not sufficient to connect them specifically with the widely umbilicated *lewisii*.

Through the kindness of Dr. Whiteaves I have been enabled to examine some of the Anticosti shells referred to by Dr. Dall. Compared with the High Island specimens, these (figs. 4–6) are thinner, less heavily striated, with a rather wider umbilicus, and the body whorl is less inflated, but they evidently belong to the same species.

As above defined, *V. sincera* appears to be a less abundant species than *lewisii*, but of considerable range, though apparently rather local in its habitats. Specimens have been examined from the following localities, in addition to those above mentioned: River Rouge, Wayne county; Mill Lake, Lake county and Lake Michigan, off New York Point, Charlevoix county, Michigan; Pigeon Lake, Ontario and Milwaukee, Wis. Some immature specimens from Lake George, N. Y., should also probably be included. It has also been found in the marl deposits at Cement City, Jackson county; Ann Arbor; Monitor, Bay county, and Pine Lake, Charlevoix county, Michigan, and Caribou, Me. As all the marl specimens are decorticated, it is impossible to say whether they were originally typical *sincera* or var. *nylanderi*.

V. SINCERA NYLANDERI Dall. Pl. I, figs. 7–9.

Judging from the suite examined, *nylanderi* (figs. 7 and 8) in its original locality is a well marked constant form, and standing alone might well be accorded specific rank. But as stated above, the specimens from High Island Harbor, show decided tendency to accentuate the striæ, and in a considerable number from Isle Royale, Lake Superior (collection of 1905), where typical *sincera* is not represented, all the gradations from close, elevated ribs to the wide spaced lamellæ of typical *nylanderi* are represented. So that there would seem to be no question, but that it is to be considered as a varietal form of Say's species. This form in its various aspects has also been found in Cliff river and Pine Lake, Marquette county, Michigan; Little Lakes, N. Y., and Lake Geneva, Wis. An unusually elevated example from Isle Royale, is illustrated by fig. 9.

V. SINCERA DANIELSI, n. v. Pl. I, figs. 10 and 11.

Shell larger and proportionately higher than the typical form; whorls 4, finely and regularly striate, very convex with a deeply impressed suture. Aperture entire, scarcely appressed to the body whorl.

Alt. 6, diam. 5.75 mm.

Cannon Lake, Rice county, Minn., Types No. 22475, coll. Walker. Cotypes in the collections of L. E. Daniels and the Philadelphia Academy. Sixteen specimens of this fine large form were collected by Mr. Daniels. They differ uniformly from the High Island typical form in the particulars mentioned.

VALVATA LEWISII Currier. Pl. I, figs. 12 and 13.

Dr. Lewis distinguished his *V. striata* by reason of its having the "epidermis brown and very regularly striate." In the same paper (Proc. P. A. N. S., 1856, 260) he describes "*V. sincera*" from the same locality as having the "shell smooth and polished, white and translucent." While unfortunately he does not seem to keep any examples of his typical *striata* in his own collection, there is a set from the Little Lakes labelled "*sincera*" which agrees with his description and which are the same as the form herein described as *V. bicarinata perdepressa*. This leaves practically no doubt as to his *striata* being the ordinary striate form.

V. lewisii in its aggregate form is exceedingly variable in regard to sculpture, ranging from the smooth or obsoletely striate var. *helicoidea* to a heavily ribbed form in which the ribs become low, closely spaced lamellæ very similar to the Isle Royale form of *sincera nylanderi*. In well developed examples of this form, the ribs give a brownish appearance to the shell, especially when not well cleaned, and it is possible that such specimens were the types of Lewis' species, and if varietal distinction were to be made between this and the more common form in which the sculpture is "fine and close like the winding of thread on a spool," it should be considered as the typical *lewisii*.[1] From the material before me, however, I fail to find sufficient evidence of any racial distinction in this particular, (as there is apparently in the case of *V. sincera nylanderi*) to justify such action. The two forms apparently live together and grade indefinitely into each other.

V. BICARINATA Lea. Pl. I, fig. 14.

When I prepared my former paper on *Valvata* (NAUT., XV, p. 123) I had not seen Prof. B. Shimek's "Mollusca of Eastern Iowa," (Bul. Lab. Nat. Hist. State Univ., Ia., I, p. 56, 1888) in which the specific validity of this species is upheld.

[1] This will have to be determined from examination of authentic author's specimens which I have not been able to obtain.

For comparison with the other forms herein discussed, a typical example is figured.

V. bicarinata has recently been collected by Messrs. H. H. Smith and A. A. Hinkley at several localities in Alabama, greatly extending its range towards the south.

V. BICARINATA CONNECTANS n. v.

Unicarinate, only the superior carina present, peripheral and basal carinæ obsolete, periphery rounded, base rounded or subangulated. Type No. 24142, coll. Walker. Lake Michigan, New Buffalo, Mich., also Lake Ontario, N. Y. Cotype in collection of L. E. Daniels, LaPorte, Ind.

Apparently of rather rare occurrence as only two specimens, were collected by Mr. Daniels in a considerable amount of material from several localities along the south shore of Lake Michigan. A single specimen also was found in a small set of *V. bicarinata perdepressa* from Lake Ontario, N. Y., received from Mr. F. C. Baker. This specimen is of special interest as illustrating the relation of this form and the succeeding one. Beginning as a typical *connectans*, the carina disappears about the beginning of the last whorl which is that of a typical *perdepressa.*

V. BICARINATA PERDEPRESSA n. v. Pl. I, figs. 15 and 16.

Shell broadly umbilicated, very much depressed, often planorboid. Ecarinate, whorls regularly rounded, occasionally subangulated around the umbilicus or at the periphery, smooth or obsoletely striate, frequently obscurely malleated, especially on the lower half of the whorl, very pale horn-colored, unicolored or with the apical whorls more or less tinged with dull purple or red. Types (No. 24123, coll. Walker) from Lake Michigan at Michigan City, Ind. Also from Lake Michigan at Chicago, Ills., Millers, Ind., New Buffalo, Mich., Lake Erie at Sandusky, Ohio, Lake Ontario at Jefferson county and ———?, N. Y., and Little Lakes, N. Y. Cotypes in the collection of L. E. Daniels, LaPorte, Ind., and the Philadelphia Academy.

This form is very abundant along the south shore of Lake Michigan. It would be taken for a smooth form of *V. lewisii*, were it not for the connecting links with *V. bicarinata* afforded by the occasional subangulated individuals and *bicarinata connectans.* It is very vari-

able in shape, ranging from planorboid with the apex depressed below the level of the body whorl to specimens with the apex quite as much elevated as in the ordinary specimens of *lewisii*. In sculpture it varies from almost perfectly smooth to a striation nearly as strong as that of typical *lewisii*. Indeed the more elevated and strongly striated examples standing alone would unhesitatingly be referred to that species.

Dr. Dall, who kindly compared specimens with his *V. lewisii helicoidea* writes: "The figured specimen (*helicoidea*) should have (to be adult) about one-half more whorl than it has in the figure. Some of yours, if the same view be taken, are almost exactly like the specimen figured. But, on comparison of adults, it is evident that the *lewisii helicoidea* has a smaller umbilicus; and, taken in profile, is less flattened. Your specimens, too, are on the whole smoother and more polished. The value of these differences remains to be determined."

The wider umbilicus in the Lake Michigan shells is undoubtedly correlated with the more depressed shape. The specimens collected by Lewis in the Little Lakes, N. Y., are indistinguishable from those from Lake Michigan. The Lake Erie and Lake Ontario specimens are uniformly smaller, but otherwise substantially the same.

The difficulty in finding any tangible distinction between the more elevated, substriated individuals of this form and the obsoletely striated examples of *V. lewisii* is similar to that experienced in attempting to separate *V. tricarinata simplex* from the smooth or obsoletely striated forms of *V. sincera*. And this naturally raises a query as to whether there are really more than two polymorphic species differing constantly in shape, but both varying in sculpture, all the way from tricarinate to smooth, and from smooth to ribbed-striate. Both series are complete and parallelism is absolutely exact.

	Group of *V. tricarinata.*	Group of *V. bicarinata.*
Tricarinate,	*V. tricarinata.*	*V. bicarinata normalis.*
Bicarinate,	*V. tricarinata confusa.*	*V. bicarinata.*
Unicarinate,	*V. tricarinata unicarinata.*	*V. bicarinata connectans.*
Smooth,	*V. tricarinata simplex.*	*V. bicarinata perdepressa.*

Obsoletely striate,	*V. sincera* (Anticosti).	*V. lewisii helicoidea.*
Thread-striate,	*V. sincera.*	*V. lewisii* (var. ?)
Ribbed-striate,	*V. sincera nylanderi.*	*V. lewisii* (typical ?)

In view of the recognized variability of all these forms, the inference to be drawn would seem inevitable.

Explanation of Plate I.

All the figures are drawn on the same scale (× 5) except 4, 5 and 6 which were drawn by Miss Helen Winchester, and these are substantially the same.

Fig. 1–3. *V. sincera*, High Island Harbor, Lake Michigan.
" 4–6. *V. sincera*, Anticosti.
" 7–9. *V. sincera nylanderi*, Portage Lake, Aroostook Co., Me.
" 9. *V. sincera nylanderi*, Isle Royale, Mich.
" 10–11. *V. sincera danielsi*, Cannon Lake, Rice Co., Minn.
" 12–13. *V. lewisii*, Traverse City, Mich.
" 14. *V. bicarinata*, Philadelphia, Pa.
" 15–16. *V. bicarinata perdepressa*, Lake Mich., Michigan City, Ind.

HELIX JEJUNA SAY TRANSFERRED TO PRATICOLELLA.

BY HENRY A. PILSBRY.

Recently I received from Mr. George H. Clapp some living examples of this small snail, with a request that they be examined anatomically to determine the generic position of the form, which has of recent years been grouped with the small Polygyras of the "Mesodon" type.

The snails were collected at Lemon City, Dade Co., Florida, by Mr. Chas. T. Simpson. Externally the soft parts do not differ from *Polygyra* and many other genera of Helices.

The terminal ducts of the genitalia are shown in Fig. 1. The penis bears the retractor and vas deferens at its apex. Near the base a very large gland or "appendix" is inserted (*a* in the figure). This seems to be a nearly solid but soft and readily broken gland. The vagina is more than half as long as the penis. The spermatheca

is large and oblong, upon an extremely short duct. Other organs as usual in Helices.

No *Polygyra* or "Mesodon" has a gland or appendix upon the penis, but in the Mexican genus *Praticolella*, represented in Texas by *P. griseola* and *P. berlandieriana*, a similar structure is found. I do not hesitate to refer *jejuna* to the genus *Praticolella* on the evidence of this peculiar organ, which has been noticed in no other genus of Helices within our limits. The Floridian snail differs from the Texan and Mexican forms by having an apparently simple penis retractor muscle, while in the other species it is split and has a triple

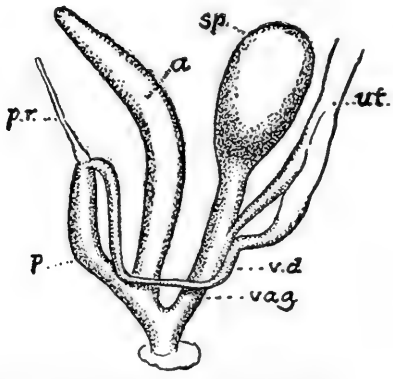


Fig. 1. *P*, penis; *p*, *r*, its retractor; *a*, penial gland; *vd*, vas deferens; *ut*, uterus; *sp*, spernatheca; *vag*, vagina.

insertion on penis and vas deferens. This simple condition was probably the ancestral structure of the genus, since it is that of all other related Helices.

The shell of this species, which we will now call *Praticolella jejuna* (Say), agrees somewhat better with that of *Praticolella* than with any other of our genera of Helices. Not much is known of the habits of the snail. It is quite a local form, which I never happened upon at Miami or elsewhere in some half-dozen visits to Florida. Mr. S. N. Rhoads found it on the "under side of young cabbage palms" at Miami. Further information upon the situations it affects will be of interest In Texas, *Praticolella berlandieriana* lives on bushes with *Bulimulus dealbatus mooreanus*, but during prolonged dry weather it burrows in the ground.

SOME SHELLS OF MISSISSIPPI AND ALABAMA.

BY A. A. HINKLEY.

In the fall of 1904, with the aid of some of my conchological friends, for the purpose of collecting in that region, a trip was made to Abbeville, Grenada, Durant and Columbus, Mississippi, and Tuscaloosa, Boligee, Tuscumbia and Florence, Alabama.

The streams along the Illinois Central railroad where stops were made, have sandy beds and not favorable for molluscan life, with the exception of two specimens of *Pleurocera elevatum*, no representatives of the *Strepomatidæ* were found in these streams.

In determination of material collected thanks are due Messrs. Bryant Walker, Wm. A. Marsh, L. S. Frierson, Dr. V. Sterki, F. C. Baker and H. A. Pilsbry.

Family Helicinidæ.

Helicina orbiculata Say. Boligee, Ala., dead specimens only.

Family Helicidæ.

Polygyra leporina Gould. Abbeville and Columbus, Miss., Boligee, Ala.

Polygyra troostiana Lea. Florence, Ala.

Polygyra fraudulenta Pilsbry. Florence, Ala.

Polygyra inflecta Say. A common species found at all localities.

Polygyra exoleta Binney. Florence, Ala.

Polygyra palliata Say. Abbeville, Miss., Boligee and Tuscaloosa, Ala.

Polygyra obstricta Say. Columbus, Miss., Florence, Ala.

Polygyra appressa Say. Florence, Ala.

Polygyra appressa perigrapta Pilsbry. Grenada and Columbus, Miss.

Polygyra thyroides Say. Abbeville, Grenada and Columbus, Miss., Tuscaloosa, Boligee and Florence, Ala. At Boligee they were numerous along the railroad right of way. In the same situation though not as numerous were *P. clausa* and *B. dealbatus*.

Polygyra clausa Say. Boligee, Ala., varies a little in size and thickness of the shell.

Polygyra spinosa Lea. Florence, Ala. Common on both sides of the river.

Polygyra barbigera Redfield. Tuscaloosa, Ala., a rare species.

Polygyra subglobosa Pilsbry. Columbus, Miss., Tuscaloosa and Florence, Ala.

Polygyra monodon Rack. Abbeville and Columbus, Miss., Florence, Ala.

Family Bulimulidæ.

Bulimulus dealbatus Say. Boligee, Ala. Dead specimens were very numerous in some of the fields.

Family Pupillidæ.

Strobilopsis labyrinthica Say. Boligee, Ala., Abbeville, Durant and Columbus, Miss.

Pupoides fallax Say. Boligee and Florence, Ala.

Bifidaria armifera Say. Boligee, Ala.

Bifidaria contracta Say. Boligee, Ala.

Bifidaria procera Gould. Boligee and Florence, Ala. At the former place it was found in tufts of grass in an open field, at the latter under stones in an open close pastured place along the river.

Family Glandinidæ.

Glandina truncata Brug. Boligee, Ala. The remains of nests of eggs were often found about old logs and young shells were quite common. A mature horn-colored specimen was an interesting variation.

Family Circinariidæ.

Circinaria concava Say. Tuscaloosa, Boligee and Florence, Ala.

Family Zonitidæ.

Omphalina fuliginosa Griff. Florence, Ala.

Omphalina laevigata Pfr. Abbeville, Grenada and Columbus, Miss., Tuscaloosa, Boligee and Florence, Ala.

Vitrea carolinensis Ckll. Boligee and Florence, Ala.

Euconulus fulvus Mull. Abbeville, Miss., Boligee, Ala.

Zonitoides arborea Say. Abbeville, Grenada Durant and Columbus, Miss., Boligee, Ala.

Zonitoides minuscula Binney. Boligee, Ala.

Gastrodonta demissa Binney. Columbus, Miss., Tuscaloosa, Boligee and Florence, Ala.

Gastrodonta interna Say. Tuscaloosa and Florence, Ala.

Family ENDODONTIDÆ.

Pyramidula alternata, Say. Abbeville, Grenada and Columbus, Miss., Tuscaloosa and Boligee, Ala.

(*To be continued*).

NOTES.

THE RAVENEL COLLECTION.—The museum of the College of Charleston, S. C., has acquired the valuable conchological collection of the late Dr. Edmund Ravenel, of Charleston, which contains some 3,500 species of land, fresh-water and marine shells.

LYMNÆA MEGASOMA SAY.—Fine specimens of this rare species have recently been taken at Lake Minnetonka, Minn., by Mrs. A. W. Abbott of Minneapolis.

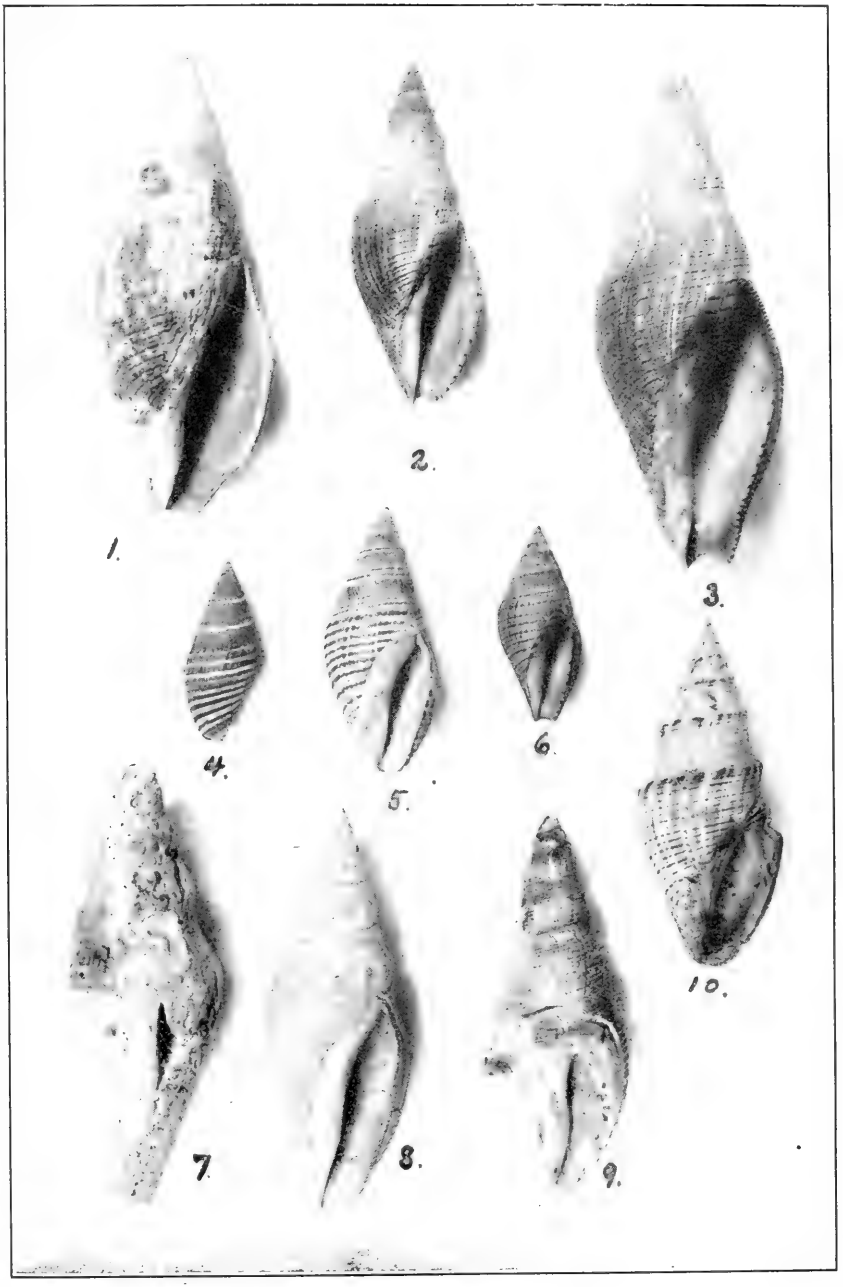
PUBLICATIONS RECEIVED.

NOTES ON JAPANESE, INDO-PACIFIC, AND AMERICAN PYRAMIDELLIDÆ. By Wm. H. Dall and Paul Bartsch, (Proc. U. S. Nat. Mus., XXX, pages 321–369, plates XVII–XXVI, 1906). This valuable work on the *Pyramidellidæ* is based in part on the collection of the museum of Berlin loaned to the U. S. National Museum for study. Some 22 new species are described and figured, and a number of new names are proposed to replace those pre-occupied. Three new subgenera *Nisiturris*, *Babella* and *Egilina* are also defined.

DESCRIPTION OF TWO NEW NAIADS. By Paul Bartsch, (Proc. U. S. Nat. Mus., XXX, pages 393–396, Plates 27–29, 1906). The species are *Nephronaias flucki* from Nicaragua and *Diplodon anapensis* from Argentina.

RECENT MOLLUSCA: A CATALOGUE OF OPERCULATE LAND SHELLS. By G. B. Sowerby and H. Fulton. London, 1906. A useful list of genera and species arranged "with slight modifications" according to Kobelt and Möllendorff's catalogue.

ANATOMY OF ACMÆA TESTUDINALIS MULLER, Part I. Introductory material. External anatomy. By M. A. Willcox. Reprint the American Naturalist, Vol. XL, pp. 171–187, 1906.



RAYMOND: WEST AMERICAN SPECIES OF GENOTA

THE NAUTILUS.

VOL. XX. AUGUST, 1906. No. 4.

THE WEST AMERICAN SPECIES OF PLEUROTOMA, SUBGENUS GENOTA.

BY WILLIAM JAMES RAYMOND.

Five species of the subgenus *Genota*, section *Dolichotoma*, have been described from the Pacific coast of North America. Three of the species have been figured; two have not hitherto. Specimens of all five, including the types of four, being temporarily in possession of the writer, it seemed desirable to bring them together in a single photographic plate. Apparently derived from a common stock, and arising in late tertiary time, the nominal species are closely allied. Yet there is convenience in retaining the present specific designations of forms which are readily distinguishable. Two of the species have not thus far been found living. As the deeper water along the coast is explored, they may possibly be discovered in the dredge, together with other forms not now known.

Pleurotoma (*Genota*) *carpenteriana* Gabb.

Pleurotoma (*Surcula*) *carpenteriana* Gabb. Proc. Cal. Acad. Nat. Sci., 1865, p. 183; Pal. Cal., vol. 2, p. 5, pl. 1, fig. 8.

Pliocene.—San Fernando and Santa Rosa (Gabb); San Diego (Dall).

Pleistocene.—Santa Barbara and San Pedro (Gabb); San Pedro, San Diego and Ventura (Arnold); Santa Monica (Rivers).

Living.—Drake's Bay, 30 fathoms (Arnheim); Monterey to San Diego (Cooper); San Pedro, Santa Catalina Island and San Diego, 10 to 100 fathoms (Raymond); Cerros Island (Dall).

This is the largest and most plentiful species of the group. It is

characterized by a regularly fusiform outline, eight whorls, fine spiral sculpture, slight concavity near the suture, slight convexity of the anterior part of the upper whorls, the obtuse shoulder thus formed being *below* the middle of each whorl and sometimes ornamented with inconspicuous nodes. Plate II, fig. 1, illustrates Gabb's type, found in the pleistocene of Santa Barbara. It is the property of the University of California. Fig. 3 shows an example close to type. It was dredged in about 100 fathoms, off Santa Catalina Island. Length 80 mm. In fig. 2 the nodes are distinguishable, which when better developed are a diagnostic feature of the next species. Length 54 mm.

Pleurotoma (*Genota*) *tryoniana* Gabb.

Pleurotoma (*Surcula*) *tryoniana* Gabb, Pal. Cal., vol. 2, p. 6, pl. 1, fig. 9.

Pleistocene.—San Pedro (Gabb); Santa Barbara and San Pedro (Cooper); Santa Monica (Rivers).

Living.—San Diego (Cooper); San Pedro (Oldroyd).

Typically the angular, nodose whorls, eight in number, separate this species from *Genota carpenteriana*, but intermediate forms like the example shown in fig. 2 are found rarely, and indicate the close alliance of the two species. Plate II, fig 7, illustrates Gabb's type, found in the pleistocene of San Pedro. Fig. 8 represents a specimen found at Santa Monica. Its length is 62 mm.

Pleurotoma (*Genota*) *cooperi* Arnold. Mem. Cal. Acad. Sci., Vol. III, p. 203, pl. vii, fig. 3.

Pleistocene.—San Pedro (Arnold); Santa Monica (Rivers).

Characterized by the angular whorls, seven or eight in number, decidedly concave above the nodose angle, with relatively sharp sculpture. The nodes are more numerous than in the last species and become less prominent toward the aperture. Aperture less than half the length of the shell. Plate II, fig. 10, illustrates the single specimen found in the pleistocene of Santa Monica.

Pleurotoma (*Genota*) *stearnsiana* Raymond. NAUTILUS, Vol. XVIII, p. 1.

Living.—San Diego and Santa Catalina Island, 25 to 40 fathoms (Raymond).

The species is characterized by its small size, eight or more whorls, relatively wide form and broad color bands. Plate II, fig. 6, represents the type. Length 30.5 mm. An old specimen, length 41.5 mm., is shown in fig. 5, and a younger example in fig. 4. All are from San Diego.

Pleurotoma (*Genota*) *riversiana* Raymond. NAUTILUS, Vol. XVIII, p. 14.

Pliocene.—Santa Monica (Rivers).

Characterized by narrow form, sharply expressed sculpture and obtuse angle *above* the middle of the whorls. Plate II, fig. 9, illustrates the type which thus far is the only specimen found. Length 59 mm.

University of California, July, 1906.

NOTE ON THE GENUS GLABARIS GRAY OR PATULARIA SWAINSON.

BY WILLIAM HEALY DALL.

The genus *Patularia* Swainson, appears in his Malacology (1840) pp. 287 and 381. There are two species of which the first is *Anodon ovatus* Swainson, Exotic Conchology pl. xxxvi, 1823, (2nd ed. by Hanley, p. 30, 1841) not *Iridina ovata* Swainson, Phil. Mag., 1823. The second species *A. rotundatus* Swainson, is doubtfully referred to *Anodonta* by Simpson in his Synopsis, p. 638. If it be as he supposes synonymous with *A. woodiana* Lea, Swainson's name dating from 1823, will of course take precedence. In 1841 Swainson cites under his *Patularia ovata Anodonta trapesialis* Lamarck, and Hanley points out that the latter specific name, being four years older, must take precedence of *ovatus* Swainson. *Anodonta trapesialis*, however, in modern classification, is a typical *Glabaris* of Gray. But *Glabaris* Gray, dates only from 1847, when the name was applied to *A. exotica* Lamarck, by Gray, in his list of generic synonyms, Proc. Zoöl. Soc. Lond., 1847, p. 197.

It would seem, therefore, that, since the first species and type of *Patularia* is a *Glabaris*, that the former name should be substituted for the latter in our systems. An examination of the nomenclators fails to show any earlier use of the generic name *Patularia* in zoölogy and there seems to be no reason which would militate against its adoption.

A careful examination of the text of the second edition of the Exotic Conchology shows that this is the only name included in it which is likely to affect the existing nomenclature.

SOME SHELLS OF MISSISSIPPI AND ALABAMA.

BY A. A. HINKLEY.

(*Concluded from July Number, p. 36*).

Family Succineidæ.

Succinea concordialis Gould. Durant, Miss., one dead shell was all found. In the summer of 1904 this species was plentiful at the R. R. bridge across Little Muddy near Du Bois, Ill.

Succinea aurea Lea. Florence, Ala.

Family Limnaeidæ.

Lymnæa desidiosa Say. Tuscaloosa and Florence, Ala.

Lymnæa caperata Say. Boligee, Ala.

Lymnæa columella Say. Florence, Ala.

Physa gyrina Say. Florence, Ala.

Physa heterostropha Say. Tuscumbia, Ala.

Physa pomilia Conrad. A rill below Columbus, Miss.

Physa troostiana Lea. Spring above Florence, Ala.

Planorbis trivolvis var. *glabratus* Say. Shoal creek, Florence, Ala.

Planorbis trivolvis Say. Durant, Miss. One specimen.

Planorbis dilatatus Gould. Grenada, Miss.

Segmentina wheatleyi Lea. Boligee, Ala.

Ancylus elatior Anthony. Tennessee river, Florence, Ala.

Ancylus kirklandi Walker. Tombigbee and Yalabusha rivers.

Ancylus rhodaceus Walker. Tennessee river, Florence, Ala.

Family Auriculidæ.

Carychium exiguum Say. Abbeville, Miss. Only found two specimens.

Family Strepomatidæ.

Io spinosa Lea. Tennessee river, Florence, Ala. One specimen only of this fine species was found.

Angitrema salebrosa Conrad. Tennessee river, Florence, common.

Angitrema subglobosa Lea. Tennessee river, Florence, Ala.

Angitrema tuomeyi Lea. Tennessee river, Florence, Ala. A few were found in 1894 but none this time.

Angitrema duttoniana Lea ?. Tennessee river, Florence, Ala.

Angitrema lima Conrad. Cypress Creek, Florence, Ala. A few faintly banded.

Angitrema verrucosa Raf. Tennessee river, Florence, Ala.

Lithasia florentina Lea. Cypress and Shoal creeks, Florence, Ala. Found only a few.

Lithasia nuceola Anthony. Tennessee river, Florence, Ala. Doubtful determination.

Lithasia curta Lea. Tennessee river and Shoal creek, Florence, Ala.

Strephobasis plena Anthony. Tennessee river, Florence, Ala.

Strephobasis curta Hald. Tennessee river and Shoal creek, Florence, Ala.

Pleurocera alveare. Tennessee river, Cypress and Shoal creeks, Florence, Ala.

Pleurocera undulatum Say. Tennessee river, Florence, Ala.

Pleurocera excuratum Conrad. Tennessee river, Florence, Ala.

Pleurocera moniliferum Lea. Tennessee river, Florence, Ala.

Pleurocera ponderosum Anthony. Tennessee river, Florence, Ala.

Pleurocera moriforme Lea. Tennesee river, Florence, Ala.

Pleurocera thorntonii Lea. Tennessee river, Florence, Ala.

Pleurocera annuliferum Conrad. Black Warrior, Tuscaloosa, Ala.

Pleurocera elevatum Lea. Yallabusha river, Granada, Miss. Only two specimens found, they were covered with a thick deposit which being removed revealed a polished, olive colored epidermus and two strong bands.

Pleurocera trivittatum Lea. Tombigbee river, Columbus, Miss.

Pleurocera incurvum Lea. Cypress creek, Florence, Ala.

Pleurocera alabamensis Lea. Cypress creek, Florence, Ala.

Pleurocera olivaceum Lea. Tombigbee river, Columbus, Miss.

Pleurocera lativittatum Lea. Shoal creek, Florence, Ala.

Goniobasis acuta Lea. Florence, Ala.

Goniobasis formosa Conrad. Florence, Ala.

Goniobasis hydeii Conrad. Black Warrior, Tuscaloosa, Ala.

Goniobasis interveniens Lea. Florence, Ala.

Goniobasis nassula Conrad. Spring in Tuscumbia, Ala.

Goniobasis thorntonii Lea. Spring in Tuscumbia, Ala.

Goniobasis aterina Lea. Florence, Ala. Found with *Pomatiopsis hinkleyi.*

Goniobasis nitens Lea. Florence, Ala. This determination is doubtful.

Goniobasis adusta Anthony. Spring near Cypress creek, Florence, Ala.

Goniobasis paupercula Lea. Small stream above Florence, Ala.

Eurycælon crassa Hald. Tennessee river, Florence, Ala. Only one very young shell found. When at this place in 1894 this form was found of all sizes with three wide bands and the carina of the young shells remarkably developed, Pilsbry says this is *Eu. anthonyi.*

Anculosa carinata Brug. Tennessee river, Florence, Ala. A few specimens can be referred to no other species and are put under this name with some doubt.

Anculosa subglobosa Say. Tennessee river and Shoal creek, Florence, Ala.

Anculosa praerosa, Say. Tennessee river and Cypress creek, Florence, Ala.

Anculosa tintinnabulum Tennessee river and Shoal creek, Florence, Ala.

Family Viviparidæ.

Vivipara intertexta Say. Rill near Durant, Miss., and a rill near Boligee, Ala., both places in heavy timber.

Campeloma ponderosum Say. Tennessee river, Florence and Tombigbee river west of Boligee, Ala.

Campeloma decisum Say. Tennessee river, Florence, Ala.

Campeloma decisum var. *heterostropha.* One specimen. Tennessee river.

Campeloma coarctatum Lea. Tallahatchie, Yalabusha, Big Black and Tombigbee rivers.

Campeloma decampi Currier. Tennessee river, Florence, Ala.

Family Amnicolidæ.

Amnicola cincinnatiensis Anth. Big Black and Tombigbee rivers.

Amnicola limosa Say. Tallahatchie, Yalabusha, Big Black and Tombigbee rivers.

Amnicola augustina Pilsbry. Tuscumbia, Ala. Found in the

stream running from the spring, they were in algæ and on the muddy bottom.

Somatogyrus subglobosa Say. Tallahatchie and Yalabusha rivers.

Somatogyrus georgianus Walker. Tennessee river, Florence, Ala.

Somatogyrus substriatus Walker. Tombigbee and Tennessee rivers. The most plentiful species of the genus in these two streams.

Somatogyrus humerosus Walker. Tennessee river, Florence, Ala.

Somatogyrus quadratus Walker. Tennessee river and Shoal creek.

Somatogyrus strengi Pilsbry and Walker. Tennessee river and Shoal creek.

Somatogyrus biangulatus Walker. Tennessee river, Florence, Ala.

Somatogyrus excavatus Walker. Shoal creek, Florence, Ala.

Somatogyrus tennesseensis Walker. Shoal creek.

Somatogyrus pumilus Conrad. Tennessee river, Florence, Ala.

Pyrgulopsis mississippiensis Pilsbry. Shoal creek. This little species was numerous a short distance above the canal aqueduct, where sediment had collected on the rock bottom, a few were found on algæ. They were only found in mid-stream.

Pomatiopsis lapidaria Say. Found on leaves after a shower, in a moist situation, always shaded by timber and scrub palmetto. Boligee, Ala.

Pomatiopsis hinkleyi Pilsbry. This species was very numerous in the same places where the types were found in 1894. It was also found across the river high up on the river bluff, on and in damp moss but not in a wet situation like the others. See vol. X, p. 37 of the NAUTILUS.

Family CORBICULIDÆ.

Calyculina transversa Say. Yalabusha, Black and Tombigbee rivers.

Calyculina occidentalis Prime. Creek, Boligee, Ala.

Sphaerium striatinum Lam. Big Black river, Durant, Miss., Boligee, Alabama, one specimen at last place.

Sphaerium stamineum Conrad. Young specimens, Grenada, and one mature at Durant, Miss.

Pisidium virginicum Gmel. Durant, Miss.

Pisidium compressum Prime. Tuscumbia spring; Black Warrior, Tuscaloosa, and Shoal creek, Florence, Ala.

Pisidium variabilis Prime. Big Black river, Durant, Miss.

Pisidium noveboracense Prime. Variety, spring, Tuscumbia, Ala.

Pisidium peraltum Sterki. Yalabusha river, Grenada, Miss.

Pisidium neglectum Sterki. Ms, name; Black Warrior, Tusca loosa, Ala.

Pisidium singleyi Sterki. Black Warrior, Tuscaloosa, Ala.

Pisidium atlanticum Sterki. Floating creek, Columbus, Miss.

(*To be continued.*)

A NEW SCALA FROM CALIFORNIA.

BY WILLIAM HEALEY DALL.

Scala lowei n. sp.

Shell small, conic, with five or more rapidly increasing whorls after the (lost) nucleus; color white, whorls very convex with deep sutures and a small, spiral umbilicus; there is no basal disk or cord; sculpture of about twenty-seven rather thick, strongly reflected, smooth, close-set varices, and very close, fine, spiral threads, covering the whole whorl between the varices, and separated by about equal sulci; aperture sub-circular, slightly higher than wide, the reflected margin wide at the outer lip, patulous at the inner base, narrow between the shoulder and the preceding whorl, and at the shoulder produced into a short, rather stout spine which, repeated on successive varices, coronates the whorls. Length of shell (without nucleus), 7.0; max. diameter, 4.0; max. diameter of aperture, 2.5 mm.

Habitat: dredged off Avalon, Catalina Island, Cala., in 40–60 fathoms, by H. N. Lowe, in 1903.

This species recalls *S. bellastriata* Carpenter, in general character, but is smaller; has more numerous, close-set and more strongly reflected varices; and has the spiral striation and threading much finer than in *bellastriata* of equal size.

The first shell belonging to Mr. Lowe was returned to him after a figure had been drawn from the specimen. A second specimen was sent by him, from the same vicinity, in 1906, which is retained in the National Museum, No. 191548. This also has lost its nucleus. The six remaining whorls measure 7.0 mm. in length.

DESCRIPTIONS OF TWO NEW CLEOPATRA AND A PISIDIUM.

BY C. F. ANCEY.

1. *Cleopatra multilirata*, Anc.

Testa fusco-olivacea, indumento ferrugineo tecta, modice sed pro genere aperte perforata, solidula, concolor vel circa umbilicum brunneo tincta, ovato-turbinata, liris acutis permultis (circa 8–9 in penultimo, 24–25 in ultimo anfractu) angulata. Spira conoidea, erosa. Anfractus superst. $3\frac{1}{2}$ rotundati, sutura profunda, ultimus latus, ovatus. Apertura ovata, fere recta, superne subangulata, marginibus callo appresso nitido junctis, columellari vix patulo. Operculum fuscum, extus medio valde concavum, nucleo paucispirato, subcentrali, attamen propius marginem columellarem sito.

Long. 9, diam. 7, alt. apert. 5 mill.

Hab. Vinaninony, Madagascar (*teste* Ph. Dautzenberg).

A very distict species quite different from other forms recorded from Madagascar, such as *C. amoena*, Morelet, *C. moniliata*, Morelet, *C. grandidieri*, Crosse et Fischer and *C. Trabonjyensis*, Smith. All of these but the latter were not correctly located in their proper genus, as the first was referred to Melania, the second to Paludina and the third to Paludomus by the describers. The present species is somewhat related to *Cl. Trabonjyensis*, but the liræ are much more numerous.

2. *Cleopatra Smithi*, Anc.

Testa ovato-acuminata, anguste perforata, subtenuis, flavescens vel flavo-virens, epidermide tenui induta, liris fuscis infra peripheriam ultimi anfractus evanescentibus regulariter exarata. Spira conoidea, truncata. Anfractus circiter 7 convexi, sed haud tumido-ventricosi, superiores, liris 4 cincti, concolores (lires haud coloratis), ultimus ovatus, liris 5–6 æquidistantibus supra insertionem aperturæ et sæpe una infra medium cinctus et 2–3 parvulis circa perforationem sculptus, inter liras striis incrementi conspicuis eximie peraratus, zona peripherica castanea, alteraque circa basin ornatus. Apertura ovalis, superne et infra paulo acuminata, totius testæ dimidio multo minor. Peristoma tenue, marginibus callo tenui junctis, columellari simplici, non expanso.

Long. (testæ erosæ, 4 anfr.) 11 diam. 7, alt. apert. 5, lat. ejusd. $3\frac{1}{2}$ mill.

Hab. River Chozi, which flows into the Chambézi, region of lake Bangwéolo, British Central Africa (Rev. Fath. M. Guillemé, 1905).

Strikingly like *Cl. Mweruensis*, Smith (Proc. Zoöl. Soc. London, 1893, pl. lix, fig. 10), but smaller, differently colored and more regularly lirate. The locality is very distant from lake Mweru, although belonging to the same geographical region.

For this and numerous other interesting shells collected during his journeys in Central Africa I am indebted to the Fath. M. Guillemé. The material collected by him will be reported upon in the near future. As a species of *Cleopatra* was already named after him, I am respectfully dedicating this new species to E. A. Smith, Esq., of the British Museum.

3. *Pisidium planatum*, Anc.

Concha minuta, lenticularis, parum inflata, compressa, nitidula, tenuis, pallide cinerea, striis concentricis exilibus crebre sub lente sculpta, umbonibus lævibus, depressis, inæquilatera. Pars antica rotundata, postica fere duplo major, regulariter arcuata. Umbones late depressi, obtusissimi, inermes, lævigati. Dens cardinalis parvus, laterales debiles. Ligamentum parvum, lineare.

Diam. $3\frac{1}{5}$, alt. $2\frac{1}{2}$, crass. $1\frac{1}{2}$ mill.

Hab. Andriba, Central Madagascar (*teste* Dautzenberg).

A more depressed form than *P. Madagascariense* Smith, the only other species of the genus described from the island.

NOTES.

On the Habits of Praticolella jejuna:—In the vicinity of St. Augustine, Florida, I found this species locally only west of the city in the white sandy, scrub oak section, near the pines, under boards and leaves, in fact this was the only shell found there. They were undersize, and very thin, probably due to the unfavorable condition for molluscan life. Mr. A. G. Reynolds writes me from Disston City, Hillsboro county, Fla.: "It is found under dead leaves and trash, occasionally under boards, and more rarely on pine stumps." Mr. Charles T. Simpson in his valuable paper, "Contributions to the Mollusca of Florida," (Proc. Davenport Acad. Nat. Sci., v, p. 66, 1886), says: "The only mollusk ever found in high, dry pine woods in Florida. I have seen it crawling on barren dry sand near Braidentown, and around my dwelling, and along the road in Fogartville."—C. W. Johnson.

CHLORITIS EDWARDI, Gude, ascribed with some little doubt to the Moluccas, is found in the Island of Ceram, where it was found by the Rev. Father Le Coq d'Armanville, who lost his life in New Guinea. My specimens were received from the Abbé Mège, *Omphalotropis macromphala*, Bavay (Journ. de Conch., 1905, vol. liii, p. 250, figs. 9, 10, 11), is the same as *O. Quadrasi*, v. Möll., and therefore becomes a synonym of the latter. The shell is from the Island of Guajan (or Guam), Ladrone Islands. Von Möllendorff's paper appears to have escaped the notice of Mr. Bavay.—C. F. ANCEY.

NOTE ON DYAKIA AND PSEUDOPARTULA.—A recent article by Lieut.-Col. H. H. Godwin Austen (Proc. Malac. Soc. Lond., vii, p. 93) has called my attention to the anatomical description of *Dyakia nasuta* (*Helix nasuta* Metcalfe) by the same author (P. Z. S., 1891), which I had overlooked when treating of this species in Manual of Conchology, xiv, p. 12. It appears that the snail belongs to the *Zonitidæ*. There cannot be much doubt that the Sumatran and Javan species forming the group *Pseudopartula*, and which I associated with *nasuta*, will also be transferred to *Zonitidæ*, since their resemblance to *nasuta* seems too strongly marked to be adventitious. —H. A. PILSBRY.

A SYNONYM OF BRACHYPODELLA.—In my monograph of *Urocoptidæ* I overlooked the name *Microstoma hanleyanum* Jousseaume. Mém. Societe Zoölogique de France for 1889, p. 247. This is *Cylindrella hanleyana* of Pfeiffer, a species of *Brachypodella*. The name *Microstoma* will become a synonym of *Brachypodella*. It was probably not intended as a new generic name, being very likely an error for *Mychostoma*.—H. A. PILSBRY.

PUBLICATIONS RECEIVED.

HELICINA OCCULTA Say (Proc. Davenport Acad. of Sciences, ix, pp. 173–180). ADDITIONAL NOTE ON HELICINA OCCULTA (Journal of Geology, xiii, 1905, pp. 232–237). By B. Shimek. The rather extensive records of this species in both conchological and geological literature are reviewed in these papers, with copious notes and comparisons of recent and fossil shells. The alleged depauper-

ation of loess as compared with modern shells is disproved; "while there are variations in size in both recent and fossil shells, there is no marked depauperation of the fossils." *H. occulta* is uniformly found living on well-wooded grounds, leading Prof. Shimek to conclude that the forest areas in the loess region were formerly of much greater extent.

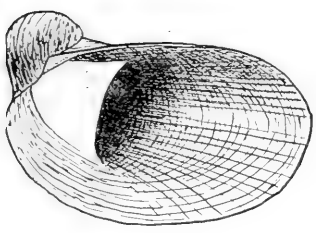
On the Anatomy of Certain Species of Solenidæ. On the Anatomy of Ensis magnus Schum. By H. H. Bloomer. Journ. of Malacol., xii, pt. 4. Several oriental and tropical American species of *Solenidæ* are described anatomically in these papers. Mr. Bloomer has now devoted ten papers to the morphology of the *Solenidæ*, to the great advantage of all interested in Pelecypod anatomy.

HENRY A. WARD.

We deeply regret to record the death of Professor Henry A. Ward, who was killed by an automobile at Buffalo, N. Y., on July 4. He was born at Rochester, N. Y., in 1834. Studied at Williams College and Rochester University, and became an assisiant of Louis Agassiz in 1854. He was Professor of Natural History at the Rochester University from 1860 to 1865. From 1870 to 1900 Prof. Ward traveled in all parts of the world, making large and valuable collections which were shipped to his Natural History Establishment at Rochester and from there distributed among the museums, universities, colleges and private collections throughout the country.

Prof. Ward has perhaps done as much to popularize and encourage the study of natural history than any one man. Mr. Wm. T. Hornaday paid him a glowing tribute, under the well earned title, "The King of Museum-builders." It is probably safe to say that through his agency more shells have been brought into this country than by any other means. His "Catalogue of Specimens of Mollusca" forms a useful hand-book for beginners. At various time his Establishment has employed men who have subsequently become prominent in various branches of the natural sciences.

For some years past Prof. Ward has devoted his energies chiefly to collecting meteorites, bringing together the largest collection in the world. An account of it may be found in the July number of the *Popular Science Monthly*.



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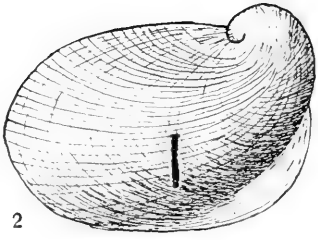

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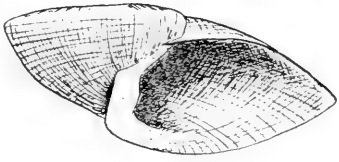

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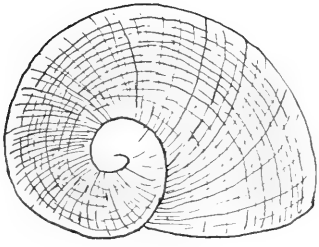

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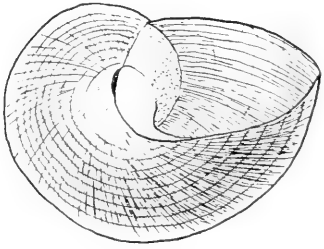

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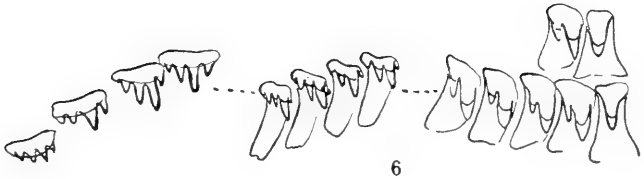


6

AMPHIGYRA AND NEOPLANORBIS.

THE NAUTILUS.

VOL. XX. SEPTEMBER, 1906. No. 5.

TWO NEW AMERICAN GENERA OF BASOMMATOPHORA.

BY HENRY A. PILSBRY.

In the course of a collecting expedition to Alabama in October and November, 1903, Mr. A. A. Hinkley found a number of mollusks of unusual interest and importance.[1] Among them were two species of spiral-shelled gastropods quite unlike any fresh-water snails hitherto known in this country, having affinities with the *Ancylidæ*.

Like Ancylus, the new forms are essentially sinistral in their soft parts, but the shells are dextral. They are very small snails, and were found on or usually under rocks in swift water, and evidently do not depend upon free air for respiration, having a false gill in the pallial chamber.

Genus AMPHIGYRA *nov.*

The shell is minute, Neritoid or Crepidula-like, with a small depressed lateral spire, apparently dextral, composed of about 1½ very rapidly enlarging whorls, the last very convex dorsally, imperforate; the apex is smooth, and the last whorl is spirally striate. The aperture is very large, oblique, transversely oval, the peristome continuous and free, thin. Cavity of the spire very small, a thin, broad, concave columellar plate projecting across the end next the spire, as in *Crepidula* or *Latia*.

The soft parts are sinistral, externally Limnæoid, with large black eyes near the inner bases of the short blunt cylindric tentacles.

[1] See lists of the species collected, in NAUTILUS for August and September, 1904.

Two adductor muscles, kidney-shaped in section, one on each side, replace the usual columellar muscle.

The radula has 18, 1, 18 teeth, arranged about as in *Lymnæa*. Centrals with a single cusp, the laterals bicuspid, the outer cusp smaller. The transition teeth have four or five cusps. The marginal teeth are low, wide and separated, with four or five cusps. Pl. III, fig. 6, teeth of *A. alabamensis*.

There is a short false gill hanging in the pallial cavity.

The shell has some resemblance to *Crepidula* and *Latia*. *Lepyrium* and *Pompholyx* are also slightly similar; but the resemblance is no doubt superficial. *Pompholyx*, like *Amphigyra*, is sinistral with an ultrasinistral shell. It has no plate or lamina across the visceral cavity. The soft anatomy of *Amphigyra*, so far as worked out, seems to show most affinity with the *Ancylidæ*.

The deck of *Amphigyra* is present at all stages of growth observed, in young as well as mature shells. In *Gundlachia* no septum is developed until a period of hybernation or æstivation is reached. The shell is more solid than that of *Ancylus* or *Gundlachia*.

Amphigyra alabamensis n. sp. Pl. III, figs. 1, 2.

The shell is shaped like a convex *Crepidula*, closely, finely and sharply striate spirally, and of a pale yellowish-corneous tint. The last whorl flares in a raised ledge at the baso-columellar region, the back being very convex. The spire is slightly sunken, depressed. The raised parietal margin of the lip is abruptly kinked where it passes across the preceding whorl. The columellar plate or deck extends over nearly one-third the total transverse length of the aperture. Alt. 1.1, diam. 2 mm.

Wetumpka, Alabama, on the under surfaces of rocks in swift water.

Genus Neoplanorbis n. gen.

The shell is minute, subdiscoidal, nearly flat above, convex below, perforate, carinate at the periphery, composed of about two rapidly enlarging whorls, the apex impressed and turned in. The aperture is very oblique, wider than high, a little dilated at the base. Peristome thin, not continuous, the columellar margin straight and broadly dilated, somewhat thickened within.

The dentition and so far as known, the soft anatomy, is similar to *Amphigyra*.

Type *N. tantillus*.

The type of this group was at first taken for a *Planorbis* of the *P. dilatatus* group,[1] but when the dentition was examined it became obvious at once that the snail could not belong to the *Planorbinæ*. The radula is not materially unlike that of *Amphigyra*, but the conchological features of the two groups are quite diverse, *Amphigyra* being Crepiduloid with a distinct "deck" or columellar plate, while *Neoplanorbis* is Planorbis-shaped, perforate, with a carinate periphery and no "deck."

Neoplanorbis tantillus n. sp. Pl. III, figs. 3, 4, 5.

Shell very narrowly perforate, slightly convex above, very convex below, with a strongly projecting rounded keel at the periphery; light brown; surface slightly shining, sculptured with very obliquely radial growth-lines and raised spiral striæ, rather coarse for a shell of this size. Whorls 2, rapidly enlarging, the apex somewhat sunken; first whorl very convex, the second much less so, slowly descending in front. Aperture very oblique, shaped like a gothic-arched door, the upper and lower margins arcuate, the outer margin angular, the columellar margin dilated, straight and vertical, with a rather wide whitish callous within. Alt. .8, diam. 1.7 mm.

The specimens occurred at Wetumpka, Alabama with the preceding species. This is one of the smallest fresh-water mollusks yet found in America.

NOTE ON LEPYRIUM.

BY H. A. PILSBRY.

In connection with the genus *Amphigyra* I have had occasion to examine the specimens of *Lepyrium* in the collection of the Academy. It appears that the *Lepyrium* from the Cahawba river differs from *L. showalteri* (*Neritina showalteri* Lea) of the Coosa, in being much smaller, alt. 2.7, diam. 3 mm., with a straighter columellar edge and without a raised outer margin of the columellar area. It will probably prove specifically distinct, but as I have been able to compare only one of the original lot of *L. showalteri*, it may be best to rank the Cahawba form as a subspecies under the name *Lepyrium showalteri cahawbensis*.

[1] It was reported as *Planorbis tantillus* in Mr. Hinkley's list, *Nautilus* XVIII, p. 54.

SOME SHELLS OF MISSISSIPPI AND ALABAMA.

BY A. A. HINKLEY.

(*Concluded from August Number, p. 44.*)

Family UNIONIDÆ.

Truncilla triquetra Raf. Tennessee river, Florence, Ala.

Truncilla brevidens Lea. Tennessee river, Florence, Ala.

Truncilla sulcata Lea. Tennessee river, Florence, Ala.

Truncilla haysiana Lea. Tennessee river, Florence, Ala.

Truncilla propinqua Lea. Tennessee river, Florence, Ala.

Truncilla personata Say. Tennessee river, Florence, Ala.

Truncilla biemarginata Lea. Tennessee river, Florence, Ala.

Truncilla florentina Lea. Tennessee river, Florence, Ala.

Truncilla perplexa Lea. Tennessee river, Florence, Ala.

Truncilla turgidula Lea. Shoal creek, Florence, Ala.

Micromya cælata Conrad. Tennessee river, Florence, Ala.

Lampsilis excavatus Lea. Tallahatchie, Big Black and Tombigbee rivers and Floating creek, Columbus, Miss.

Lampsilis ovatus Say. Tennessee river, Florence, Ala.

Lampsilis multiradiatus Lea. Tennessee river, Florence, Ala.

Lampsilis biangulatus Lea. Tennessee river, Florence, Ala.

Lampsilis hydianus Lea. Tallahatchie, Yalabusha, Big Black and Tombigbee rivers.

Lampsilis affinis Lea. Tombigbee river and Floating creek, Columbus, Miss.

Lampsilis orbiculatus Hildreth. Tennessee river, Florence, Ala.

Lampsilis anodontoides Lea. Tombigbee river, Columbus, Miss., and Yalabusha and Tennessee rivers.

Lampsilis fallaciosus Simpson. Tallahatchie, Yalabusha and Big Black rivers in Mississippi.

Lampsilis rectus Lamarck. Tombigbee and Tennessee rivers.

Lampsilis lineosus Conrad. Tallahatchie, Big Black and Tombigbee rivers.

Lampsilis concestator Lea. Yalabusha river, Grenada, Miss.

Lampsilis ogeecheensis Conrad. Tombigbee river, Columbus, Miss.

Lampsilis apicinus Lea. Tombigbee river, Columbus, Miss.

Lampsilis trabalis Conrad. Tennessee river. One specimen.

Lampsilis parvus Barnes. Tombigbee river, Columbus, Miss.

Lampsilis cromwellii Lea. Yalabusha river, Grenada, Miss.

Lampsilis alatus Say. Tombigbee and Tennessee rivers.

Lampsilis purpuratus Lamarck. Tallahatchie, Yallabusha and Big Black rivers.

Lampsilis gracilis Barnes. All the rivers visited.

Lampsilis leptodon Rafinesque. Tennessee river. Two poor specimens.

Lampsilis claibornensis Lea. Floating creek, Columbus, Miss.

Medionidus acutissimus Lea. Tombigbee river and Floating creek, Columbus, Miss.

Medionidus subtentus Say. Tennessee river, Florence, Ala.

Obovaria retusa Lamarck. Tennessee river, Florence, Ala.

Obovaria tinkeri Wright. Yalabusha river, Grenada, Miss.

Obovaria unicolor Lea. Tallahatchie, Yallabusha, Big Black and Tombigbee rivers, very plenty in the last stream at Columbus, Miss.

Obovaria ellipsis Lea. Tennessee river, Florence, Ala.

Obovaria castanea Lea. Tallahatchie, Yalabusha, Big Black and Tombigbee rivers.

Plagiola securis Lea. Tombigbee and Tennessee rivers.

Plagiola elegans Lea. Tennessee river, Florence, Ala.

Plagiola donaciformis Lea. Tallahatchie, Yalabusha, Big Black, Tombigbee and Tennessee rivers.

Tritogonia tuberculata Barnes. Tallahatchie, Yalabusha, Big Black and Tombigbee rivers. In the Black a few specimens were found with purple nacre.

Cyprogena irrorata Lea. Tennessee river, Florence, Ala.

Obliquaria reflexa Rafinesque. Tombigbee and Tennessee rivers.

Ptchobranchus phaseolus Hildreth. Tennessee river, Florence, Ala.

Dromus dromus Lea. Tennessee river, Florence, Ala.

Strophitus spillmanii Lea. Yalabusha river, Grenada, Miss.

Strophitus tombigbeensis Lea. Tombigbee river, Columbus, Miss.

Strophitus elliotii Lea. Tallahatchie river, Abbeville, Miss.

Strophitus schafferianus Lea. Tennessee river, Florence, Ala.

Anodonta grandis Say. Tallahatchie and Yalabusha rivers.

Arcidens confragosus Say. Yalabusha, Big Black and Tombigbee rivers.

Symphynota costata Rafinesque. Tennessee river. Only dead and poor ones found.

Symphynota complanata Barnes. Tombigbee river, Columbus, Miss.

Margaritana monodonta Say. Tennessee river. Large numbers were piled up by rocks, logs and in places on the river bank, where the musk rats had opened them. The living ones were plentiful under rocks in the shallow water, as many as two hundred being found under one slab.

Unio gibbosus Barnes. Tombigbee and Tennessee rivers.

Unio crassidens Lam. Tombigbee and Tennessee rivers.

Unio arctatus Conrad. Tombigbee river, Columbus, Miss.

Unio tetralasmus geometricus Lea. Yalabusha river, Grenada, and a rill near Durant, Miss.

Pleurobema holstonensis Lea. Tennessee river, Florence, Ala.

Pleurobema edgariana Lea. Tennessee river, Florence, Ala.

Pleurobema tumescens Lea. Tennessee river, Florence, Ala.

Pleurobema dolabelloides Lea. Tennessee river, Florence, Ala.

Pleurobema decisa Lea. Tombigbee river, Columbus, Miss.

Pleurobema curta Lea. Big Black and Tombigbee rivers.

Pleurobema taitiana Lea. Tombigbee river near Boligee, Ala.

Pleurobema nux Lea. Tombigbee river, Columbus, Miss.

Pleurobema bulbosa Lea. Tombigbee river, Columbus, Miss.

Pleurobema nuculopses Conrad. Tombigbee river, Columbus, Miss.

Pleurobema aesopus Green. Tennessee river, Florence, Ala.

Quadrula asper Lea. Tallahatchie, Yalabusha, Big Black and Tombigbee rivers.

Quadrula plicata Say. Tennessee river, Florence, Ala.

Quadrula perplicata Conrad. Yalabusha and Black rivers.

Quadrula latecostata Lea. Tombigbee river, Columbus, Miss.

Quadrula heros Say. Tallahatchie, Yalabusha and Tennessee rivers.

Quadrula trapezoides Lea. Yalabusha, Big Black and Tombigbee rivers.

Quadrula cylindrica Say. Tennessee river, Florence, Ala.

Quadrula metanevra Raf. Tombigbee and Tennessee rivers. Common in both streams.

Quadrula intermedia Conrad. Tennessee river.

Quadrula stapes Lea. Tombigbee river, Columbus, Miss.

Quadrula rumphiana Lea. Tombigbee river near Boligee, Ala.

Quadrula pustulosa Lea. Tallahatchie, Yalabusha, Big Black, Tombigbee and Tennessee rivers. Those from the Yalabusha, Tallahatchie and Big Black have few pustules, and occasionally one is smooth.

Quadrula rubiginosa Lea. Tallahatchie river, Abbeville, Miss.

Quadrula cerina Conrad. Yalabusha and Tombigbee rivers.

Quadrula hebetata Conrad. Big Black river, Durant, Miss.

Quadrula rubida Lea. Big Black river, Durant, Miss.

Quadrula obliqua Lamarck. Tennessee river, Florence, Ala.

Quadrula solida Lea. Tennessee river, Florence, Ala.

Quadrula plena Lea. Tombigbee and Tennessee rivers.

Quadrula pyramidata Lea. Tennessee river, Florence, Ala.

Quadrula subrotundus Lea. Tennessee river, Florence, Ala.

Quadrula ebenus Lea. Tombigbee and Tennessee rivers. Common.

Quadrula granifera Lea. Tennessee river, Florence, Ala.

LYMNÆA DANIELSI SP. NOV.

BY FRANK COLLINS BAKER.

Lymnæa danielsi sp. nov.

Shell elongated, attenuated, of medium thickness; color ranging from very light-yellowish horn to dark chestnut or purple; surface shining, growth lines generally fine and close-set, but occasionally as near the aperture, coarse and often raised into ridges; last whorl often malleated; spiral sculpture of fine impressed lines; apex smooth, spermaceti-white in color; whorls 7, flat sided or slightly convex, slowly increasing in diameter; spire long and sharply attenuated, longer than the aperture; sutures impressed; aperture ovate, often a little triangular, somewhat flaring; peristome sharp, simple, bordered by a dark purple or chocolate band in many specimens; parietal wall with a thin callus, generally closely appressed to the shell and almost closing the umbilical region, leaving a small chink; axis gyrate as in stagnalis, forming a heavy, ascending plait; interior of aperture varying from white to dark purple.

Length 28.5, breadth 12, aperture length 14, breadth 6.5 mm.

Length 27.5, breadth 11.5, aperture length 12.5, breadth 6.0 mm.
Length 29.01, breadth 11.25, aperture length 13, breadth 6.0 mm.
Length 25.5, breadth 10, aperture length 11.5, breadth 6.0 mm.
Length 23, breadth 9, aperture length 9.5, breadth 4.75 mm.
Length 20, breadth 10, aperture length 10.5, breadth 5.5 mm.

Types: Chicago Academy of Sciences, L. E. Daniels; cotypes, Academy of Natural Sciences, Philadelphia; State Museum, Indianapolis, Ind.

Range: Lake Maxinkukee, Indiana, collected by Mr. L. E. Daniels.

This distinct species may be known by its acutely pyramidal spire and small, flaring aperture. It somewhat resembles elongate forms of *stagnalis*. Some time ago Mr. Daniels sent six specimens of this *Lymnæa* for identification. It remained unnamed until a recent visit to Washington, when a large collection of the same form was seen which had been secured by Dr. Paul Bartsch, of the Smithsonian Institution, and its novelty was thereby established. Later, Mr. Daniels sent several hundred specimens for examination. Lake Maxinkukee also contains *Lymnæa palustris*, *desidiosa* and *parva*. The juvenile *palustris* are liable to be mixed with *danielsi* if care is not taken to observe the form of the shell particularly the form of the axis.

The material collected by Dr. Bartsch contains one monstrosity in which the aperture is entire and separated from the body whorl. The lot recently sent by Mr. Daniels is wonderfully uniform, showing that the species is quite stable. A few curious variations occur in which the spire is shortened and the aperture is enlarged and expanded. In some specimens the columella plait is exaggerated to such an extent that it forms a pseudo-tooth. In other specimens the lower part of the aperture is somewhat effuse. The variation in color is remarkable, and it would be of interest to know the cause of the rich chestnut and purple color. The normal form is horn-colored like *stagnalis*.

The species is named in honor of Mr. L. E. Daniels, of La Porte, Indiana, whose assiduous collecting has added many new and interesting shells to the fauna of the middle west.

NOTE ON MITRA PICTA REEVE.

BY SLOMAN ROUS.

Mitra picta Reeve (Conch. Icon., p. 123, 1844) has been placed by Tryon in the synonymy of *M. barbadensis*. This, I think, is an error. A very cursory examination of the two shells will at once show them to be distinct. The sculpture of *barbadensis* consists of spiral raised lines, with fine microscopic, spiral and longitudinal lines decussating the spaces between them. In *picta* the spiral lines are impressed, closely, deeply foveolated, microscopically striated longitudinally and pitted where they cross the revolving lines. The fine spiral lines of *barbadensis* are absent in *picta*.

In color *M. picta* is a much darker brown, with the white patches much more conspicuous, being larger and more numerous often in wide longitudinal lines from end to end of the shell, but broken at the suture, or often massed on the suture so that the white predominates. I think usually one-fourth of the surface is white.

The folds on the columella of *M. barbadensis* are five in number, sometimes a sixth being just perceptible, in *picta* there are only four, the fourth being very small. I do not recollect ever to have noticed a fifth fold, but if it occurs it will be as rare as six in *barbadensis*.

Tryon also says "Sowerby erroneously refers the latter (*picta*) to the Cape of Good Hope." This is not an error of Mr. Sowerby. I was resident in the Cape over forty years, during which I had the pleasure of supplying him with many examples, and I have many still in my possession, most, or I think all, of them collected in Algoa Bay.

There can be no doubt that *M. picta* Reeve, is a valid species, and that its habitat is the Cape of Good Hope. That other writers have followed Tryon in this synonymy is sufficient reason for bringing this error to the notice of conchologists.

NOTE ON VITREA APPROXIMA AND V. VANATTAI.

BY H. A. PILSBRY AND BYRANT WALKER.

Owing to the fact that the proof of the article in which these species were described (Proc. A. N. S. P. 1902, pp. 431–3) was not read by both us, some errors unintentionally crept in, which were

not discovered until too late to be corrected in the original publication.

The localities of the two species were reversed and the proper credit was not given for the discovery of *V. approxima*. The types of that species were not collected by Ferriss and Walker and did not come from Wilson's Cove. They were collected by Henry Hemphill many years before and were distributed by him as "*V. wheatleyi* Bld." As Hemphill's stay on Mt. Mitchell was very limited (See Proc. P. A. N. S. 1900, page 149) they were no doubt collected either along the trail to the summit or on Mt. Mitchell itself. Collectors who received specimens from Hemphill as *V. wheatleyi* would do well to reëxamine them carefully.

V. vanattai was collected by Walker in Wilson's Cove.

SUBSPECIES, MUTATIONS AND FORMS.

BY T. D. A. COCKERELL.

Messrs. Pilsbry and Ferriss in discussing the variations of *Bulimulus alternatus* (Proc. Acad. Nat. Sci. Phila., 1906, p. 140) say: "we can find no ground for dividing them [the different forms of subsp. *mariæ*] into several races, as Prof. Cockerell proposes."

It seems opportune to protest against this interpretation of my paper of 1891; the more so, since Prof. Pilsbry has before tried to insist upon the erroneous nature of my proposed classification. There is not, and never has been, the least divergence of opinion as to the actual facts. In 1891, of course, we did not know as much about the subject as we do to-day, thanks to the excellent researches of Messrs. Pilsbry and Ferriss; but now, as before, the objections to my nomenclature have no valid basis, except in a mere difference of opinion as to what should receive a name.

I grew up in England, accustomed to the methods of the Jeffreysian school, which paid little attention to slightly differentiated races, but bestowed names on all sporadic or individual variations which were striking enough to be easily recognized. Professor Pilsbry pays little attention to sporadic variations, but is very much interested in geographical races or subspecies. It was undoubtedly a

serious fault in the English work, that we were so little alert for racial characters, and we were also to blame for confusing under the name "variety" several different phenomena. I have watched the development of the American researches with admiration, and certainly have no fault to find with the methods adopted; but at the same time I believe we make a great mistake if we assume that sporadic varieties are not worth noting and recording. Professor Pilsbry will probably concede all this, in principle, but will object to giving them names. It is unavoidable, I suppose, that there should be differences of opinion about this; but it is certainly true that only when they are named and find a place in the manuals do they get properly noticed and recorded.

The best example of the English method which has so far appeared is found in Taylor's "Monograph of the Land and Freshwater Mollusca of the British Isles," now in course of publication. I can hardly believe that any naturalist can study this work without admiring its exhaustive treatment of variation, and perceiving the value, from the standpoint of evolution, of the orderly presentation of so great a mass of information. At the same time, it is not without its faults, one of which is the confusion together of different races and mutations, treating them all as "varieties," without discrimination. Thus under *Testacella scutulum*, the geographical form *major*, from Algeria, appears as a variety; while its mutation *albina* is made to include all pallid forms, whether from Algeria or elsewhere. It is evident that *albina* should be treated under *major* as a mutation; and the name *pallida*, proposed for the pale mutation of the typical *scutulum*, should be so applied. Following the Jeffreysian method, the term "monstrosity" is applied in an illogical manner to sinistral mutations and various distortions of the shell, which have nothing particular in common.

Deviations from the normal may be conveniently included under three heads:

1. *Subspecies*, as generally understood in this country; forms occupying a distinct territory (or it may be ecological position) of their own, but intergrading with the species.

2. *Mutations*, the so-called spontaneous variations, arising sporadically from some modification of the germ-plasm, and often persisting in limited strains. These include, among other things, sinistral and albino variations; and it is desirable that analogous variations of

different species should receive the same mutational name: *e. g.*, *sinistrorsum* for all sinistral mutations.

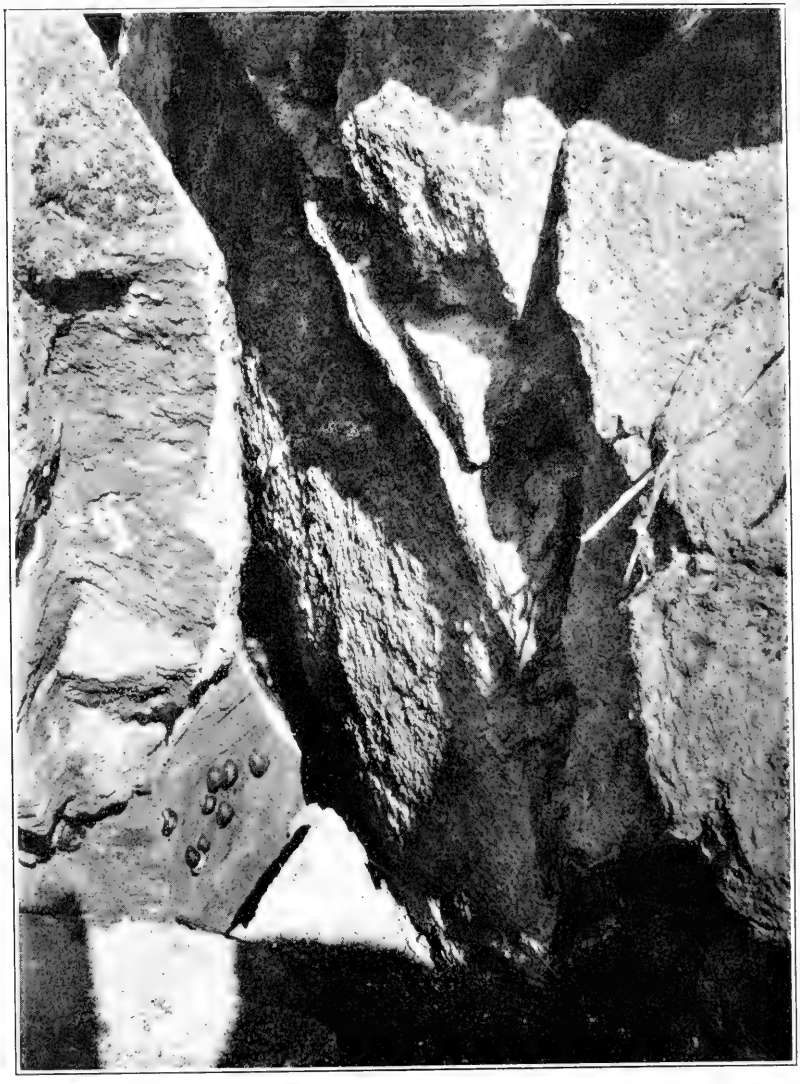
The interest attaching to these variations is very great at the present time, when so much is being said about the theories of de Vries and the Mendelian phenomena. We have, moreover, pretty good evidence that such "sports" have given rise to genuine specific characters, certain shells (*e. g.*, *Vitrea crystallina*) being permanently "albino," while whole genera have become sinistral. The sinistral mutations are perhaps of especial significance, inasmuch as in the nature of the case they must arise "all at once."

3. *Forms*, resulting from the immediate effect of the environment upon the individual, and presumably not inheritable in the proper sense of the word. I notice that Messrs. Pilsbry and Ferriss, in the work already cited (p. 169) name a "form" of *Goniobasis*.[1] These variations might be held to have the least significance of the three, but they are often striking, and are usually of interest from a physiological if not from an evolutional standpoint. It must be remembered, also, that while they are said to be immediately due to the environment, this is only true in a partial sense; there must already exist the inheritable power of *responding in this particular way* to the conditions found. This power of response, as exhibited under diverse environments, is itself a thing of great interest to every biologist, and no one can doubt its significance in relation to the persistence and spread of species.

The term "variety" may well be retained for use in cases which cannot clearly be referred to one of the above categories. The simple trinomial may be used for the subspecies; in the case of the others, "var.," "mut." or "f." should be placed before the last name.

It should be added that not unfrequently "mutations" belong to particular races, which are distinguishable only from their power of producing them. Thus, I cannot see that the *Cochlicopa lubrica* of the Rocky Mountains and of England are in any wise different shells; but in England certain mutations are frequently produced, which are never seen in the Rocky Mountains.

[1] Omitting, however, to name the very distinct mutations, figs. 27 and 28, p. 167. According to the method I advocate, fig. 28 would be mut. *spiralis*, and the same name would be applied to similar mutations of other species, except when a different one had been earlier provided.



KELSEY: COLONY OF EPIPHRAGMOPHORA TUDICULATA.

The Nautilus.

Vol. XX. OCTOBER, 1906. No. 6.

A HEALTHY COLONY OF EPIPHRAGMOPHORA TUDICULATA.

BY F. W. KELSEY.

While enjoying a short vacation, during the month of July of this year, I sojourned with an old-time friend, Mr. I. J. Frazee, in Pamoosa cañon, about fifteen miles north of Escondido, in San Diego County, and whenever I went prowling around among the hills with my camera I always kept my weather eye open for anything that carried a shell on its back.

My efforts were rewarded by a goodly find of *Glyptostoma newberryanum* Binney, and *Epiphragmophora tudiculata* Binney. The latter, in one instance, were so plentiful as to deserve more than passing notice, and I went to a good deal of trouble to enable me to get a photograph to present to the readers of the Nautilus.

By means of bars, I moved a rock weighing over a ton, back from the face of the cliff, so as to allow the light to enter and to give an unobstructed view of the colony of helices hibernating in the lower part of the cleft between the two masses of rock, and occupying a space of not more than two square feet.

Of course, only a portion of the group shows in the picture, but after making the exposure, I collected fifty-eight adult shells and left more than half that number of immature ones for seed.

With one exception, I have never before seen snails in their wild state so plentiful. This was in the summer of 1902 when I collected over one thousand live *Epiphragmophora stearnsiana* Gabb, in a space not over fifty yards square at Pacific Beach, near San Diego.

REMARKS ON CERTAIN NEW ENGLAND CHITONS WITH DESCRIPTION OF A NEW VARIETY.

BY FRANCIS N. BALCH.

The recent announcement by Dall ['05 a. and b.] of a new *Chiton* from New England—the first local addition to the group in many years—makes this a favorable moment to introduce an allied novelty with a few remarks.

Tonicella Blaneyi Dall, was founded on a single specimen dredged by Dwight Blaney, Esq., of Boston, off Ironbound Island, Frenchman's Bay, Maine, in twenty fathoms.

Its diagnostic marks consist substantially in conspicuously radially ribbed lateral areas and terminal valves.

Dall says it seems: "somewhat intermediate between *Tonicella* and *Trachydermon*, with a leaning toward the former, while it seems to be most nearly related specifically to *Tonicella marmorea*"—an opinion in which I concur.

But this "intermediate" character raises the whole question of the true relation of these forms, which I now propose to discuss.

Trachydermon ruber and *Tonicella marmorea* are both common north of Cape Cod in from five to one hundred fathoms; the former, in my experience, outnumbering the latter (which favors the deeper waters,) at least ten to one.

They much resemble one another and in fact Gould ['70] (who retained them both in the Linnean genus *Chiton*) says of *ruber:* "It is not difficult to distinguish at sight well marked individuals of this species from those of *C. fulminatus*" (i. e., *Tonicella marmorea.*) "But there are intermediate specimens which it is not easy to pronounce upon. In general, this species is smaller, more solid, more convex, the valves more beaked, lines of growth more deep, the zigzag lines never appearing, though the posterior margin of the valve is sometimes dotted with white and red. The impunctured or ungranulated surface, however, is the best, as it is a constant, characteristic."

But Gould's diagnostic points will not stand. The color-patterns *do* duplicate, and the surface of *ruber is* punctate, as Dall has himself pointed out ['79]. I may add that in the coarseness of the punctation the two overlap.

The fact is, as Gould indicates, that while the extremes of the two

forms are well separated the series yet approach very near if they do not overlap.

In spite of this the two are to-day almost universally placed by American and British malacologists in two distinct genera—genera which, in Pilsbry's monograph [Pilsbry '92] are rather widely separated.

I propose very briefly to review their recent generic history.

Both were included in Gray's genus *Ischnochiton*, from which Carpenter ['63] split off *Trachydermon* as a sub-genus, naming no type though his own *retiporosus* was the first of the species referred to it. Neither *ruber* nor *marmoreus* was mentioned. He later declared it corresponded to the "second section" of Gray's *Ischnochiton* "* * * scales of mantle minute, granule-like," and raised it to the rank of a genus.

In 1873 [Carpenter '73] he published brief and informal, but important, notes of his observations on the *Chitons* of our New England Coast made during work with our Fish Commission expeditions. Of *C. ruber* he said: "It belongs to Gray's genus *Ischnochiton*, * * * 'section †, mantle scales minute, granular;' but as the gill-rows are short * * * it is necessary to establish a fresh genus, *Trachydermon* * * *."

Of *C. albus*—now by far the commonest species all along our shore, outnumbering *ruber* and *marmorea* combined a great many times over and scarcely to be missed by any dredger—he said: "I twice captured a live specimen; but each time it eluded the aftersearch. I do not doubt that this is also a *Trachydermon* * * *." While not germane to the present inquiry this is interestingly suggestive of changes in the *Chiton* census.

Of *C. marmoreus*, he said: [it] "is *Tonicia* of H. Adams and Gray, simply because the girdle is smooth. The true southern *Toniciæ*, however, have pectinated insertion-plates and ambient gills, like the typical *Chitons;* while the northern species so-called have sharp plates and short gills. They differ, in fact, from *Trachydermon* simply in the girdle being destitute of the minute scales. I distinguish the group as *Tonicella*."

This is the origin of the latter genus, which we now know is far removed from true *Tonicia*.

Tonicella, then, was originally nothing but a scaleless-girdled *Trachydermon*, with *marmorea* as its type-species. I have looked in

vain through Dall [’79,] Fischer [’87,] Pilsbry [’92] and other leading modern authorities for some other tangible distinction between the two genera, but all the cited authors retain the two nearly in the exact Carpenterian sense above given, though the single diagnostic difference results in their rather wide separation under Pilsbry's scheme.

The trouble with this single diagnostic difference is that according to my observations it does not exist in the type-species, *marmorea*.

According to my observations neither *ruber* nor *marmoreus* has scales, strictly speaking. In both (in *ruber* always, in *marmorea* usually) the girdle is set with minute, stumpy spines. In *ruber* these have some such shape as a thimble or short finger-cot and are thick-set, giving a shagreen-like surface, while in *marmorea* they are proportionately longer and thinner, commonly absolutely much smaller, usually (if not always) much less thickly set, often very sparse indeed and apparently sometines lacking entirely.

In other words my observations bear out the beautiful accuracy of Sars [’78,] Tab. 8, figs. 3 a.—1. and 4 a.—1., on the basis of which he erected the genus *Boreochiton* expressly to contain our two forms, in ignorance of Carpenter's prior *Trachydermon*.

If Sars' figures and my observations are correct there is no more ground for generically separating *ruber* and *marmorea* on the basis of girdle-character [and no other has been suggested] than there would be for putting No. 3 and No. 1 sandpapers in different genera. If indeed the two species do not actually intergrade in this character, at least the difference between the coarsest and finest (or naked) *marmorea* is far greater than the difference between the coarsest *marmorea* and the finest *ruber*.

The upshot is that I feel confident *marmorea* must be removed to *Trachydermon* and stand close beside *T. ruber*. What is to become of *Tonicella* after the removal of its type-species to a prior genus I leave to others.

Admitting that *ruber* and *marmorea* stand close beside one another in the same genus, how are they specifically distinguished? I think the answer must be—only by what Dall calls “ the sum of the characters.” Gould's supposed diagnostic differences have been dealt with already. Great as is the apparent difference between the rough red-and-white striped narrow girdle of an extreme *ruber* and the smooth, leathery, green, wide girdle of an extreme *marmorea* they almost if not entirely overlap on this point also.

The most reliable features known to me are the arrangement of the notches and radial canals of the anterior valves (which in *marmorea* are confined to a central segment of say 100°, while in *ruber* they spread through nearly 180°, the limiting pair being obscure); and the form of the tegumentum of the mid-valves (which in *marmorea* has a rather sharply convex anterior edge, and in *ruber* concave or sinuated). These characters are ascertained in so few specimens that I am not sure how constant they are.

I have no doubt, however, that *ruber marmorea*, taking the "sum of the characters," are quite valid species as such things go.

With these conclusions behind us, let us take up the new forms to be discussed.

The affinities of *T. Blaneyi* may be analyzed as follows[1]: girdle-covering, like *marmorea;* girdle-color, like *marmorea;* punctation, like *ruber;* notches and canals (anterior valve,) like *marmorea;* form of tegumentum (mid-valves,) like *ruber.*

I may add that, examining large series for ribbed specimens, I find distinct though slight "ribbing" of the anterior valve in several specimens of *ruber* but none in *marmorea.*[2]

What, now, is *T. Blaneyi?* It may be pathological, but nothing suggests it. It may be a unique specimen of an established distinct species, but if so, since said to be conspicuous and occurring in much-worked waters, it must be highly local or excessively rare. It may be a "connected variant" of *marmorea*, but the intermediate stages of "ribbing" are missing, occuring rather in *ruber;* it may be a "connected variant" of *ruber*, but seems closer to *marmorea;* it may be a "disconnected variant," "sport" or "mutant," which will either become extinct or found a species and which merely happens to come from the *ruber* end of the *marmorea* series. Finally, it may be a hybrid, with the *ruber* tendency to wrinkling (possibly ancestral?) intensified by the cross as is not uncommon in such cases. My own provisional judgment would be for the latter.

While Mr. Blaney was working in Frenchman's Bay I was at work (in the summer of 1899 and 1901) in the next bay west—Blue Hill Bay. My richest ground was a small, stony area in about 12 fathoms off Harriman's Point where *T. ruber* was abundant while

[1] Based entirely on Dr. Dall's descriptions and figures. The unique specimen is in the U. S. Nat. Mus.

[2] Series much smaller.

T. marmorea was rather uncommon—as indeed I found it throughout. On this spot I dredged the form described below—one adult and one half grown in 1899, and a young specimen in 1901.

Tonicella ruber (Lowe) var. *index*. nov.

In every respect typical except in color,[1] which is in life an ivory-white slightly tinged with green (taking on in alcohol or formol the exact appearance of old ivory tinged faintly with yellow,) highly polished and absolutely unmarked except for a few extremely faint and minute light pink dots on the posterior edges of the mid-valves and a very conspicuous dark purple elongated triangle pointing posteriorly on the keel of the fifth valve. Girdle very pale, otherwise typical.

A color variety connected with the typical form by intermediate stages is perhaps not worth describing, but this form, while clearly close to typical *ruber*, appears to be quite discontinuous. Dr. Dall pronounces it new to him, which is practically to say new to science.[2] In spite of the fact that the mark on the fifth valve is often recognizable in typical specimens (and is probably present in all, though disguised by the strong color-patterns) and in spite of the fact that very pale, almost white, valves frequently occur and sometimes (as Dall has noted) to the number of four or five in a single specimen, yet the present variety can be distinguished from any other specimen of *ruber* I have ever seen, across an ordinary room. It is not a mere case of faintness of the rosy markings. The markings are wiped out and a totally new color scheme (viz. green) introduced. My three specimens, dredged two years apart, are absolutely indistinguishable except for size. The first specimen dredged was adult (probably hatched the year previous) the last very young (probably breeding the next year.) It is, therefore, not connected with age and has persisted on the same spot probably for at least four years; but is not a true geographical race (in the sense, for instance in which ornithologists use the term) since it is a cohabitant with the typical form.

What, then, is *T. ruber* var. *index?* It may be pathological, or a "physiological variety"—an albino in short—but it's local persist-

[1] Radula not examined.

[2] In this connection *Chiton marmoreus* var. *cæruleus* Winkley should be considered. See NAUTILUS VIII, p. 78, 1894.—ED.

ence for at least four years looks otherwise. It is scarcely a "variety" in the ordinary sense, for the intermediate terms are completely lacking. It is a "sport" or "mutant" in the sense of a discontinuous variant, breeding true and founding a new centre of variation? To my mind the evidence, while wholly inconclusive, suggests that possibility.

T. Blaneyi and *T. ruber* var. *index*, add two extremely interesting problems to New England malacology-problems which are all the more interesting because further work by Mr. Blaney or some other fortunately situated student, should go far to yield a solution in the course of a few years.

I may add that the feature from which var. *index* takes its name—the striking dark backward-pointing triangle on the keel of the fifth valve—suggests an interesting inquiry of a different nature. It appears to be a very wide spread and definite feature, appearing in various species in various groups, now more, now less disguised by conflicting color-patterns. It is by no means confined to the fifth valve though commonest there. I find no notice of this odd *Chiton* character in such examination of the literature as I have been able to make. The fifth valve appears to have no specially significant topographical relation with the internal anatomy, nor, indeed, is the hollow of the keel in any of the valves occupied by any special organ so far as I know. Has this mark, then, relation to some specialization of the complicated tegumentary system of organs?[1]

Jamaica Plain, Mass., September, 1906.

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[1] Postscript. Since the above was written I have noted that in the "List of British Marine Mollusca" published in 1902 by a committee of the Conchological Society of Great Britain and Ireland—apparently a very careful revision in the course of which generic questions were well considered—*T. ruber* and *T. marmorea* are, indeed, united in one genus, but that genus is *Tonicella*. How this result was reached I do not know.

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SOME OBSERVATIONS ON THE OVA OF UNIONIDÆ.

BY L. S. FRIERSON.

When the ova of those species of Unionidæ, with which I am acquainted, are first noted in the marsupia, they are spherical in shape, and consist of a single mass of yolk, surrounded with a clear fluid, probably albumen, all confined in a spherical egg-shell membrane. Soon after fertilization takes place, the yolk undergoes segmentation, and goes through a "mulberry" stage, and finishes with the familiar glochidium. Several interesting facts have been noted, which may prove of interest. Some young ova of a *Quadrula trapezoides* Lea were under observation, and being called off a short time, on my return I noticed that some of the ova had changed their

shapes in the interim. Some of these ova resembled dumb bells in shape (except that the two balls were in close juxtaposition). Close observation showed that on the side of the spherical vitellus would appear a slight bump or projection. This would slowly grow until it had become as large as the remainder of the yolk, thus producing the dumb bell, apparently the fluid contents of the yolk would pour itself from one ball into another, and a motion similar to that of the well known Amœba would result.

The other case was that of the ova of *Anodonta imbecillis* Say, which were in the mulberry stage. These were revolving about an axis, making in some instances six complete turns per minute, while the axis was fixed for each individual, the direction of this axis bore no relation to anything that I could see, but were in every direction. Some were horizontal, others perpendicular and many oblique.

This revolution was confined to the inside of the shell. The egg as a whole remaining unmoved, neither the cause or object of this rotation could be noted or conjectured by me. Possibly when packed together in the marsupium, the motion would influence the shell, and so in a measure prevent *congestion* in the narrow gill passages.

A solution of salt would in a minute or two cause a visible contraction of the vitellus, and the stoppage of the motion. Being curious to know if alcohol would stimulate their motions I placed a drop on the slide. In an instant an appearance resembling a violent effervescence took place, and at its close every egg-shell had *burst open*! Apparently the endosmosis had so far exceeded the exosmosis as to burst the membranes.

Frierson, La., August, 1906.

SPHÆRIUM HENDERSONI N. SP.

BY V. STERKI.

Mussel large, almost equipartite, well inflated; superior margin curved, with slightly marked rounded, or no angles where passing into the supero-anterior and posterior slopes which are slightly marked; scutum and especially scutellum distinct; anterior and posterior ends rounded, the latter scarcely drawn downward; beaks near or in the middle in half-grown and adult specimens, markedly

anterior in the young, well prominent over the hinge margin, slightly inclined towards the anterior, moderately large, rounded in the adult, but with a small, more or less flattened area near the center, in some specimens bounded by a slight ridge, most noticeable in the young; surface with moderately coarse, subregular sulcation, rather sharp to shallow, rugulose, slightly shining, with one or sometimes two well-marked, dark lines of growth; color generally grayish in the adult, lighter over the beaks and with light, yellowish zones along the margins, often with dark mottlings; in some specimens there are irregular zones of bluish; shell moderately thick, substance white, muscle insertions distinct, those of the protractor pedis separated from the anterior adductors; hinge moderately stout, curved, formed rather as in *Sph. solidulum* Pr., plate narrow, cardinal teeth short and slight; ligament rather long, covered, or a narrow median line uncovered in old specimens.

Soft parts, in alcohol, pale, the syphons with a yellowish tinge; palpi large; outer branchiæ comparatively small; metapodium distinct, but rather small, with the retractor pedis; branchial cavities with numbers of young at different stages, the largest 5 mill. long, seems to be free in the cavity (not in a marsupium).

Size: long. 17.5, alt. 14, diam. 9.5 mill. (= 100 : 80 : 54.3); one specimen 18 mill. long.

Habitat: Water holes, Crow Creek, 25 miles N. E. of Greeley, Colorado, collected by Mr. Junius Henderson, curator of the museum of the University of Colorado. There were over 120 specimens in the lot, of all stages of growth, few of them full-grown; some also were in alcohol.

So far as can be judged, the present *Sphærium* is distinct from all described species, and except for the largest forms of *S. simile* Say, is the largest. The mussel is higher than in *simile*, the beaks narrower and more prominent, the shell and hinge are stouter, the sulcation coarser, and the color and surface appearance quite different.

There is a *Sphærium* from several parts of the Mississippi valley, somewhat smaller and more inflated, and partly of different outlines, regarded as distinct since 1896, but shelved. It may be a form of the present species, which was named in honor of its discoverer.

A few specimens were affected in the same way as those of *S. solidulum* Pr. from Iowa, recently described in the NAUTILUS.

NOTES.

Popular Conchology.—Karl Soffel, of Paris, the well-known naturalist, has discovered that snails snore. He was experimenting with several specimens, which he had placed in a glass jar in his library, and one evening while writing he noticed a peculiar noise issuing therefrom. It sounded like a person snoring in the next room. M. Soffel approached and found that the snails were sleeping soundly and snoring peacefully, the loudest snorer of them all being the one that had lived among grape vines.—New York American.

PUBLICATION RECEIVED.

The Tertiary and Quarternary Pectens of California. By Ralph Arnold. (U. S. Geol. Survey, Professional paper No. 47, Series C., Syst. Geol. and Paleont., 76.—Pp. 264, plates LIII; plate I, a sketch map of California). Students of West American Mollusks are greatly indebted to Dr. Ralph Arnold for his monograph on this subject. In the introduction he says, of the first part, it "Is a brief outline of the different Tertiary and Pleistocene formations of California, giving the type localities, where, when and by whom first described, their salient characters, where they and their supposed equivalents are known to occur, the species of *Pecten* found in them and their typical fauna as far as known." These faunal lists will be very useful to students. The second part of the work describes and illustrates the Tertiary, Pleistocene, and recent Pectens, from Alaska to the Gulf of California, including the latter. The classification follows Dr. Dall's "Tertiary Fauna of Florida."

The number of Pectens listed for California is 93, of these fifty species and varieties are described as new.

The well-known form of *Pecten æquisulcatus* Cpr. is figured as a variety of *Pecten circularis* Sowerby, instead of *P. ventricosus* Sby. *Pecten hindsii* Cpr. is listed as a var. of *Pecten hastatus* Cpr. rather than *hericeus*, as lately listed, the latter now ranking as a variety also of *hastatus*. Dr. Arnold writes the name as *hericius* Gould rather than the better known form "*hericeus*." Dr. Dall's Ms. name of *Pecten* (C.) *hericius* var. *albidus* and *P.* (*Pseudamusium*) *randolphi* Dall, var. *tillamookensis*, are two new varietal names of Pectens known only among recent forms.

The bibliography ranges from 1829 to 1905.

A list of bulletins issued by the U. S. Geol. Sur., under Series C., Systematic Geology and Paleontology, is appended to this valuable monograph.—Mrs. M. Burton Williamson.

The Urocoptid Mollusks from the Mainland of America in the collection of the U. S. National Museum. By Paul Bartsch. (Proc. U. S. Nat. Mus. 1906, pp. 109–160, 3 plates). This paper deals chiefly with Mexican species, describing a number of new species and subspecies, and several new subgenera of great interest. The United States forms represented in the National Museum are also reviewed, and two described as new: *Holospira goldfussi anacachensis*, from the Anacacha Mts., near Cline and Spofford, and from near Eagle Pass, Texas. It differs from *goldfussi* by the fewer and stronger ribs. *Holospira* (*Haplocion*) *tantalus*, from "somewhere in Arizona or New Mexico." No comparisons are given, but it is said to be distinct from *H. pilsbryi*. It is what has been reported as *pilsbryi* from the above territories. *H. pilsbryi* is to be removed from the U. S. list.

The following errors or emendations require notice because they enter into nomenclature:

Microceramus texasianus (p. 158) is used for *M. texanus* Pils.

Microceramus mexicanus (p. 159) should be credited to von Martens, not Pfeiffer.

Cælocentrum eiseni (p. 119) is used in place of *C. eisenianum* Pils.

If these changes are intended as corrections or emendations, that fact should, we think, have been stated; but the introduction of new forms or spellings of specific names on any grounds is to be deprecated. —H. A. P.

Notes on Wisconsin Mollusca. By George H. Chadwick (Bull. Wis. Nat. Hist. Soc., IV, pp. 67–99, 1906.) A valuable annotated list containing 115 species, giving their distribution throughout the State, bibliography, etc.

Notes on Some Land and Fresh Water Shells from British Columbia. By J. F. Whiteaves (The Ottawa Naturalist, XX, pp. 115–119, 1906). An interesting faunal list containing upwards of thirty species.

THE NAUTILUS.

VOL. XX. NOVEMBER, 1906. No. 7.

ON THE DISTRIBUTION OF HELIX HORTENSIS MUELLER, IN NORTH AMERICA.

BY CHARLES W. JOHNSON.

The object of this paper is to record in full our present knowledge of the distribution of this species in North America, and to bring together the scattered literature bearing on the subject.

This species which presents such an interesting problem in geographical distribution was first recorded from North America in 1829 by a Mrs. Sheppard, of Woodfield, in an article "On the recent shells which characterize Quebec and its environs."[1] In this she states that *Helix hortensis* is "found on the bank near the plain of Abraham, common in the spring." In 1837[2] Amos Binney described the "olivaceous yellow," non-banded variety as *Helix subglobosa*, stating that it "is common on the lower parts of Cape Cod and Cape Ann, and is very abundant on Salt Island, a rocky uninhabited island near Gloucester." This seems to be the first New England record, for it is not mentioned by either John M. Earle or Col. Jos. G. Totten in their lists of Massachusetts and New England shells in 1833.[3]

Dr. A. A. Gould in 1841,[4] under *Helix hortensis*, adds to the

[1] Transactions of the Literary and Historical Society of Quebec, I, p. 193' 1829.

[2] Boston Journal of Natural History, I, p. 488, pl. 17, 1837.

[3] Hitchcock's Rept. on the Geology, etc., Mass., pp. 557, 559, 1833.

[4] Report on the Invertebrata of Massachusetts, p. 172, 1841.

localities above cited, "the region of Portland, Maine," and also gives the St. Lawrence. In 1843 Dr. J. W. Mighels, in his catalogue of the shells of Maine,[1] refers to *H. hortensis* as follows: "Captain Walden has recently detected this species on a little island in Casco Bay. It must be very plentiful as he obtained more than five hundred specimens in a few hours. * * * Most of them have five dark brown bands on a yellow ground; some four, some two, and a few none. Some have light fawn-colored bands on a white ground; in others, in place of colored bands the yellow ground is interrupted with nearly transparent zones, one beautiful specimen is heterostrophed." The latter probably represents the mutation *sinistrosum* of British authors, and seems to be the only American record. In the same year James E. DeKay[2] under *H. subglobosa* says: "I am indebted to Col. Totten of the United States engineers for my acquaintance with this species, which he found near the shore of the St. Lawrence, two hundred miles below Quebec."

In 1851[3] Amos Binney adds to his previous remarks on its geographical distribution, as follows: "It is also said to occur in the northern part of Vermont, in Maine, Canada on the St. Lawrence, Nova Scotia, and the islands of St. Pierre and Miquelon." In referring to changes which have taken place he says: "The prevalent characters of this, and probably of other species in a given locality, seem to undergo a considerable change from time to time. When I first visited Salt Island, where the species abounds, ten years ago, it was impossible to find a single specimen with either lines or bands. One uniform color prevailed throughout. At the present time the banded varieties are said to be not uncommon." To this Dr. Gould appends the following note: "They have recently been discovered by Dr. Samuel Cabot, in great numbers, on House Island, another of the little islets in the vicinity of Cape Ann, where all of them are of the banded variety. On the Outer Gooseberry, another neighboring islet, he found still another variety.

Mr. Samuel Tufts, Jr., in "A List of Shells Collected at Swampscot, Lynn and Vicinity" (Proc. Essex Inst., I, p. 32, 1853), says:

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[1] Boston Journal of Natural History, IV, p. 332, 1843.

[2] Natural History of New York, Mollusca, Pt. V, p. 32, 1843.

[3] The Terrestrial Air-breathing Mollusks of the United States (edited by A. A. Gould), II, p. 112, 1851.

"*Helix hortensis* may be added to this list on the authority of Wm. A. Phillips, Esq."

Prof. Edward S. Morse in 1864, in his valuable paper, "Observations on the Terrestrial Pulmonifera of Maine, etc.,[1] places the species under the genus *Tachea* with the following note: "This species has been found in abundance on several islands from Casco Bay to Grand Manan; Mr. Fuller found them on one of the extreme outer islands of Casco Bay in great profusion."

In 1868 O. A. L. Mörch, under *Helicogena hortensis* in his paper "On the Land and Fresh-water Mollusca of Greenland,"[2] says: "Dr. Beck writes in his manuscript above this species: 'Wormskiold has told me that he has found on the leaves of the small shrubs of *Salix lanatus* in the vicinity of the interior of the Gulf of Tgaliko a banded snail not unlike our garden snail. Two years ago (1844?) I obtained a dead specimen from Greenland, probably introduced.' It is certainly found in Iceland." See, also, Mörch, "On the Land and Fresh-water Mollusca of Iceland," page 42, of the same journal.

In 1869 W. G. Binney and T. Bland in "Land and Fresh-water Shells of North America,"[3] refer to the distribution of this species as follows: "An European species introduced by commerce (?) to the northeastern portion of North America. It is found on the islands along the coast from Newfoundland to Cape Cod, and on the mainland plentifully at Gaspé, C. E., also along the St. Lawrence, Vermont (?), Connecticut (?), etc."

The above records give all we know of what may be called the early history of this species in America, and clearly show that at that time its distribution was practically as it is at present. The following records are, therefore, probably only the results of more careful collecting over the same area. In taking up in detail the distribution of *H. hortensis*, I will commence at the most southern locality and go northward.

The Connecticut record is very doubtful, being based entirely on J. H. Linsley's Catalogue of the Shells of Connecticut, 1845.[4]

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[1] Jour. Portland Society of Natural History, I, p. 10, 1864; also American Naturalist, I, p. 186, fig. 16, 1867.

[2] American Journal of Conchology, IV, p. 38, 1868.

[3] Smithsonian Miscellaneous Collection, VIII, p. 181, 1869.

[4] American Journal Science, XLVIII, p. 280, 1845.

"*Helix subglobosa* (?) Binney, Weston, Gould, 172." The late John H. Thomson, in his paper on "The Land Mollusca of Bristol County, Massachusetts,"[1] says: "I have found large numbers of the bright lemon-yellow variety of this shell on Martha's Vineyard near Gay Head, never on the mainland. Of course introduced from Europe. I tried some in my garden [New Bedford], but the slugs Limax, Arion, etc., devoured the young, and I could never succeed in getting matured specimens." Rev. H. W. Winkley informs me that Rev. Geo. D. Reid has found it in the shell heaps on Martha's Vineyard.

In 1870 Dr. H. A. Pilsbry records this species from Nantucket.[2] They were taken by the late Dr. Harrison Allen at Sciasconset, the four specimens showing the following variations: uniform yellow (var. *lutea*), four and five bands, and one with five translucent almost colorless bands. During the same year Dr. Benj. Sharp also found it in the town of Nantucket, and later, on the adjacent island of Tuckernuck, all of the uniform lemon-yellow variety.

In 1904 the writer reported the finding of this species at Chatham, Mass.[3] Although I am aware that it was collected there long before, it apparently has not been recorded. They were all very pale yellow and bandless, the var. *subalbida* Locard. Some of the older specimens had entirely lost their epidermis, and were chalky-white, but still as active as their offspring. They were abundant on the steep bluff in front of the light-houses, although I did not discover their presence until a rainy day brought them from their hiding place; not even a dead shell indicated their existence. Mr. L. R. Reynolds informs me that he has collected *H. hortensis* on Morris Island, a wooded island just south of Chatham.

There is a tray of specimens in the museum of the Boston Society of Natural History from Provincetown, Mass., collected by Mr. L. L. Thaxter. All are the bright yellow, bandless variety (*lutea*). A few uniform light yellow specimens were found by Mr. A P. Morse among some cedars near "Old Harbor," Cohasset, Mass.

The next localities to consider are those of the Cape Ann region. W. G. Binney in his Manual of American Land Shells,[4] page 496,

[1] Journal of Conchology (British), IV, p. 373, 1885.

[2] The NAUTILUS, IV, pp. 24 and 48, 1890.

[3] The NAUTILUS, XVIII, p. 45, 1904.

[4] Bulletin, U. S. National Museum, No. 28, pp. 467 and 496, 1885.

gives "Eagle Island, Marblehead; House Island, Manchester; Kettle Island, Cape Ann." It is also to be found on the mainland at Manchester, Magnolia, Gloucester and Rockport.

Prof. T. D. A. Cockerell, in a paper on "Helix hortensis in America,"[1] describes the following varieties from Magnolia: *pallida* Ckll., "pale purplish or purplish-brown, without bands;" *quinquevittata* Moq., "yellow with five bands;" *rufozonata* Ckll., straw-colored with red-brown bands, five in number; also the varieties *subalbida*, *lutea* and *subglobosa*. Later Prof. Cockerell, on the "Variations of Helix hortensis at Rockport, Mass.,"[1] describes the following varieties: *subglobosa; arenicola*, "bands colorless, translucent, 12345;" *subalbida* and *lutea*, the latter showing some fifteen different band formulæ including 00000, 12345, 123(45), (123)(45), 10345, 12045. The latter specimens were collected by Mr. G. H. Clapp, who is quoted as follows: "The bandless or very faintly banded forms were by far the most common. Typical shells were scarce, even less plentiful than the transparent banded variety. On rainy days the shells were out by the hundreds."

The first locality north of Cape Ann from which this species is recorded is some of the outer islands of Casco Bay. Mrs. A. S. Packard has kindly donated to the Boston Society of Natural History a large series of this species from the collection of the late Prof. Packard. These were collected on Brown Cow Island, Casco Bay. The olive-green variety (*subglobosa*) predominates, grading insensibly into the yellow (*lutea*); the banded forms represent about ten per cent, while a corresponding number could be referred to the variety *arenicola*. Rev. H. W. Winkley has found it on Inner Green Island, and Mr. W. H. Weeks, Jr., on Cliff or Crotch Island. In a letter from Mr. H. K. Morrell, he writes: "I was at Seguin two days this week and the keeper, Capt. H. L. Spinney, happened to say that *Helix hortensis* was found on Pumpkin Knob, on the east side of Sheepscot Bay, and was abundant on Matinicus." Mr. Owen Bryant found the five-banded form on Seal Rock, one of the Matinicus Group. Mr. Arthur H. Norton also reported it from Seal Rock, and has found it on Mosquito or Little Egg Rock, Muscongus Bay. I have a specimen in my collection labeled "Spruce Head, Me." Mr.

[1] The Nautilus, III, p. 139, 1890.

[2] The Nautilus, XIII, p. 32, 1899.

Morris Schick collected it at Bar Harbor. Mr. H. S. Colton and later Mr. Dwight Blaney record it as "common" on Little Duck Island, near Frenchman's Bay.[1]

It is also reported from Grand Manan, Halifax and Cape Breton, while from the Gaspé region it has been collected by a number of persons. Dr. John M. Clarke found it very common on the limestone area at Perce. Mr. A. W. Hanham, in an article on the "Mollusca of the Gaspé region,"[2] says: "*Helix hortensis* was very common on the hillside, generally buried in the sand, several varieties were taken, the plain form seemed to be the most abundant." They were collected at Barachois, and in a beautiful series which he sent to me at the time, I find several specimens in which the bands are all united (12345). It has also been found at Gaspé Basin by Mr. F. R. Latchford. Abbé Provancher lists it from the Province of Quebec as "*H. nemoralis*."[3]

Specimens from Wreck Harbor, East Cape, Anticosta, collected by members of the "Arethusa" expedition in 1880, are in the collection of the Boston Society of Natural History. In Newfoundland the species seems to extend along the greater portion of the west coast. In a recent letter from Mr. L. P. Gratacap he says: "I found *H. hortensis* in considerable numbers in Newfoundland, in damp, woody ravines, in the two Codroy valleys, principally in the Little Codroy. They were deep in color, with and without bands. I did not see it on the east coast." Mr. Owen Bryant also failed to find it on the east coast. Mr. G. H. Clapp[4] says: "A friend has just brought me a living example of *H. hortensis* (12345) from the headwaters of Robinson's River, west coast of Newfoundland." This locality is not far above the Great Codroy. Mr. John Bryant, Jr., found it at the Serpentine River, June 20, 1905, and Dr. John Bryant at the mouth of East River, Hawkes Bay. During the past summer (July 8, 1906) Drs. C. W. Townsend and G. M. Allen also collected a beautiful series from the same locality on Hawkes Bay. They found them only at the one place, feeding on the "cow parsnip." All were the bright yellow variety (*lutea*) with (12345) and without bands.

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[1] The NAUTILUS, XVII, p. 99, and XVIII, p. 46, 1904.

[2] The NAUTILUS, VII, p. 65, 1893.

[3] Le Naturaliste Canadien, XIX, p. 186, 1890.

[4] The NAUTILUS, XIV, p. 72, 1900.

Dr. Wm. H. Dall in his work on Land and Fresh-water Mollusca,[1] gives Labrador, but the exact locality is not recorded. Only the single specimen referred to by Mörch has been found in Greenland. Dr. Dall thinks that it is doubtless an accidental importation. In Iceland the species still exists, as will be seen from the following letter from Mr. Gratacap: "I found *hortensis* this last summer in Iceland, where it assumes a very dark tint, with the longitudinal yellow threads strongly marked and the revolving dark bands reduced to one. They were fragile and very scarce. I have only three from Seydisfiord, on the east coast."

The origin of this species in America has been the subject of considerable discussion. Amos Binney, in describing *subglobosa*, and comparing it with the European *hortensis*, and the possibility of its being introduced by commerce, says: "It would be difficult, however, to account for their inhabiting the barren and retired situations at the extremity of Cape Cod, and the rocky islands in the neighborhood of Cape Ann, while in the intermediate country they are not found." Later (1851) he believed its origin in this country to be due to commercial intercourse with Europe. Prof. Edw. S. Morse in 1864 (*loc. cit.*) asks this question: "If this species is really identical with the *Tachea hortensis* of Europe, it seems a little singular that here it should only be found on islands frequently barren and far out from the land, * * while in the old country they become a nuisance in gardens." This is only another way of saying that if this species was introduced by commerce, why do we not find it in the gardens of Portland, Salem and Boston, instead of on the barren islands and exposed headlands?

W. G. Binney has always questioned its introduction by commerce, and later (1890) informs Prof. Cockerell (NAUTILUS, III, 139) that he regards the species as naturally present in America, an opinion in which Prof. Cockerell also concurs and refutes the theory "that the hardy Norsemen of old may have carried the snails about for food, and so imported it where they went." It seems too bad to shatter this fabulous, though pertinent story, before the poet has had a chance to versify. Dr. Pilsbry did not, however, coincide with Prof. Cockerell's idea that it is a native American (see NAUTILUS, IV, 24, 1890), and later in the Manual of Conchology (IX, p. 321, 1894), says: "*H. hortensis* inhabits many of the islands off the New

[1] Harriman Alaska Expedition, XIII, p. 20, 1905.

England coast, and being found in pre-Columbian kitchen-midden deposits, cannot be regarded as a recent immigrant. Possibly it may be the sole survivor of that Viking incursion in the eleventh century." Rev. Henry W. Winkley, in an interesting article, "Helix hortensis in New England" (NAUTILUS, XVII, p. 121, 1904), suggests that it is a survivor of the pre-glacial period. When we consider its present distribution and power to withstand even the climate of Iceland, this seems to be the only solution of the problem, which is further strengthened by its discovery in the Pleistocene by Dr. Dall (*loc. cit.*), who says: "The wide distribution of the species, often on uninhabitable islets off a coast little frequented, and its presence, which I have verified, in the glacial Pleistocene of Maine, tends to confirm the view that it is a prehistoric immigrant if an immigrant at all."

The question which now arises is this: Why does *Helix hortensis* continue to occupy the outer islands and headlands and not spread further inland? I think this can be quite readily explained, as far as the New England coast is concerned, by taking into consideration the geological character of the coast and the conditions most favorable to the life of land mollusks. The New England coast is composed almost exclusively of granitic rocks, or, on Cape Cod, of sand and gravel, both very unfavorable geological conditions for mollusca, owing to the absence of lime; even the more common species of the eastern United States are comparatively few on the coastal area. Again, the atmospheric conditions even slightly removed from the outer shore line are very different from the islands and headlands, continually bathed by the ocean's spray. These barren locations make up in lime and moisture what they lack in vegetation; the islets are also probably much more free from mice, rats and forest fires, which on the mainland destroy large numbers of snails. *Polygyra albolabris* and *Pyramidula alternata* are much more abundant on the islands than on the adjacent mainland, nor do these remarks apply only to the New England coast. The sandy pine and scrub oak barrens of southern New Jersey are void of land shells, while on the islands separated from the mainland by a wide expanse of salt marsh, and numerous creeks and bays, *Polygyra albolabris* var. *maritima* is quite abundant. The distribution of *hortensis* along the broad estuary of the St. Lawrence is undoubtedly due to favorable physical conditions.

A LIST OF SHELLS FROM NEBRASKA.

BY BRYANT WALKER.

The shells enumerated in the following list were all collected by Dr. R. H. Wolcott, of the University of Nebraska, Lincoln, Neb.

Many of the localities represented are in counties not covered by Aughey's List (Bull. U. S. Geol. Survey, 18, p. 697), so that while not large, the collection makes a considerable addition to our knowledge of the distribution of the different species in the State.

Dr. Pilsbry has kindly identified the *Vertigo* and *Bifidaria*.

Polygyra profunda Say. Omaha.

Polygyra multilineata Say.

Polygyra multilineata alba Witter.

Polygyra multilineata rubra Witter.

Omaha. A rather small, solid and elevated form. The four specimens measure $20\frac{1}{2}$ x $15\frac{1}{2}$, $20\frac{2}{3}$ x 15, 20 x $15\frac{1}{2}$, $20\frac{1}{4}$ x 14 mm.

Bellevue. A single, small, globose, greenish-brown, unicolored specimen measuring $16\frac{2}{3}$ x $12\frac{1}{2}$ mm.

Polygyra fraterna Say. Omaha. A small elevated, perforate form varying from $12\frac{2}{3}$–$13\frac{1}{2}$ x $4\frac{2}{3}$–$5\frac{1}{2}$ mm. Salt Creek, Roca. Similar in shape, but rather larger, 13–14 x 5–$5\frac{1}{2}$ mm.

Bifidaria contracta Say. Roca.

Bifidaria pentodon tappaniana Ad. Monroe Canyon, Sioux Co.

Vertigo ovata Say. Monroe Canyon.

Vitrea hammonis Ström. Roca.

Euconulus chersinus polygyratus Pils. Omaha, Roca and Monroe Canyon.

Zonitoides arborea Say. Lincoln, Roca and Monroe Canyon.

Pyramidula cronkhitei anthonyi Pils. Monroe Canyon.

Vallonia parvula Sterki. Roca.

Succinea grosvenori Lea. Salt Basin, Lincoln. A small, rather thick-shelled form, largest specimen 10 x 8 mm.

Hackberry Lake, Cherry Co. A large, thin-shelled form, quite variable in contour, the two largest specimens measuring $14\frac{3}{4}$ x $10\frac{1}{2}$, aperture $7\frac{1}{2}$ x 11 and $15\frac{1}{2}$ x 10, aperture 7 x 10 mm. Immature shells are very similar to those from Lincoln, but more inflated.

Succinea retusa Lea. Hackberry Lake and Marsh Lake, Cherry County.

Succinea avara Say. Roca and Monroe Canyon.

Lymnæa reflexa Say. St. Michaels, Buffalo Co., and Bellevue.

Lymnæa caperata Say. West Point, Cuming Co., and Dewey's Lake, Cherry Co.

Lymnæa desidiosa Say. Monroe Canyon.

Lymnæa palustris Mull. Dewey's Lake and Marsh Lake, Cherry County.

Physa anatina Lea. Lincoln; Washington, Cedar Co.; Roca and Platte River.

Physa gyrina Say. West Point, St. Michaels and South Bend.

Physa gyrina hildrethiana Lea. Lincoln and Hat Creek Valley, opposite Monroe Canyon.

Physa gyrina oleacea Tryon. Bellevue.

Physa heterostropha Say? Omaha. A few very young specimens seem referable to this species.

Physa ancillaria Say. Hackberry Lake, Dewey's Lake and "Sink" near Dewey's Lake, Cherry Co. Fine, large specimens. Those from the "Sink" are elegantly striped like *Lymnæa reflexa zebra*, a rare occurrence in this genus.

St. Michael. A more typical example.

Physa sayi warreniana Lea. Lincoln.

Physa Sp.? Dewey's Lake, Cherry Co. A single specimen resembling *P. aplectoides* Sterki, but with a short, obtuse spire and well-impressed suture.

Aplexa hypnorum L. Dewey's Lake and Marsh Lake, Cherry Co.

Planorbis trivolvis Say. Bellevue, St. Michael, Lincoln, Hackberry Lake and Dewey's Lake, Cherry Co., Omaha and South Bend.

Planorbis bicarinatus Say. Sidney, Cheyenne Co. One example is slightly transversely striate, approaching var. *striatus*.

Planorbis parvus Say. Omaha and Lincoln.

Segmentina armigera Say. Omaha.

Ancylus shimekii Pils. Calloway.

Ancylus rivularis Say. Deadman's Run, Lincoln.

Ancylus tardus Say. Lincoln.

Ancylus Sp.? Lincoln.

Amnicola limosa Say. Lincoln.

Sphærium simile Say. Lincoln.

Sphærium stamineum Con. Salt Creek, Lincoln.

Sphærium striatinum Lam. Lincoln.

Musculium jayanum Prime. Lincoln.

Musculium transversum Prime. South Bend, Cass Co., and Woodlawn Creek, Lincoln.
Musculium securе Prime. Lincoln.
Pisidium Sp.? Omaha.
Lampsilis luteolus Lam. Blue River, Crete.
Lampsilis parvus Bar. Lincoln.
Lampsilis subrostratus Say. Lincoln.
Unio tetralasmus Say. Lincoln.
Anodonta grandis Say. Lincoln.

NOTES.

LYMNAEA MEGASOMA. This species is abundant in Cobalt Lake, the centre of the wonderful silver-cobalt mines that now hold the attention of the world. No shell is found in an environment of such enormous qualities of precious mineral. Untold millions in value of silver ores, running in many cases over $5,000 to the ton, surround the placid lake, the waters of which are so strongly impregnated with arsenic as to cause serious intestinal trouble to those who use it. *L. megasoma* however lives and thrives, attaining large size and preserving to a ripe old age the beautiful brown epidermis characteristic of young shells. I have also found *L. megasoma* in Lake Temagami, the terrestrial paradise of the Algonquins—the North West Arm of Lake Nipissing, and at the mouth of French River. It doubtless occurs in suitable waters across New Ontario from the Albany River to Lake Abittibi.—F. R. LATCHFORD, Ottawa, Ont.

MIGRATION OF SCALLOPS.—The fact that beds of scallops in New Bedford and Fairhaven waters and along the Cape shore are being rapidly thinned out, and in some places completely exhausted, while new beds are being constantly located about Nantucket, is alleged to be causing the Massachusetts Fish and Game Commission to perfect a system of procuring more definite data regarding the movements of this toothsome shellfish.

Although the Nantucket fishermen will not commence dredging before November 1st, they are keeping up a continual watch for new scallop beds, and almost daily one of the boatmen will report large beds of the shellfish on flats and shoals which only a week or so before were barren. And the old beds which give promise of such a

rich harvest again this year are being watched with interest. The scallops at Nantucket are in prime condition this year, and the "eyes" are much larger than usual.

The Fish Commission experts are now desirous of obtaining definite data concerning the movements of scallops, and have liberated in Nantucket harbor a number of the shellfish to which copper tags have been attached. For the success of this experiment the commissioners look to the fishermen themselves, who are requested, whenever a tagged scallop is found, to record the same to the experts on their next visit to the island. It is known that the scallop is capable of moving through the water quite rapidly by simply opening and closing its shell, but how far it can go in a certain length of time is what the Fish Commission wants to find out. Perhaps it may develop through this experiment that scallops migrate from the Cape shore across the sound to Nantucket.—(*Boston Evening Transcript.*)

The Senior Editor of The Nautilus, in company with Mr. Jas. H. Ferriss, is on a collecting trip in Arizona. He expects to be absent about six weeks.

PUBLICATIONS RECEIVED.

The Behavior of the Pond Snail. *Lymnæus elodes* Say. By Herbert E. Walter (Cold Spring Harbor, Monographs, vi). An interesting series of experiments and observations.

New Mollusca from the Persian Gulf, etc. By J. Cosmo Melvill (Proc. Mal. Soc., London, vii, p. 69). Thirty-one new species of Gastropoda and one new Scaphopod are described and figured.

Capulus lissus Smith, as Type of a Proposed New Subgenus (Malluvium) of Amalthea. By J. Cosmo Melvill (Proc. Mal. Soc., London, vii, p. 81). Under this subgenus is also placed the *Amalthea benthophila* Dall.

Mollusca from Three Hundred Fathoms off Sydney. By C. Hedley and W. F. Petterd (Records of the Australian Mus., vi, p. 212). About 100 species are recorded, of which 11 are new.

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ABALONES AND THE PENAL CODE OF CALIFORNIA.

BY MRS. M. BURTON WILLIAMSON.

A rule, or tape-measure, is not considered necessary when collecting shells along the beach, but if one would not pay too dear for his shells on the Pacific Coast of North America it were well to take some cognizance of the size of the Halioti detached from the rocky coast, especially during certain months of the year.

Some years ago the writer presented to the American Association of Conchologists a series of young *Haliotis cracherodii* Leech; but one would not dare to undertake it now that the law was passed prohibiting the collecting of such shells; for it is the young or small specimens that the statute protects.

In the Penal Code of California, section 628, the law prohibiting the collecting of abalones[1] was incorporated and approved February 12, 1903, as an amendment to the section for the protection and preservation of lobsters, crabs, etc. The law as then amended in regard to abalones reads, "or any abalone shells or abalones the size of which shall measure less than fifteen inches around the outer edge of the shell." In 1905 this statute was amended, the size of the shell allowed by law being three inches less in circumference for the black abalone. It now reads as follows:

"Every person who between the 1st day of April and the 15th day

[1] Monterey county appears to have taken the initiative in regulating abalone-fishing by passing an ordinance. See Dr. R. E. C. Stearns' article in THE NAUTILUS for Nov., 1899, Vol. xiii, p. 81.

of September of each year, buys, sells, takes, catches, kills or has in his possession * * * any abalones or abalone shells of the kind known to commerce as the black abalones (*Haliotis Californica*), the shell of which shall measure less than twelve inches around the outer edge of the shell, or any other abalone shells, or abalones, the shell of which shall measure less than fifteen inches around the outer edge of the shell, is guilty of a misdemeanor."

Is this law enforced?

H. I. Pritchard, Deputy State Fish Commissioner, says: "Section 628 has been enforced the same as any other section of the fish and game laws."

In answer to my inquiry for THE NAUTILUS, he writes: "I can only give you the names and dates of my personal cases: August 13, 1904, at Anacapa Island Bay, Webster of Venture, small shells, fined $20.00, first offense. Same day and place, Henry Ireland, of Los Angeles, same fine. September 13, 1906, James Greenbeck, at Redondo, small shells, fined $20.00. There has been a gang of Japanese arrested near San Clemente Island, and again near Santa Cruz Island and heavily find both times, but cannot give names and dates; they used a diving suit and took 45,000 shells in 60 days."

Instead of mentioning "*Haliotis californica*" as the name of the black abalone, our lawmakers would have done better had they left the shell with the familiar name of commerce instead of giving the scientific one. It is to be presumed the name "*Haliotis californica*" is intended for *Haliotis californiensis*,[1] but this latter name belongs to a rare variety of the black abalone (*Haliotis cracherodii*), not, to my knowledge, collected north of the Mexican line. No conchologist would testify that the common young black abalones were *H. californica* or *H. californiensis*, but there is a saving clause in the statute that would prohibit a culprit from escape because of the technicality of a wrong name. It is this: "or any other abalone shells, or abalones," evidently intended for the larger red and green species (*Haliotis rufescens*, *Haliotis fulgens*, etc.).

Abalone fisheries are confined to California. One is located a few miles from Monterey, another at Whites' Point in Los Angeles county. Dried abalones are prepared and shipped to China from

[1] Dr. H. A. Pilsbry on *Haliotis cracherodii* var. *Californiensis* Swains. THE NAUTILUS, Vol. xii, no. 7. p. 79.

San Diego. The Japanese are the men employed as divers. In 1900 the diving armor with air pumps came into use. Before that the product from the Los Angeles county abalone fishery was in one year, 1899, "60,000 pounds of dried abalones and 30,000 pounds of shells of $7,800 value."[1]

It is said that the Chinese and Japanese are the consumers of this white, boneless mollusk (the foot of the animal is the part used, and this is white, no matter what the color of the shell may be); but I have known of persons eating this shell-fish—not previously dried as prepared for shipping—perfectly unconscious that the name given to the soup, or fritters, masked the real one. Cans of daintily prepared abalones, with another name, are among grocery supplies and the contents of a can with butter, milk, salt and pepper, all heated in a chafing-dish, is odorous and tender enough to please the palate of any fish consumer.

Hollywood, Los Angeles, Cal., November 9, 1906.

NEW PISIDIA.

BY V. STERKI.

Pis. neglectum, n. sp. Mussel of small size, slightly to scarcely oblique, rather rounded in outlines, moderately to rather well inflated; superior margin slightly curved or nearly straight, with more or less marked angles where passing into the anterior and posterior, supero-anterior slope generally marked, slightly curved, anterior end rounded angular, posterior part subtruncate, inferior margin moderately curved; beaks slightly posterior, rather narrow, rounded or somewhat flattened on top, moderately projecting over the superior margin; surface with fine, subregular to irregular, crowded, concentric striæ, microscopically rugulose, dullish or somewhat shining; over the beaks there are much finer concentric striæ to the center, and the surface is not rugulose, more shining; color light to yellowish horn to whitish, shell translucent to rather opaque, rather thin; hinge rather slight, well formed, plate comparatively broad; right cardinal tooth rather short, strongly curved, not reaching the lower

[1] Ann. Rept. Fish Commission, 1901.

edge of the plate, its posterior end much thicker, deeply grooved or bifid; there is an impressed groove between it and the edge of the plate; left anterior strongly curved to sharply angular and bent upward, the posterior oblique, curved; "lateral teeth" moderately stout, the outer ones of the right valve distinct, the anterior left cusp pointed, abrupt, the surfaces of all cusps rugulose; ligament rather strong.

Long. 3, alt. 2.6, diam. 1.8 m., types, and average.

Soft parts not examined.

Habitat: North America; widely distributed and common in Ohio, Michigan and Illinois, and probably over the Nearctic province, seen also from New York, Canada and Alabama; living in all kinds of waters. The specimens regarded as types are from a brook at Krumroy, Summit Co., Ohio, 1900 (No. 3265, collection of Cycladidæ).

This *Pisidium* was regarded as probably distinct years ago; since then the material has been looked over and compared dozens of times. It seems to be the central form of a group which is one of the most difficult to deal with of all our *Pisidia*. There are a host of forms ranging under it or near it, really or apparently, and if only a few specimens from various places were on hand, they might well be regarded as distinct. But among the thousands seen, there are more or less plainly intermediate forms. Some are still under doubt and scrutiny, and waiting for additional material in order to ascertain their true positions. Some forms have a slight resemblance to some small forms of the polymorphous "*abditum* Hald.," others to small forms of *noveboracense* Pr. It may also be said that the more typical specimens resemble *Pis. pusillum* Gmel. more than any other of our *Pisidia* does.

Var. (?) *corpulentum* n. Larger, more inflated, somewhat more elongate and oblique, beaks generally somewhat more posterior, large, prominent; concentric striæ coarser, surface more dull, color whitish to yellowish, to grayish, and even bluish with lighter zones along the margins.

Hab.: Grand River, Grand Rapids, Mich., collected repeatedly by Dr. R. J. Kirkland in good numbers; a similar *Pisidium* is from Sillycash creek, near Joliet, Ill., collected by Messrs. J. H. Ferriss and J. H. Handwerk. It seems that these forms are connected with *Pis. neglectum*, although the Grand River, Mich. form, is considerably different and appears to be distinct.

Pis. trapezoideum St. (described in the NAUTILUS, IX, p. 124, 1896), from the middle Atlantic States, and probably the same from Grand Rapids, Michigan, is very different from *neglectum*, yet there may be intermediate forms connecting the two. Should that prove true, *trapezoideum* would probably better be regarded as a specially differentiated form, a variety of *neglectum*, and not vice versa. Priority cannot be considered if there are better reasons for a different point of view.

THE BROOKLYN CONCHOLOGICAL CLUB.

To the Nautilus:

The Brooklyn Conchological Club was formed over two years ago by a number of collectors and admirers of shells. Several of the members have extensive and valuable collections, the product of many years of careful selection and world-wide correspondence with collectors. THE NAUTILUS is a welcome visitor at the club. Two of our members' names are found on its advertising pages, and occasionally an article appears from the pen of our esteemed friend and conchologist, Mr. Sloman Rous. We hope to hear of similar clubs in other cities, and from individual collectors.

At the October meeting of the Brooklyn Conchological Club, Mr. Maxwell Smith exhibited specimens of the shells collected by him last summer in Otsego County, N. Y., also a map of the stations visited. Mr. Smith gave an interesting account of his experience in collecting. A list of the shells exhibited includes 54 species.

SILAS C. WHEAT.

SHELLS OF RICHFIELD SPRINGS, NEW YORK AND VICINITY.

BY MAXWELL SMITH.

The following species were all found in Otsego Co., with the exception of those from Weaver and Young's Lakes (Little Lakes), Herkimer Co. The collection was made in July and August, 1906. It is interesting to note that *Lymnæa gracilis* Jay was reported from Canadarago Lake previous to 1870 by a number of authors. I hunted diligently for this species but did not find it. From Allan

Lake the water flows into Otsego Lake and a number of species occur which are not found in Canadarago. From the latter the streams empty into the Susquehanna River and species finally intermingle.

Amnicola limosa Say. In every lake and a large number of streams.

Pomatiopsis lapidaria Say. Canadarago Lake.

Valvata tricarinata Say. Weaver, Canadarago and Allan Lakes.

Somatogyrus integer Say. Sunset Creek.

Campeloma decisum Say. Canadarago Lake.

Omphalina fuliginosa Griff. Sunset Hill, near Canadarago Lake.

Omphalina inornata Say. Sunset Hill.

Zonitoides nitidus Müller. Woods near Richfield Spa.

Zonitoides arboreus Say. Sunset Hill.

Gastrodonta ligera Say. Sunset Hill.

Pyramidula alternata Say. Everywhere with other species (one albino farm).

Pyramidula striatella Anthony. East of Sunset Hill.

Polygyra tridentata Say. Sunset Hill, west of Canadarago Lake.

Polygyra Sayi Binney. Sunset Hill, east of Canadarago Lake, near Oak Creek.

Polygyra albolabris Say. Cooperstown, near Canadarago Lake, Sunset Hill.

Polygyra palliata Say. Washed down Town Creek.

Polygyra thyroides Say. East of Canadarago Lake.

Polygyra monodon Rack., var. *fraterna* Say. Woods near Richfield Spa.

Vallonia pulchella Müller. In fields, everywhere.

Circinaria concava Say. Sunset Hill, near Allan Lake.

Vertigo ovata Say. Under bark, near Richfield Spa.

Vertigo milium Gould. Near Sunset Creek.

Cochlicopa lubrica Müller. Cooperstown (Council Rock), Richfield Spa. (town), near Young's Lake.

Carychium exiguum Say. Near Sunset Creek.

Succinea ovalis Gld. Near Canadarago Lake, near Oak Creek, Cooperstown.

Succinea obliqua Say. Sunset Hill, in fields.

Succinea totteniana Lea. Near Allan Lake.

Succinea retusa Lea, var. *peariensis* Walker. Near Oak Creek.

Lymnæa stagnalis Linn. Canadarago Lake.
Lymnæa columella Say. Allan, Weaver Lakes.
Lymnæa palustris Müller var. Canadarago Lake, Otsego Lake.
Physa ancillaria Say. Allan Lake.
Physa heterostropha Say. Canadarago and Otsego Lakes and many streams.
Planorbis trivolvis Say. Allan Lake.
Planorbis dilatatus Say. Canadaraga Lake.
Planorbis campanulatus Say. Canadarago Lake.
Planorbis bicarinatus Say. Sunset Creek, Canadarago Lake.
Planorbis exacutus Say. Near Weaver Lake.
Planorbis deflectus Say. Young's Lake.
Planorbis albus Müller. Allan Lake, Otsego Lake.
Ancylus rivularis Say. Oak Creek.
Ancylus tardus Say. Weaver Lake.
Ancylus fuscus Adams. Allan Lake.
Ancylus parallelus Hald. Town Creek.
Sphærium simile Say. Sunset Creek, Town Creek, Allan Lake, Weaver Lake.
Sphærium rhomboideum Say. Allan Lake.
Sphærium striatinum Lam. Sunset Creek.
Pisidium ventricosum Prime. Canadarago Lake.
Pisidium novehoracense Prime. Canadarago Lake.
Lampsilis radiatus Gmelin. Canadarago Lake.
Strophitus edentulus Say. Sunset Creek.
Anodonta marginata Say. Weaver Lake.
Alasmidonta undulata Say. Sunset Creek.
Unio complanatus Solander. Oak Creek.

A NOTE UPON THE INSUFFICIENCY OF THE OPERCULUM AS A BASIS OF CLASSIFICATION IN ROUND-MOUTHED SHELLS.

BY L. P. GRATACAP.

In 1801 Lamarck established the genus Cyclostoma which he made for the reception of a very miscellaneous and unclassified group of shells, characterized however by certain common features as the entire round aperture, continuous peristome, and operculum.

Among this unassorted assemblage were placed marine, fluviatile and terrestrial shells. Later Lamarck withdrew the marine and fluviatile shells, and in 1819 he limited the genus Cyclostoma to terrestrial species.

In 1829 the Rev. M. G. Berkeley described the anatomical structure of *Cyclostóma elegans* (Zoölogical Journal, vol. iv, p. 278), and alluded to the operculum as "ovate spiral, calcareous." This description was, up to that time, the most extended and accurate that had been published, of the soft parts of the animal of this group of mollusca.

In the second edition of the *Histoire Naturelle des Animaux sans Vertebres*, edited by Deshayes and Milne-Edwards (1838), the diagnosis is *Testa varia; anfractibus cylindraceis. Apertura circinata, regularis: marginibus orbiculatim connexis, aetate patenti-reflexis. Operculum.*

In his observations Lamarck alludes to the similarly circular and entire margins of the aperture of *Paludina*, but remarks that in adult cyclostomas the edge of the peristome is reflected, whereas in *Paludina* and generally in fluviatile shells these edges are sharp and plain.

The comments of the editors exhibit the diversity of views then held by naturalists as to the affinities of these interesting shells; some gave full weight to the fact of their aerial respiration and grouped them in a special order, in which their manner of respiration, their terrestrial habit, and the possession of an operculum formed distinguishing or separative features; while others considering their respiration unimportant, dwelt upon morphological resemblances to *Turbo*, *Trochus* and *Scalaria*. These resemblances were the two tentacles, the absence of eye-stalks, the eyes placed at the base of the tentacles, and the respiration anteriorly open. This latter view was advocated by Cuvier. It was further emphasized by their unisexual nature, and in the armature of their lingual ribbon, which however rather coincides with that of pectinibranchiate gasteropods. Milne-Edwards and Deshayes regarded the cyclostomas as terrestrial Turbos breathing air.

Amongst the forty-five species enumerated by Lamarck in 1838, are representatives of the genera *Pterocyclas*, *Cyclophorus*, *Choanopoma*, *Tudora*, *Chondropoma*, *Helicina*, *Cyclotus*, *Otopoma*, *Leptopoma*, *Truncatella*, *Megalomastoma*, and *Realia*.

Draparnaud had first separated the marine round-mouthed shells from their supposed terrestrial congeners, which led Lamarck to erect his genus *Delphinula* for the reception of some of the marine forms, and later *Paludina* for others, which genus was substituted for his own *Vivipara*. *Helicina* although proposed as a genus by Lamarck was not grouped by him near the cyclostomous genera. Its operculiferous character was known, but in spite of this fact its position was assigned in the family of the Colimaces (Pulmonifera), amongst the helices, bulimi and pupas. Ferussac had first recognized that the genera *Helicina* and *Cyclostoma* were closely related, and had, in deference to their similar breathing organization, placed them at the end of the air-breathing gasteropods.

Reeve united *Pupina*, *Truncatella*, *Cyclostoma*, and *Helicina* in the single family Cyclostomacea. Menke as early as 1828 appears to have separated the operculate shells into two families, typified by *Helicina* and *Cyclostoma*. Dr. Gray (1842) first pointed out the significant morphological distinction between *Cyclostoma* and *Helicina*, and assigned to the family Helicinidae the three genera *Helicina*, *Lucidella*, and *Alcadia*, while Swainson (1840) had grouped together *Helicina* Lam., *Pachytoma* Swains., *Oligyra* Say, *Trochatella* Swains., and *Lucidella* Swains. In the monograph (1846) in Kuster's Conchylien Cabinet upon "Die gedeckelten Lungenschnecken," by L. Pfeiffer, the family Helicinacea was regarded as composed of the genera *Trochatella* Swains., *Lucidella* Swains., *Helicina* Lam., and the family Cyclostomacea of *Cyclostoma* Lam., *Choanopoma* Pfr., *Cyclophorus* Montf., *Leptoma* Pfr., *Megalomastoma* Guilding, *Pupina* Vignard, *Callia* Gray, *Pomatias* Studer, *Aulopoma* Trosch., *Craspedopoma* Pfr., *Myxostoma* Trosch., *Pterocyclas* Bens., *Acicula* Hartmann, *Geomelania* Pfr., *Hydrocena* Parreyss.

The generic divisions thus slowly evolved had been largely based upon the characters of the opercula, and it seems that the credit of emphasizing this feature was due to J. E. Gray, who in 1825 published in the Zoölogical Journal and Philosophical Transactions the results of his observations on their structure, formation and growth, and insisted on their affording "characters for the division of families and genera as the shell of the gasteropods themselves, and that to neglect them in the description of the genus or species is quite as rational as to describe only the single valve of a bivalve shell." The

closing words of this quotation allude to Gray's opinion that the operculum of the gasteropods was homologous or identical with the second valve of a lamellibranch.

(*To be continued.*)

HELIX HORTENSIS IN NEWFOUNDLAND.

BY T. D. A. COCKERELL.

Mr. L. P. Gratacap has very kindly permitted me to examine a dozen specimens of *Helix hortensis* which he collected at Little Codroy river, Newfoundland, as reported in NAUTILUS, November, p. 78. They are thin, and the dark bands when present are dull reddish-brown, not black. The forms represented are:

(1) Clear yellow, bandless = *lutea* Moquin. Two.

(2) Greenish-yellow, bandless = *subglobosa* Binney. One. This seems to have been stained owing to the decay of the animal, and may originally have been more nearly a pure yellow.

(3) Yellow, five-banded = *quinquevittata* Moquin. Five.

(4) Yellow, formula (123)45 = *pauluccia* Locard. One.

(5) Yellow, all the bands united = *bouchardia* Moquin. Three.

In the British museum there is an example of the variation *vallotia* Moquin, from Labrador. It is yellow, with formula, O_{345}.

Mr. Gratacap has also permitted me to see the shells collected at Seydisfiord, Iceland, as reported in NAUTILUS, p. 79. They are *Helix arbustorum*, rather thin, but otherwise typical.

NOTES.

OYSTERS CARRIED BY SEAWEED.—Some time ago an oyster-breeder in Morbihan, France, named Martine, called the attention of the French Academie des Sciences to the appearance of unknown algae that threatened to ruin the oyster-beds established at the mouth of the river Vannes. These algae (which the breeders called ballons—balloons) assume the form of little brownish-green leather bottles or wineskins, which stick to the oysters, and which, microscopic at the start, very soon reach the size of a large hen's-egg. Formed of a very thin, elastic and rather frail coat, these bottles, usually full of

water, fall in upon themselves at the moment of low tide. They become empty then by the rents in their exterior; but, in virtue of their elasticity, they fill up again with air. At the return of the tide, they thus form a float more than sufficient to raise up the oyster that serves them as support. Therefore at each great tide, when the beds are wholly uncovered, the oysters are seen to disappear in the offing upon this automobile algae.

According to M. Bornet, we have the *Colpomenia sinuosa*, abounding notably in the Mediterranean in the tracts adjacent to the Atlantic. It was pointed out for the first time at Cadiz at the beginning of the last century, and has never been seen farther north. It no doubt came upon the hull of a vessel, and, having found in the gulf of Morbihan suitable water, it multiplied there.

Hitherto no other effective means has been found of combating this alga than to sweep the beds with prickly fagots. It is to be hoped that a rigorous winter will be sufficient to cause it to disappear.—*Scientific American.*

British Columbia Shells.—Mr. Stewardson Brown, of the Academy of Natural Sciences of Philadelphia, collected the following species of land shells while on a botanical expedition in the Canadian Rocky Mountains. At Field, B. C.: *Thysanophora ingersolli* Bld., *Vertigo gouldii* Binn, *Vertigo v. elatior* Sterki, *Vertigo modesta* Say, with the form *parietalis* Anc., *Vitrea hammonis* Ström, *Vitrea binneyana* Mse., *Euconulus fulvus* Drap., *Zonitoides arborea* Say, *Pyramidula c. anthonyi* Pils., *Sphyradium edentulum* Drap., *Succinea avara* Say, and at Banff, Alberta: *Vertigo modesta* Say, *Vitrea binneyana* Morse, *Euconulus fulvus* Drap., *Pyramidula c. anthonyi* Pils., *Sphyradium edentulum* Drap.—E. G. Vanatta.

Additional Localities for Helix hortensis.—Since the publication of my article on the distribution of *Helix hortensis* in the November Nautilus, I have received the following additional records. From Curtain Island, Richmond Bay, Prince Edward Island, a specimen of the plain yellow variety was received by Rev. Henry W. Winkley from a Mr. Ives. In 1902 Mr. Geo. H. Clapp collected the banded variety (12345) at Cape Porpoise, about three miles from Kennebunkport, Maine. Mr. Francis N. Balch has found it at Orleans, Massachusetts, and also at Cohasset.

I overlooked Mr. L. P. Gratacap's record of "Hare Island," St. Lawrence River, given in his catalogue of the Binney and Bland collection of the terrestrial air-breathing mollusks, etc. (Bull. Amer. Mus. Nat. Hist., XIV, p. 396, 1901). This species seems to be more widely distributed than has been generally supposed. It is to be hoped that these articles will lead to a still further knowledge of its geographical distribution.—C. W. JOHNSON.

PUBLICATIONS RECEIVED.

STUDIES ON AUSTRALIAN MOLLUSCA, PT. IX. By C. Hedley (Proc. Linn. Soc., N. S. Wales, pt. iv, 1905). Twelve new species are described and figured, with critical notes on other species.

SOUTH AUSTRALIAN NUDIBRANCHS, AND AN ENUMERATION OF THE KNOWN AUSTRALIAN SPECIES. By Herbert Basedow and Chas. Hedley (Trans. Royal Soc., S. Australia, xxix, p. 134). About 80 species are recorded, six new species described, and a number of others redescribed and illustrated by 12 plates of beautifully-colored figures.

REPORT ON MOLLUSCA COLLECTED BY MR. HERBERT BASEDOW ON THE SOUTH AUSTRALIAN GOVERNMENT EXPEDITION 1903. By Charles Hedley (Trans. Roy. Soc., S. Australia, 1905). A valuable contribution to knowledge of the snails of the "Eremian Region" of Central Australia. "Though quite unrelated to the forms that people the arid regions of Asia, Africa or America, these Australian shells repeat in their chalky texture and rough sculpture the features of foreign species subjected to similar environment." Several new species of *Thersites* and *Xanthomelon* are described, and a beautifully-drawn plate illustrates the principal forms.

A CATALOGUE OF THE MOLLUSCA OF ILLINOIS. By Frank Collins Baker (Bull. Illinois State Lab. Nat. Hist., vii, pp. 53–136, Sept., 1906). An excellent catalogue, giving in full the distribution of each species throughout the State. The number recorded is 241 species of fluviatile and 91 species of terrestrial mollusks. A very exhaustive bibliography is also given.

THE NAUTILUS.

VOL. XX. JANUARY, 1907. No. 9.

MOLLUSKS OF CAZENOVIA, N. Y.

BY JOHN B. HENDERSON, JR.

The village of Cazenovia, Madison Co., N. Y., about 20 miles southeast of Syracuse, is upon the northern edge of the elevated plateau of central New York. It is surrounded by hills more or less wooded which in conformation form series of north and south valleys of considerable depth, in one of which lies Cazenovia lake, with the village at its southern end. At the altitude of Cazenova (1100 ft.) the sedimentary rocks are shaly, but about two hundred feet below a white limestone appears. The hills are grooved by deep ravines, cutting many feet down into the limestone. These "Gulfs" as they are locally called, are heavily wooded, always damp, and offer excellent collecting-grounds. Within a radius of a mile about the village many types of station can be found with favorable soil, forest, stone, and moisture conditions.

Messrs. Pilsbry, Walker, Clapp and the writer enjoyed a three days' collecting trip through the Cazenovia valley, and the following catch, remarkable in the number and quality of specimens, was made. Comparatively little time was given to the lake.

Vallonia pulchella Müll.
" *excentrica* Sterki.
Polygyra tridentata Say (small).
" *sayi* Binn.
" *albolabris* Say.
" " *dentata* (Walker).
" *dentifera* Binn.
" *palliata* Say.
Polygyra thyroides Say.
" *fraterna* Say.
Strobilops labyrinthica Say.
Bifidaria contracta Say.
Vertigo pygmæa Drap.
" *gouldi* Binn.
" *ventricosa elatior* Sterki.
Cochlicopa lubrica Müll.

Circinaria concava Say.
Omphalina fuliginosa Griff.
" *inornata* Say.
Vitrina limpida Gld.
Vitrea cellaria Müll.
" *hammonis* Ström.
" *indentata* Say.
" *rhoadsi* Pils.
Euconulus chersinus polygyratus Pils.
Zonitoides nitida Müll.
" *arborea* Say.
" *minuscula* Binn.
Gastrodonta intertexta Binn.
" *ligera* Say.
Agriolimax campestris Binn.
" *agrestis* L.
Philomycus carolinensis Bosc.
Arion fasciatus Nils. (very abundant).
Pyramidula alternata Say.
" *perspectiva* Say.
" *striatella* Anth.
Helicodiscus lineatus Say.
Succinea retusa Lea.
" " *peoriensis* Wolf.
" *ovalis* Say.
" " var. (a striking form, apparently new).
" *avara* Say.
Limnea reflexa Say.
Limnea catascopium Say.
" *umbrosa* Say.
" *emarginata* Say.
" *desidiosa* Say.
" *palustris* L.
" *humilis* Say.
" *columella* Say.
" *owascoensis* Baker.
Planorbis trivolvis Say.
" " *binneyi* Tryon.
" *campanulatus* Say.
" *bicarinatus* Say.
" *deflectus* Say.
" *parvus* Say.
" *exacutus* Say.
Valvata tricarinata Say.
Physa gyrina Say.
" *sayii* Tapp.
" *integra* Hald.
" *heterostropha* Say.
Aplexa hypnorum L.
" " *glabra* DeKay.
Ancylus rivularis Say.
Pisidium variabile Prime.
Sphærium striatinum Lam.
" *occidentale* Prime.
" *simile* Say.
" *fabale* Prime.
" *stamineum* Con.
Calyculina securis Prime.
" *transversa* Say.
" *partumeia* Say.

NEW PISIDIA.

BY V. STERKI.

Pis. superius n. sp. Mussel rather small, well inflated, ovoid in outlines, rounded or subangular; beaks rather posterior, broad, rounded or somewhat flattened on top, projecting over the superior

margin which is slightly curved, with slightly projecting, rounded angles at the scutum and scutellum, the latter often covered in lateral aspect, in full-grown mussels; supero-anterior slope well marked, slightly curved to nearly straight, posterior part subtruncate to rounded; young specimens are generally more angular in outlines than adults; surface with very fine, crowded, concentric striæ and generally a few well marked lines of growth, somewhat shining; color light to deeper horn, generally with lighter zones along the margins; shell rather thin, more or less translucent; hinge slight, well formed, plate narrow, right cardinal tooth moderately to strongly curved, its posterior part thick and grooved; a deep, impressed groove in the plate between its inferior edge and the cardinal tooth; left anterior strongly curved, posterior oblique, slightly curved to nearly straight; "lateral teeth" with short, slight, thin cusps, the left ones and the right anterior pointed, the outer anterior of the right valve distinct, the posterior quite small; ligament rather slight.

Long. 3.2, alt. 2.8, diam. 2.2 m. (100 : 37.5 : 69) average.

Long. 3.5, alt. 3, diam. 2.4 m.

Soft parts not examined.

Habitat: Mountain Lake and Pine River, Marquette county, Michigan, on the south shore of Lake Superior, Mono Lake, Muskegon county, Michigan, collected by Mr. Bryant Walker. A *Pisidium* from the Isle Royale, in Lake Superior, and some specimens from other places in Michigan, seem to range under the same. Several hundred specimens at all stages of growth, collected in Mountain Lake from 1895 to 1905, are remarkably uniform and characteristic in appearance, although showing slight differences in outline. There is none of the described species under which the present *Pisidium* might be ranged, and it is similar only to *trapezoideum*, being of about the same size and approximately the same shape. But the latter mussel is much more angular in outline, its supero-anterior slope is steeper, the anterior end is more angular and more below the longitudinal median line, the beaks are narrower, the surface more dull, and the hinge much stouter. Although known for over ten years, this *Pisidium* has not been published before, as I thought it might be connected with some other species.

Pis. succineum n. sp. Mussel of moderate size, moderately inflated, somewhat elongate, little oblique; beaks slightly posterior, rounded or slightly flattened, somewhat projecting over the upper

margin, which is slightly curved, supero-anterior slope slightly marked, curved to nearly straight, anterior end rounded angular, posterior part subtruncate, inferior margin moderately curved; surface with fine to very fine irregular striæ, shining, shell thin, transparent to translucent, of wine to deep amber color; hinge of the same formation as that of *P. noveboracense*, but less curved and slighter; ligament rather short and strong.

Long. 3.6, alt. 3, diam. 2 m. (100 : 83 : 55.5) average.

Long. 4, alt. 3.3, diam. 2.4 m.

Soft parts not examined.

Habitat: North America, probably of wide distribution; seen from the Atlantic States from Maine to Virginia; New York (near Mohawk), Ohio, Michigan, Indiana; common e. g. in the vicinity of Washington, D. C., and Alexandria, Va., where it was collected in 1896 by the writer, and in the vicinity of New Philadelphia, O.

In shape it has a resemblance to *P. noveboracense* Pr., with which it seems to range under the same group, but is smaller, the beaks are less prominent, and it is at once recognized by its transparent shell, its color and glossy surface. In the latter respect, it is also similar to *P. splendidulum* St., but averages larger and its shape is different. Like a number of other Pisidia, this has been a stumbling-block for over ten years; but it seems constantly distinct, and is of wide distribution.

Erratum. On p. 88 of the December number line 4 from bottom, correct *Sillycash* to *Lilycash* creek.

LAND SHELLS FROM EAST SHORE OF CAYUGA LAKE.

BY SILAS C. WHEAT.

The following list of land shells were found by the writer in July and August, 1905, on the east shore of Cayuga Lake, between Ithaca and Portland Point, N. Y., and between the lake and the top of the cliffs:

Omphalina fuliginosa Griffith. Abundant, woods.
Omphalina inornata Say. Common, woods.
Vitrea ferrea Morse. Rare, one found.

Zonitoides nitida Müller. Abundant in low, wet fields.

Zonitoides arborea Say. Common.

Euconulus fulvus Müller. Rare, found four.

Gastrodonta ligera Say. Abundant, woods.

Gastrodonta multidentata Binney. Rare.

Pyramidula alternata Say. Abundant everywhere. One specimen is turreted, having a sharp angle at the periphery, and the suture placed far below the angle.

Pyramidula striatella Anthony. Rare.

Pyramidula perspectiva Say. Rare, west side of lake.

Helicodiscus lineatus Say. Rare.

Polygyra tridentata Say. Common.

Polygyra sayi Binney. Rare, 8 on 1 sq. yd. No others found.

Polygyra albolabris Say. Abundant.

Polygyra albolabris dentata Walker. Rare.

Polygyra exoleta Binney. Rare.

Polygyra palliata Say. Common.

Polygyra thyroides Say. Common.

Polygyra hirsuta Say. Rare.

Polygyra monodon Racket. Rare.

Polygyra monodon fraterna Say. Common.

Vallonia pulchella Müller. Common.

Circinaria concava Say. Rare.

Pupoides marginata Say. Rare.

Vertigo ovata Say. Rare.

Vertigo ventricosa Say. Rare.

Cochlicopa lubrica Müller. Abundant.

Bifidaria corticaria Say. Rare.

Bifidaria contracta Say. Common.

Bifidaria armifera Say. Rare.

Bifidaria pentodon Say. Rare.

Strobilops labyrinthica Say. Rare.

Succinea obliqua Say. Abundant.

Succinea obliqua totteniana Lea. Rare.

Succinea retusa Lea. Common.

Succinea avara Say. Common.

A NOTE UPON THE INSUFFICIENCY OF THE OPERCULUM AS A BASIS OF CLASSIFICATION IN ROUND-MOUTHED SHELLS.

(*Continued*).

BY L. P. GRATACAP.

The naturalists who subsequently worked upon the classification of the mollusca were all sensibly influenced by these observations, and the operculum became a diagnostic note in the separation of genera. Troschel (1847) and Pfeiffer (1852), thoroughly applied this method of discrimination, and augmented the number of genera. M. Petit de la Saussaye (1850) questioned the significance of the operculum as a real generic feature, and especially so far as the nature of the substance of the operculum had been used by Pfeiffer to distinguish genera. He says (*Journal de Conchyliologie*, Vol. I., 1850) "the nature more or less calcareous or corneous of the opercula arises rather from accidental circumstances, such as the habitation of these animals, their nourishment, the character of the ground upon which they live, the force of the sun, etc. As to the variable form of the volutions of the spire, observed in these accessory parts, it doubtless arises from the modifications, that the tissue secreting them presents; modifications which do not seem adequate for the establishment of generic groups."

Benson reiterated the importance of the operculate features of the round-mouthed shells, and the system of classification incorporated in H. and A. Adams, "Genera of Recent Mollusca" (1858) still further imbedded in the science the critical relations of the form and substance of the operculum to the natural limitations of the genera.

In the latest important systematic treatise, Tryon's Structural and Systematic Conchology, the operculum is perhaps less exhaustively used for descriptive purposes, but the author remarks that the operculum "presents many beautiful modifications of structure, characteristic of the smaller groups, which are often peculiar to limited regions as in the Helicidæ."

In an examination of this group of shells in the general collection of the American Museum of Natural History and representing the Jay, Haines, and Constable cabinets, the somewhat exaggerated importance of the separative features of their opercula seemed apparent.

It is quite evident that the opercula vary in substance and form; that these variations are related to groups and genera; that in some instances (*Opisthoporus*, *Stoastoma*) they present in one family a unique and generally well-maintained uniformity of structure. But their determinative character has been overestimated. The prominent characters of the opercula are repeated in diverse sections of the entire group, and the elements of their composition are more nearly significant of habitat than they are of systematic differences in the shells themselves.

It is noteworthy in this connection to recall the demonstration made by Blanford (Annals & Mag. Nat. Hist., 1869), that the opercula of *Georissa* (Blanford's genus) and *Hydrocena* Parreyss are almost identical, whereas the former shell is entirely terrestrial, and the latter marine.

(A note of importunity to traveling or exploring naturalists may be appropriately inserted here. The character of the environment of species or genera of land shells is generally not closely enough observed. The moisture, temperature, mineral nature of the ground, seasonal features, and frequency and amount of sunlight, the vegetation, are all influential factors in the physiological life of shells. They do, in land shells especially, have a clearly marked relation to the coloring, thickness and operculum of the shells, and they are not as particularly dwelt upon by collectors as they might be, both for the purpose of elucidating the effect of environment and the sometimes misleading rules of systematists.)

Poey has called attention (*Memorias sobre la Historia Natural de la Isla de Cuba*) to a striking illustration of local influence in the sierras of the Isle of Pines. The Sierras de Casas and de Caballos are respectively a short distance to the west and east of Nueva-Gerona; in the latter region the shells display regular spires, and the crustaceans are destitute of spinose surface, as *Trochatella stellata*, *Pineria beathiana*, *Cyclostoma pupoides*, among the shells; *Oniscus* sp.? among the crustaceans. In the former area the *Trochatella* is represented by a denticulate, roughened, and loosely coiled shell (*constellata*); the *Pineria* resembles a screw (*terebra*); the *Cyclostoma* separates its last volution (*moreletianum*), and the *Oniscus* presents spiny asperities, preserving otherwise a very similar appearance to the de Casas species.

The geological formations are identical, and Poey has suggested

the differing intensity of the sun's rays as a partial explanation of these surprising differences.

This same author has protested against any sweeping conclusions as to the importance in the operculate shells of the operculum, in establishing genera, and agrees with Petit de la Saussaye in considering this feature of quite subordinate value, remarking, " porque varia el operculo de los Cyclostomas en los grupos mas aproximados por el caracal y las costumbres del animal. No suce de asi en los turbineos, entre los cuales se nota que los que viven apegados a los arrecifes tienen el operculo corneo, y los que se apartan a mayor profundidad lo tienen calcareo : de aqui un excelente caracter para diferenciar las Litorinas de los verdaderos turbos y trocas."

Poey has also pointed out the confusion that results from the adoption by different authors of varying or diverse morphological characters for the classification of this group.

A *Cyclostoma* becomes a *Chondropoma* because of a corneous operculum, or the same shell a *Megalostoma* by its thickened peristome, a character participated in by the *Cyclophorus* of Montfort, and the *Tropidophora* of Troschel.

It is perhaps interesting to recall that Poey in a protest against classification based upon the shelly parts of these mollusca, has called attention to the method of progression of the Cyclostomas, their divided pedal muscle allowing the movement forward of one-half of the foot alternately with the other. It is not at all likely that this feature would ever be useful in separating the round-mouthed shells, but Poey has made of this observation an opportunity to emphasize the preponderant significance of the physiology of molluscs over the form, etc., of their shells for purposes of classification. Cyclophorus has not a divided foot. Pfieffer, in his *Monographia Pneumonopomorum Viventium*, analyzes the Cyclostomacea as composed of three series, in each of which the form of the operculum is regarded as the separative character. The entire systematic table is as follows, so far as the opercula are here discussed.

FIRST SERIES.

Operculum circular, frequently concave exteriorly, formed of many slowly-increasing whorls. Nucleus central.

I. Operculum shelly (testaceous).

Genera, *Cyclotus, Alycæus, Diplommatina.*

Cyclotus. Operculum orbicular, shelly, arctispiral, externally rather con-

cave, with the margin of the whorl thickened, or raised in an incurved lamina, nucleus subcentral.

Alycæus. Operculum circular, subtestaceous, obsoletely multispiral.

Diplommatina. Operculum subtestaceous, thin, with few whorls, outer edge with thin lamella.

II. Operculum cartilaginous?

Genus, *Pterocyclos.* Operculum subcartilaginous, multispiral, interiorly concave.

III. Operculum corneous.

Genera, *Craspedopoma*, *Aulopoma*, *Cyclophorus*, *Leptopoma*, *Megalomastoma*, *Cataulus*, *Pupinella*, *Pupina*, *Registoma*, *Callia*.

Craspedopoma. Operculum horny, solid, closely whorled. Nucleus central, external lamina plane, internal furnished in its last whorl with a circular prominence, centre profoundly concave.

Aulopoma. Operculum horny, arctispiral, planorbal composed of two laminæ, with an intermediate channel, with the last whorl furnished interiorly with a circular groove. (The outer edge larger than the aperture and reflexed over the peristome of the shell.—Adams.)

Cyclophorus. Operculum horny, thin, arctispiral, externally more or less concave.

Leptopoma. Operculum membranous, arctispiral, flat.

Megalomastoma. Operculum subcircular, thin, horny, arctispiral, planular.

Cataulus. Operculum orbicular, plane, corneous, arctispiral.

Pupinella. Operculum horny, arctispiral.

Pupina. Operculum thin, membranous, arctispiral, subplanum.

Registoma. Operculum circular, thin, horny, arctispiral.

Callia. Operculum thin, membranous, arctispiral.

(*To be continued.*)

NOTES.

HELIX HORTENSIS ON MAGDALEN ISLAND.—In 1901 the Carnegie Museum of Pittsburg sent an expedition to the Magdalen Islands and Labrador to collect birds and eggs, and on June 23d, while at Grand Entry, Magdalen Island, one of the party collected a lot of *Helix hortensis* Müll., which show a remarkable tendency towards a single type of banding. There are about 330 shells in the lot, counting young and old, and all are the form with yellow ground. The following table, based on matured shells only, gives the number of each form:

186—12345.

48—(12)345.

1—12045.
22—00300. No. 3 very faint, translucent.
8—00000.

In a large proportion of the 186, 12345, bands 1 and 2 are *very close* together, but separated by a distinct but very narrow light line. In many of the (12)345 the union of 1 and 2 is indicated by a lighter space in the center of the band. It will be interesting to get further collections from this locality and see if the proportion of (12)345 shells increases, as this lot seems to indicate.

The shells are rather thin and very uniform in size, the average being about 18 × 15 × 14 mm. The largest shell measures 21 × 18 × 16½ mm., and in this shell bands 1 2 and 3 are unusually wide. The smallest shell measures 16½ × 14 × 12 mm.

Since my note in THE NAUTILUS, xiv, p. 72, I have received 8 additional *H. hortensis* from near the headwaters of Robinson's River, Newfoundland, as follows: Four (12345), one 1(234)5, three 00000. —GEO. H. CLAPP.

PUBLICATIONS RECEIVED.

MOLLUSCA OF THE SOUTHWESTERN STATES. II. By H. A. Pilsbry and J. H. Ferriss. Proc. Acad. Nat. Science, Philadelphia, 1906, pp. 123–175.

This important paper completes the review of the southwestern mollusca collected by the authors in Texas, New Mexico and Arizona, with the exception of *Omphalina* and the *Unionidæ*. Although any attempt to a complete faunal monograph is expressly disclaimed, this paper and its predecessor (P. A. N. S. P., 1905, p. 211) will be found to contain practically all the reliable data extant upon the fauna of southeastern Arizona and western Texas. The molluscan fauna of this region, like the reptilian, shows that the transcontinental zones of distribution as established by Merriam cannot be maintained in the Mediocolumbian region for these lower forms of life, but that "these zones are secondary divisions of vertical life areas of which the molluscan faunas were evolved in large part independently."

While the range of practically all the Austroriparian species is limited on the west by the rise between the 96th and 98th meridians of longitude, marking the approximate limit of the Cretacious forma-

tion and the Sonoran area in Texas, there is along its border an apparent, rather than a real, intermingling of the fauna, owing to the fact that the eastern species follow up along the river valleys, while at the same time "the fauna on the bluffs or away from the streams is frankly Sonoran." The scope of the present paper is, in the main, restricted to the species of the Sonoran region, only such of the Austroriparian species are mentioned as were actually collected by the authors.

The list of the forms considered characteristic of the Sonoran region in Texas includes twenty-one genera and thirty species. Of the former, nine are not known to occur in the Austroriparian or humid region of Texas. And of the latter, nine species and varieties are described as new. The larger and more important part of the paper is taken up with a monographic revision of the Texan *Bulimuli*, which have so long been a source of exasperation and despair to the American collector. It appears that the typical forms of *B. alternatus* and *schiedeanus* do not, so far as known, occur in the United States. The Texan series is restricted to *B. dealbatus* and *B. alternatus mariæ*. The specific distinction of *dealbatus* and *alternatus* is clearly established by the details of the genitalia. The typical form of *dealbatus* ranges from Alabama and Kentucky west to Kansas. West of the Mississippi from southwestern Missouri through Arkansas and the Indian Territory to Texas a number of well characterized local races have been differentiated, of which six are recognized and fully described and figured. *B. alternatus mariæ* ranges through a wide territory along the Rio Grande from the Gulf as far west as the Pecos river. Its exact western range has not been determined. While there are some general differences between the eastern (typical) and western forms, the intergradation is so complete that the authors do not deem it advisable to attempt to separate them into the distinct races.

Another important part of the paper is a revision of the genus *Helicodiscus*, of which four species and one variety are recognized. It is something of a shock, like that of losing an old friend, to learn that *lineatus* of Say must be given up, but fortunately it is replaced by another name, *parallelus*, of the same author.

Other corrections in nomenclature to be noted are, that *Helix sayi* of Binney was preoccupied by Wood for an uncertain species of *Polygyra*, but probably *auriformis;* and our well-known eastern

species will be known as *P. sayana* Pils., hereafter, and that *Pyramidula striatella* Anthony for like reason must give way to *P. cronkhitei anthonyi* Pils.

Among the large number of new forms of land species described the most remarkable is *Bifidaria tuba*, the type of a new subgenus Chænaxis, characterized by its "large hollow axis, open below and about one-third the total diameter of the shell," found in the drift of the San Pedro river, Cochise county, Arizona.

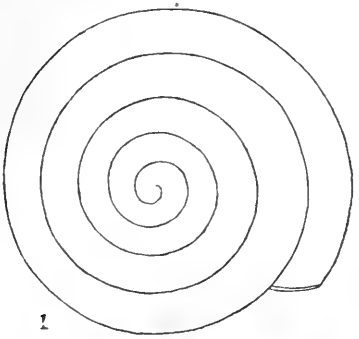
Radiodiscus millecostatus from the Huachuca Mountains, Arizona and Mexico, a minute Endodontid, is likewise both a new species and the type of a new genus.

The fresh-water forms of the region are also fully discussed, and afford several novelties in *Planorbis*, *Valvata*, *Amnicola* and *Paludestrina*, all minute, and some of them the smallest species yet discovered. The several varieties of *Lymnæa bulimoides*,—*sonomaensis* Hemp., *techella* Hald., and *cockerelli* (new)—are fully differentiated and figured, but unfortunately the typical form is neither figured nor discussed comparatively.

In *Segmentina*, attention is called to the difference in the character of the apertural lamellæ in the North American forms included in s. g. *Planorbula* Hald., and in the Antillian and Mexican group represented in our fauna by *S. obstructa* (Morel.). In *S. armigera* and *wheatleyi* the lamellæ, though differing in development, are "fundamentally identical." The Section *Haldemanina* recently established by Dall (Alaska, xiii, 97, 1905) for the latter species would therefore seem to be a synonym of *Planorbula* Hald.

The most important item in this portion of the paper is the discovery of a species of *Cochliopa* (*C. riograndensis*) in the drift of the Rio San Felipe, Val Verde County, Texas. The occurrence of *C. rowelli* Tryon, a Central American species, in California has always been doubted. The present discovery confirms the genus as a member of our fauna.

The authors intimate that their discussion of the southwestern mollusks will be concluded by a third paper. Its appearance will be eagerly looked for by all students of our North American fauna. But, unless their well-known skill in the field has deserted them, it is confidently expected that the expedition of 1906 to the Grand Canyon will yield results quite as important as did their former ones, and that the fauna of the southwest will in the near future be still further illuminated by their labors. BRYANT WALKER.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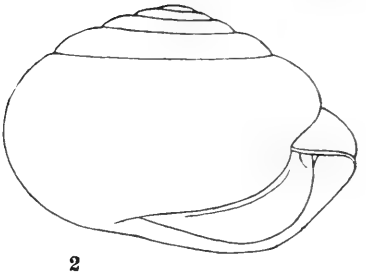
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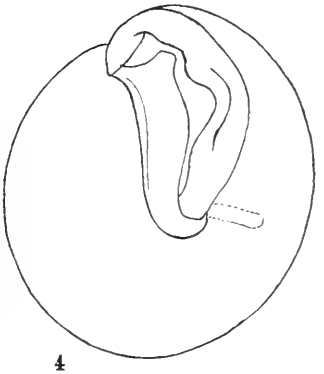
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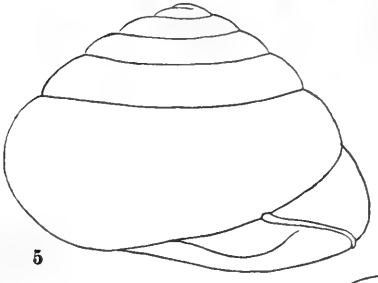
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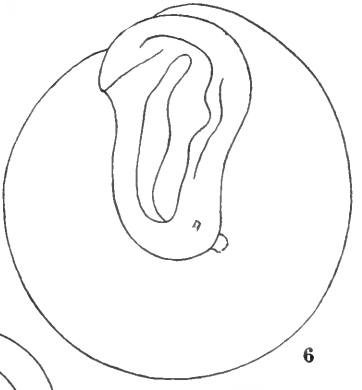
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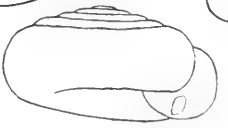
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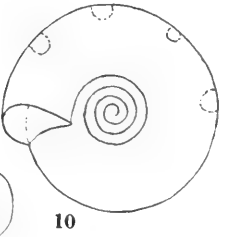
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STENOTREMA AND PARAVITREA.

THE NAUTILUS.

VOL. XX. FEBRUARY, 1907. No. 10.

NEW SPECIES OF STENOTREMA AND PARAVITREA FROM ALABAMA.

BY GEORGE H. CLAPP.

VITREA (PARAVITREA) ALDRICHIANA n. sp. Pl. V, figs. 8, 9, 10, 11.

Shell small, widely, perspectively umbilicate, flattened, slightly convex above and below, the periphery well rounded; greenish-white almost transparent, highly polished with very faint growth lines and on the body-whorl a few impressed lines spaced irregularly. Whorls five, those of the spire rounded at the well-impressed suture; umbilicus contained about three times in the diameter of the shell and showing all of the volutions; peristome forming two-thirds of a circle; lip simple.

Slightly below the periphery, and in the last half of the body whorl are about four teeth which are longer, vertically, than wide, and, apparently, project at both the upper and lower ends; *i. e.*, they are double pointed.

Greater diam. 2, lesser 1.9, alt. 1 mm.

Type from the slope of the Cumberland Plateau in Jackson County, Ala., close to the state line, and about 2 miles S. E. of Anderson, Tenn. Collected by Herbert H. Smith, who found but four specimens of this excessively rare species, the others being from "Buck Creek Cove," Franklin County, Tenn., "Cove in Valley of Little Crow Creek," and "Bennett's Cove, near State Line," both Jackson County, Ala.

These four localities are near together on the Cumberland Plateau, and along the Tenn.-Ala. boundary.

It is interesting to note that Mr. Smith collected both *V. multi-*

dentata and *lamellidens* in the same general locality, although he did not find the latter in Alabama.

The species is so distinct from all others of the genus that it can not be compared with any of them. The fact of finding four specimens at different places and all of practically the same size, shows that it is not likely to be the young of a larger species.

I take great pleasure in naming it after Hon. T. H. Aldrich so well-known by his work on the fossil mollusca of the South.

Type in my collection; the other specimens in the collections of Bryant Walker, John B. Henderson, Jr., and T. H. Aldrich.

Polygyra (Stenotrema) brevipila n. sp. Pl. V, figs. 1, 2, 3, 4.

Shell imperforate, globose, thin, light reddish-horn color; *densely hirsute with fine, short hairs.* Whorls five, those of the spire convex with a well-impressed suture; the body-whorl *very convex*, equally rounded above and below, *deeply impressed* in the umbilical region, abruptly deflected at the aperture and contracted behind the lip. Aperture transverse, narrow, *widening anteriorly;* parietal tooth large, strong but narrow, erect, with the sides nearly at right angles to the whorl and projecting beyond the lip, with which it is not parallel, *but diverges for three-fourths of its length*, when it is abruptly bent inward and downward, terminating opposite the second notch in the lip, its distal or outer extremity connected with the end of the peristome by a ridge of callus, the axial end *sweeping around and "pocketing"* the basal end of the lip; outer lip reflected back against the body-whorl, but with its *sharp edge free from the whorl its entire length;* very much thickened along its inner edge which forms a raised margin around the wide notch, and a well-developed tooth or fold beyond it, after which the margin is incurved around the outer extremity of the parietal tooth. *Fulcrum long.*

An average shell measures, diam. 8½, alt. 6 mm.

The largest seen measures 9 x 6, and the smallest 7¾ x 5¾ mm.

Collected by Herbert H. Smith on Horseblock Mountain, Talladega Co., Ala., at an altitude of about 2,000 feet. On some of the U. S. Geological Survey sheets this mountain is called "Talladega," but "Horseblock" is the local name.

"The mountain sides, near the top, are littered, or rather piled with talus, big and little rocks; the shells are found almost invariably on the lower sides of these rocks, and generally they chose

the biggest and heaviest; you turn over perhaps fifty to find one shell. They are obtained by sheer hard work." H. H. S.

This is one of the most striking species of the *Stenotrema hirsuta* group, and differs from all others in having a *continuous free lip;* the lip-notch is also of an entirely different type, as it will be noticed by a reference to the figures that the notch is *not* an indentation in the center of the lip, but the lip forms a curve from the columellar end to the highest part of the notch when it is suddenly deflected and bent forward. The parietal tooth differs in being more perpendicular to the body-whorl, *not bent toward the lip*, as in *Stenotrema*, where the tooth is very convex on its outer side and concave on the side next the lip, which it frequently overhangs. On looking into the aperture, through the notch, the whole of the long fulcrum can be plainly seen.

The only species with which this is likely to be confused is *P. altispira* Pils., but the resemblance, due to the wide notch in each case, is only superficial; for, as pointed out above, the notch is of a different type. The hairs are also much finer, closer and shorter, and the shape of the shell is entirely different.

Type in my collection; cotypes in the collections of the Academy of Natural Sciences, Phila., Bryant Walker, T. H. Aldrich and John B. Henderson, Jr.

Reference to Figures.

Figs. 1, 2, 3, 4. *Polygyra* (*Stenotrema*) *brevipila* Clapp.

Figs. 5, 6, 7. *Polygyra* (*Stenotrema*) *altispira* Pils. Roan Mtn., N. C., specimen 9 x 6 mm., size of type.

Figs. 8, 9, 10. *Vitrea* (*Paravitrea*) *aldrichiana* Clapp. Type.

Fig. 11. Apparent shape of teeth of *V. aldrichiana.*

A NEW CARDIUM FROM PUGET SOUND.

BY WILLIAM HEALEY DALL.

Among the specimens of *Cardium* received from the Pacific coast during a series of years was occasionally a specimen with more numerous ribs, smoother surface and small, compact shell, which was doubtfully referred to the young of *C. californiense* Deshayes, better known under Gould's name of *blandum*. Recently in an endeavor

to identify one of these shells, sent in from Monterey by Mr. Berry, all the available specimens were brought together and carefully compared, leading to the conclusion that the shell is a distinct species.

Cardium (*Cerastoderma*) *fucanum* n. sp.

Shell small, plump, compact, solid for its size, covered with a smooth brown or gray periostracum usually more or less eroded; form varying from nearly circular to slightly ovate, with rather prominent slightly prosocœlous beaks, situated a little anterior to the middle of the shell; valves moderately convex, equal and nearly equilateral, sculptured with numerous (40 to 58) similar, small, low, flattish radial ribs separated by much narrower interspaces; these ribs are not nodulous nor keeled, they are sometimes slightly rippled by the incremental lines, and, as usual, are smaller, fainter and more crowded distally; the interspaces are rounded; near the dorsal margins on each side of the beaks there is an ill-defined narrow space which is devoid of ribs; the average number of ribs is about 50; the inner margins of the valves are crenulated; the hinge delicate and normal; the inner surface of the valves white, polished; the outer surface usually shows three or four concentric sulci due to resting-stages. Length 38, height 33, diameter 18 mm., of a fully adult specimen; a shorter variety measures 25.5, 24.5 and 16 mm. for the same dimensions.

From Bering Sea (in 70 fathoms, temperature 39.0°) south to Monterey Bay, California (in 20 fathoms); the depths varying from 20 to 70 fathoms and the temperatures from 39.0° to 52.3°. Collected by Kennerley, Swan, the U. S. F. Com. Str. Albatross, and Mr. S. S. Berry, of Stanford University.

This species somewhat resembles *C. hayesii* Stimpson from the Arctic Sea but has more numerous and more uniform ribbing. It wants the angulation (in fresh specimens fringed with periostracum) which is characteristic of *C. ciliatum* Fabr. in the young stages, and has more, and more crowded, ribs, and a more solid shell. It is most nearly allied to *C. californiense* but has a thicker and more ventricose shell, is less attenuated posteriorly and less oval in form, the ribs are more closely adjacent and more uniform in size than in *californiense;* though the number is about the same the diminutive size of *fucanum* makes them appear much more numerous. Most of the 14 specimens examined came from the Straits of Fuca.

A NOTE UPON THE INSUFFICIENCY OF THE OPERCULUM AS A BASIS OF CLASSIFICATION IN ROUND-MOUTHED SHELLS.

(Concluded).

BY L. P. GRATACAP.

SECOND SERIES.

Operculum subcircular, few whorls, rather quickly widening, nucleus subcentral.

I. Operculum horny.

Genera, *Jamaicia*, *Licina*, *Choanopoma*.

Jamaicia. Operculum horny, exteriorly convex, with few rugose whorls, obliquely striated, sublammellose.

Licina. Operculum not described.

Choanopoma. Operculum horny, subcircular, whorls rather quickly widening, with free external margin, acute, frequently raised into lofty lamella, nucleus subeccentric.

II. Operculum cartilaginous.

Genus, *Adamsiella*.

Adamsiella. Operculum circular, thin, subcartilaginous, with few whorls, gradually increasing, with somewhat free edges, nucleus subcentral.

THIRD SERIES.

Operculum oval or angulated, few whorls, more or less quickly increasing, nucleus eccentric.

I. Operculum shelly.

Genera, *Lithidion*, *Otopoma*, *Cyclostomus*, *Tudora*, *Leonia*.

Lithidion. Operculum subcircular, shelly, whorls rather rapidly increasing, with a subcentral keel, strong, convex, furnished with simple margins.

Otopoma. Operculum horny, solid, few whorls, convex center, simple margin.

Cyctostomus. Operculum suboval, horny, plane, four to five whorls, gradually increasing, simple margin, nucleus subeccentric.

Tudora. Operculum oval, horny, plane, two or three whorls rapidly increasing, obliquely arcuate, striate, or sulcate, nucleus quite eccentric, with the left and lower margin closely fitting to the peristomes.

Leonia. Operculum oval, shelly, externally perconvex, unispiral, nucleus placed near the columellar margin.

II. Operculum cartilaginous, covered externally with a thin shelly layer.

Cistula. Operculum oval, thin, cartilaginous, externally furnished with a thin horny layer, with a few whorls gradually increasing, margin generally free, nucleus eccentric.

III. Operculum entirely cartilaginous.

Chondropoma. Operculum oval, subcartilaginous, plane, few whorls, rapidly increasing, nucleus generally quite eccentric.

IV. Operculum double interiorly concamerated.

Pomatias. Operculum cartilaginous, few-whorled, made up of two laminæ, interiorly concamerated.

V. Operculum corneous.

Genera, *Realia, Omphalotropis, Bourciera.*

Realia. Operculum thin, horny, few-whorled.

Omphalotropis. Operculum thin, horny, few-whorled.

Bourciera. Operculum oval, somewhat solid, horny, with few rapidly increasing whorls.

Later authors have extended this list of genera, but Pfeiffer's synopsis practically embraces the important and distinguishing genera. The force assigned to the operculum as separative of the genera naturally appears exaggerated, when their characters are thus isolated, but in view of the purpose of this paper to emphasize their secondary, or in cases, entirely negligible weight, this isolation serves the more explicit object of fixing attention solely upon the operculate features.

To begin with, in the genus *Cyclotus*, there exist differences in the opercula of many species almost as great as that between the opercula of recognized genera. In the species *C. corrugatum*, Swb. the whorls of the laminae in the operculum are margined by erect incurved slightly striate free fillets, the whole operculum presenting the appearance of a watch-spring; whereas in typical examples of the operculum of *Cyclotus*, the laminae are flat with edges strictly in contact or slightly overlapping, the latter feature becoming extreme in *seminudum*. There is here no essentially different principle of construction involved but the formal contrast in appearance might as safely be invoked to make another genus in the case of *C. corrugatum* (as it has been) so far as opercula offer signs of generic distinction. Troschel and H. and A. Adams have indeed placed this shell, along with *asperulus*, *cingulatus*, *crassus*, etc., in all twenty-five species, in the subgenus *Aperostoma*.

The shelly substance of the operculum of *Cyclotus* is however a quite constant feature. The shelly opercula are found in such small shells as *fodiens*, *hunanus*, *parvulus*, *minimus*, where it might be expected that the calcareous secretions would be less complete.

The opercula of the small shells *Alycaeus* and *Diplommatina* are not often found in shells in collections. Where I could examine them under a one-inch objective they certainly offer no determinative differences from the opercula of *Cyclophorus*, and like the latter are horny (corneous). Compare for instance the opercula of *Alycaeus rathouisiana*, Hende, *Cyclophorus parapsis*, Benson.

The genus *Pterocyclos* is certainly closely allied to genera *Opisthoporus*, *Spiraculum*, *Rhiostoma*, but the opercula of these four genera exhibit two contrasted forms. Taking *Pterocyclos angulifer us* Soul. as an example of one form, the operculum forms a calcareous button, concave upon the outer side, interiorly filmed by a horny scale covering its entire width, grooved at the sides, and showing on its exposed surface closely wound narrow whorls, throughout obliquely striate. This configuration and structure is quite as naturally and truly referable to the opercula of some species of *Cyclotus* as *C. auriculata*, Kob., etc.

This form of operculum is found in some species of *Opisthoporus* (vide *biciliatus*, Mouss., *birostra*, Pfr.) and the distinction made by H. and A. Adams between the opercula of *Opisthoporus* and *Pterocyclas* is certainly misleading if universally applied. Another more common type of operculum, seen in *Spiraculum*, *Rhiostoma*, some species of *Opisthoporus* and *Pterocyclos* is a spiral lamina, concave interiorly, more or less deep with the free edges of the laminae erect or explanate and horizontal, arising screw-wise steeply around a solid nucleus (*Rhiostoma*) or more spreading with corneous intercalation (*Spiraculum*). The morphology of the shells themselves separates these genera, though it is probable the distinctions should form subgenera, but the opercula present two forms, which while partially restricted are surely not enough so to offer any basis for strict classification.

But the confusion, so far as opercula are considered, does not end here. The opercula of the second type of *Pterocyclos*, *Opisthoporus*, *Spiraculum*, *Rhiostoma*, in substance and structure, is practically repeated in those of *Choanopoma*. Both groups show the exsert, erect, or spreading laminae, the spiral curvature, the union of calcareous and corneous texture, though the inner surface of the operculum in *Choanopoma* is usually flat, and in some instances as *C. pulchrum*, Gray, the coarse expansive character of the whorls contrasts with the analogous feature in *Pterocyclas*, etc.

The operculum of *Leptopoma* is essentially that of many species of *Cyclophorus* (compare *Leptopoma sericatum*, Pfr. with *C. fulguratus*, Pfr. and *C. borneense*, Mtf.). It is membranous, corneous, arctispiral suppressedly striate, on the laminae, concave, with a polished inner surface. The fimbriated shaggy exfoliated surfaces of many opercula of the larger *Cyclophorus* (see *C. arthritis*, *C. nilagirianus*, *C. oculus-capri*, *C. tuba*, *C. validus*, etc.) are age characters, and seem also to have some relation to the moist habitats of the animals. This type of operculum is repeated in *Megalomastoma*, though the shell in the latter case is pronouncedly and divergently different (see *M. ventricosum*, *M. verruculosum*.)

Cataulus is in its operculate character identical with the foregoing. Although from the size of the apertures the opercula are small, they are in construction, substance, expression, and microscopic features, inseparable from the opercula of *Cyclophorus*, *Megalomastoma*, and *Leptopoma*. The flatness usually observable in the opercula of the last two genera is shown in *Cyclophorus* in small shells, the concavity of the opercula of the latter genus being the result of the natural curvature produced by the protruding fibres of the larger foot in larger species.

The operculum of *Pupina* is unmistakably indicated in structure, nature, and physical appearance with all the foregoing, its tenuity alone and flatness offering only the most evanescent and unreal discrimination from the other genera. *Pupinella*, *Registoma*, *Callia*, are quite inseparable in their operculate character. *Aulopoma* is a shell very near in external characters to *Pterocyclos*, *Opisthoporus*, *Spiraculum*, *Rhiostoma*, omitting the lip expansion and spiracle, but the operculum is sharply contrasted. The operculum in *Aulopoma* is corneous, consisting of a flat spiral made up of tubular whorls coarsely striate and embracing, cap-like, the margins of the shell aperture. If the distinction of this genus is based upon the operculum it rather forcibly separates a shell from its natural generic position.

In structure, at least, the sub-orbicular operculum of *Otopoma naticoides* Rec., with its cycloidal development with the tangential striæ leaving the whorls and extending outward, but forming flexuous lines on the limits of the last whorl, is repeated in the authentic operculum of *Cyclophorus metableus* Crosse & Fischer.

The instances of exact repetition in the opercula of *Cyclotus* and *Cyclophorus* ase numerous. The operculum of *Cyclotus translucidus*

Sowb. is certainly reproduced in those of *Cyclostoma xanthocheilus*, *C. barclayanus*, *C. campanulatus*. The flat thin spiral, almost equal with the slightly overlapping ascent outward to the last whorl, striate on its exterior edges, is closely repeated in each.

In *Adamsiella grayana* Pfr., *A. variabile* Ad., there is a spiral operculum with exsert laminæ, somewhat multifolded or lamellose on edges, but structurally distinctly like *Choanopoma* and *Opisthoporus*.

The operculum of *Tudora* and *Cistula* with their rapidly increasing whoris, the last expansive and filling one-third of the aperture, nucleus subcentral, are practically identical. The thin substance of the operculum of *Chondropoma* gives it some essential differentiation, but in the theory of its form it is exactly like *Tudora* and *Cistula*. The outer surface of the operculum of *Tudora* is frequently (*T. shepardianus* Ad., *T. pupoides* Morelet) fibrous-rayed, whereas in *megacheilus* its surface is smooth, or obsoletely striate which form is closely imitated by the operculum of *Chondropoma*.

The following table exhibits the substance of the operculum in the genera of round-mouthed shells, as observed in the collection of the American Museum of Natural History, and as given by Pfeiffer. The two columns afford slight differences, but such differences might readily be referred to individual variations in the shells examined by two observers, using different groups of specimens.

SUBSTANCE OF THE OPERCULUM.

Observed in Collection.		*Pfeiffer.*
Testaceous to subtestaceous. Subtestaceous in *C. crassus*, Ad. *C. triliratum* Pfr., *C. rugatus* Guppy, *C. suturale* Swb.	*Cyclotus.*	Testaceous.
Corneous.	*Alycæus.*	Sub-testaceous.
Corneous.	*Diplommatina.*	Sub-testaceous.
Testaceous to Sub-testaceous in *P. rupestris* Bens.	*Pterocyclos.*	Sub-cartilaginous.
Not seen.	*Craspedopoma.*	Corneous.
Corneous.	*Aulopoma.*	Corneous.
Corneous.	*Cyclophorus.*	Corneous.
Corneous. Membranous.	*Leptopoma.*	Membranous.
Corneous.	*Megalomastoma.*	Corneous.
Corneous.	*Cataulus.*	Corneous.
Corneous.	*Pupinella.*	Corneous.
Corneous.	*Pupina.*	Membranous.

Corneous.	*Registoma.*	Corneous.
	Callia.	Membranous.
Corneo-testaceous.	*Jamaicia.*	Corneous.
Not seen.	*Licina.*	?
Testaceous to Corneo-testaceous. In *C. majusculum* Morelet the corneous layer is quite intimately and equally developed with the testaceous.	*Choanopoma.*	Corneous.
Corneous.	*Adamsiella.*	Sub-cartilaginous.
	Lithidion.	Corneous.
Testaceous.	*Otopoma.*	Corneous.
Testaceous.	*Cyclostomus.*	Corneous.
Corneous layer quite thick in instances as *C. bicarinatum* Swb., *C. filosum* Swb., *C. madagascariense* Gray, *C. rangelinum*, *C. xanthocheilus.*		
Testaceous to Testaceo-corneous.	*Tudora.*	Corneous.
Testaceous.	*Leonia.*	Testaceous.
Testaceous.	*Cistula.*	Cartilaginous.
Corneo-cartilaginous.	*Chondropoma.*	Sub-cartilaginous.
Not seen.	*Pomatias.*	Cartilaginous.
Not seen.	*Realia.*	Corneous.
Not seen.	*Omphalotropis.*	Corneous.
Not seen.	*Bourciera.*	Corneous.
Testaceous to Sub testaceous.	*Hybocystis.*	
Testaceous.	*Cyclotopsis.*	
Testaceous to Sub-testaceous.	*Ctenopoma.*	
Testaceous.	*Diplopoma.*	

Collections of the Cyclostomacea are often sadly deficient in opercula, and this very interesting feature is as frequently absent as present. It seems most probable that opercula have no exact generic value, and should not be regarded with the extreme importance assigned to them by Pfeiffer, H. & A. Adams, and other authors.

It is hoped that a more detailed and illustrated study of them will be made in the future.

NOTES.

THE WINKLEY COLLECTION OF SHELLS.—"A most gratifying gift was received last June from the Rev. Henry W. Winkley, of Branford, Conn.; it consists of a large series, some 1600 species and

varieties of land shells from all parts of the world, except New England. His New England collection Mr. Winkley retains for study, but he writes that he thinks in time it too 'will find its way to the Museum.' The shells received are in excellent condition. Mr. Winkley, as a member of the class of 1881, recalls with pleasure his undergraduate work in the Museum, and gives the collection as his contribution toward the twenty-fifth anniversary celebration of the class. It is hoped that Mr. Winkley's gift will prove an incentive to other graduates to associate their college work with the interests of science and the Museum."—(*From the Annual Report of the Curator, Museum of Comparative Zoölogy*, 1905–1906.)

THE MUMFORD COLLECTION OF SHELLS.—Through a bequest of the late Mr. Henry Mumford, the Museum of the Brooklyn Institute of Arts and Sciences has secured an unusually fine collection of shells, comprising about 15,000 specimens, representing 2,400 species; this will be known as the Phebe L. Mumford Collection. It was originally brought together by Mr. Isaiah Greegor, for many years a resident of Jacksonville, Florida, who made a special effort to secure the best possible specimens. This makes the collection particularly valuable for a museum, since the shells are in their natural condition, retaining the outer layer or "epidermis," which is usually removed to show the brilliant coloring beneath, a proceeding that makes the shell "look pretty," but utterly destroys its scientific value; there are, however, series of shells cleaned and polished so that the student and the lover of the beautiful may alike find what they wish.

Two years ago the Museum received a valuable gift of shells from Mr. Julius Brunn, so that the division of mollusks is now very well represented.—(*The Museum News.*)

PUBLICATIONS RECEIVED.

AN ILLUSTRATED CATALOGUE OF THE MOLLUSCA OF MICHIGAN: Part I, Terrestrial Pulmonata (Land Snails). By Bryant Walker (From Report of the Michigan State Board of Geological Survey, 1906). "This catalogue has been prepared to supply the need for a convenient manual of Michigan mollusks for the use of teachers and students of biology throughout the state." It contains

chapters on the history of Michigan conchology, the relations of the Michigan fauna, on collecting and preserving mollusks, on classification, measurements and descriptive terms. While these subjects are concisely treated, yet Mr. Walker has condensed into his pages the practical results reached by the modern group of American workers in both field and laboratory, so far as applicable to the Michigan fauna. There are few collectors who will not profit by reading the "Hints on collecting mollusca," and "Arrangement of the collection." The classification and nomenclature of the catalogue are up to date.

The list comprises 81 species, all described and illustrated by cuts in the text, most of them borrowed from Binney's standard series of figures, though with a considerable number of original drawings. Full references are given to previous Michigan literature, as well as to the original descriptions, and to Mr. Binney's Manual. Excellent keys to the species are given.

It is no disparagement of other lists to say that the Michigan catalogue as here presented is the most thoroughly worked-up state catalogue we have had. Every species has been the subject of special investigation, as to its characters and identity, and its distribution in Michigan. The time and labor involved in working up a state fauna in this thorough manner will be appreciated only by those who have undertaken the rigid verification of every record in the fauna of an equal area.

A summary of the work on distribution done up to this time is given in the tabular census, giving the distribution of all the species by counties. Records have been received from all but 16 of the 84 counties in the state. It will be noted that the comparatively remote and inaccessible Upper Peninsula is well represented in the Census, and the Boreal character of its fauna is well shown by the absence of nearly all of the Polygyras, larger *Zonitidæ*, etc.

Species interesting because of their rarity or on account of notable extensions of their known range, are *Vitrea wheatleyi* and *rhoadsi*, *Pallifera hemphilli*, *Succinea retusa peoriensis* (here for the first time figured), *Vertigo morsei*, *Cochlicopa lubrica morseana*, etc. Excellent and much-needed original figures of *Strobilops labyrinthica*, *S. virgo* and *S. affinis* are given.

Mr. Walker is at work upon the fresh-water mollusks, to form the second part of the catalogue. We will all look with interest for his treatment of the aquatic pulmonates.—H. A. P.

The Nautilus.

Vol. XX. MARCH, 1907. No. 11.

A NEW FOSSIL BUSYCON (FULGUR) FROM FLORIDA.

BY T. H. ALDRICH.

BUSYCON MONTFORTI n. sp. Plate VI.

Shell large, solid. Whorls about seven; those of the spire with slight nodules, which on the body whorl develop progressively into small, medium, and then large spines, ten in number on the specimen figured; these spines are flattened above, and partly so below, and differ from those of *Busycon eliceans* Montf., by being filled by the successive growth additions. Surface covered with raised lines, except on the middle of the body whorl. Aperture within still yellowish-brown. Canal contracted and twisted somewhat to the left. Inner lip with a strong callus carrying a fold at the angle with the canal; outer lip corrugated within. The specimen has the spire slightly broken, but it is probably pointed like *Busycon eliceans*. The canal is considerably shortened by breakage.

Locality: Shoal River, Walton County, West Florida.

Remarks: The geological horizon is in the Upper Oligocene of Dall. This species is especially interesting because it shows that *Busycon eliceans* Montf. is a distinct form with an Oligocene (?) ancestor. There are a number of minor differences between the two species, but when placed side by side they show without question their intimate relations. The descent of the group will need to be cousiderably modified to conform to the new discovery.

A NEW SPECIES OF SEGMENTINA.

BY BRYANT WALKER.

SEGMENTINA CRASSILABRIS n. sp., Pl. VII, figs. 4–6.

Segmentina wheatleyi, Witter, J. of Conch., I, 388 (1878).

" " ? Walker, Naut. VI, 137 (1893).

" " Walker, Rev. Mich. Moll., 18 (1895).

Shell dextral, broadly umbilicate, planorboid, smooth, slightly wrinkled by subobsolete growth lines and microscopic transverse lines and undulations; light horn colored; whorls $4\frac{1}{2}$, regularly increasing, those of the apex flattened and concavely depressed, antepenult and body whorl rounded above, the latter deflected and slightly expanded towards the aperture, and sharply contracted at the lip, forming an obtuse crest just behind the edge of the lip, obtusely angled below, around the deep, subfunicular umbilicus; aperture oblique, subtriangular, greatly contracted by a heavy callous ridge just within the lip, the face of which is concave, the edge of the lip being sharp and black; the extremities of the labial ridge are connected by a slight callus across the parietal wall; apertural lamellæ six; two parietal and four (palatal) on the outer wall. The principal parietal lamella is a thin, broad, sigmoid blade rising from the lower third of the parietal wall, and extending upward and backward nearly to the suture, it is widest in the center, the anterior extremity is subtruncate and rather abruptly bent outwards, posteriorly it slopes gradually to its termination; below this and just behind the curve in the anterior portion and about halfway between it and the base is a short, sharp denticle projecting obliquely forward and downward; the lower palatal fold extends transversely nearly across the entire base of the whorl and is a low, strong fold, the upper surface of which is parallel with the base, the inner extremity is opposite the lower parietal lamella and rises abruptly at right angles to the base, the outer extremity is rounded and bent forwards, sloping down to its termination, viewed externally the base of this fold roughly resembles a figure-7; immediately above this, about halfway between it and the lower extremity of the third palatal fold, and about at the periphery of the whorl is a short, trans-

versely diagonal lamella, the anterior end of which is lower than the posterior, which is slightly bent upwards; above the anterior extremity of this fold is the third palatal fold, a short, slightly oblique lamella, the posterior end of which is slightly curved backwards and slopes more gradually to its termination than the anterior extremity; above this and at its posterior extremity is a short, transverse denticle, which lies immediately below the superior arch of the whorl.

Alt. 3, greater diam. $7\frac{1}{2}$, lesser diam. 6 mm. Types (No. 2998 coll. Walker) from Hamtramck, Wayne Co., Mich. Also from Kent and Monroe counties, Mich.; Muscatine, Ia.; Knox county, Vincennes and Brownston, Ind.

This very distinct species was first seen in 1878, when specimens from Muscatine, Ia., were received from Prof. F. M. Witter, labelled *S. wheatleyi* Lea, on the authority of the late Dr. Jas. Lewis. Subsequently, when the species were detected in Michigan, in reliance on this identification it was so listed in the two papers cited above. The recent receipt of the true *S. wheatleyi* from Princeton and Boligee, Alabama, collected by H. H. Smith and A. A. Hinkley, has shown that the reference of this form to that species was erroneous.

Although occupying an intermediate position between the well-known *S. armigera* and *S. wheatleyi*, *crassilabris*, is quite distinct from either. In external appearance, compared with *armigera* (Fig. 1–3), it is smaller and more compactly coiled and higher in proportion to its width, the umbilicus is smaller and deeper, and the angulation of base of the whorl around the umbilicus more pronounced. In *armigera*, the whorls are more regularly rounded and the aperture lacks the crest behind the lip, and is not at all contracted, the thickening within the lip is very slight and does not sensibly diminish its calibre. In *wheatleyi* (Fig. 7–9) the distinctive features of *crassilabris* are all intensified. The apical whorls are more depressed, the body-whorl is obtusely angulated above and sharply carinated around the umbilicus, which is funicular, the inner whorls scarcely, if at all, obtruding beyond the curve of the body-whorl; the aperture is more oblique and more contracted in front of the crest, which is more prominent. The inner ridge of callus is less developed and lacks the regular concave slope to the edge of lip characteristic of *crassilabris*.

As recently stated by Pilsbry and Ferriss (Proc. A. N. S. P., 1906, p. 166) in regard to *S. armigera* and *wheatleyi*, the arrange-

ment of the apertural lamellæ in these three species is fundamentally the same. Their number, position and character are the same in all. The differences, which are, however, specifically characteristic, are only in the degree of development.

In *armigera*, the principal parietal lamella is much shorter, less oblique and its anterior end is less curved and truncated than that of *crassilabris*, the palatal folds are all less developed, and the spaces between them consequently greater; the upper extremity of the basal fold is less deflected and scarcely noticable externally. In both these species, there is a marked tendency to develop an additional fold in connection with the central palatal giving it a V-shape, which is quite noticeable from the exterior.

In *wheatleyi*, the position of the principal parietal lamella is more like that of *armigera* than of *crassilabris*, being, taken as a whole, less oblique and the anterior end is less bent forward than in the latter species, but the posterior extremity is more prolonged than in *armigera*, and is continued for a short distance parallel with the suture; the basal palatal is much wider than in either of the other species and is abruptly contracted at its base, while the upper extremity is deflected as in *crassilabris;* the second palatal fold is remarkably developed, rising abruptly near the base of the whorl; it runs back for a short distance parallel with the base, and curves upward, terminating just below the superior carina, having much the shape of a boomerang. The third palatal is only slightly oblique, the lower end is bent backwards and close to the upper extremity is a small knob, not sufficiently differentiated from it to be called a distinct denticle, but evidently similar to the accessory fold noticed in the other species; the upper extremities of this fold and of the basal palatal are about on the same level. The fourth palatal is situated directly under the superior carina and is a short, straight, transverse, club-shaped fold, the posterior extremity being the thickest.

EXPLANATION OF PLATE VII.

Figs. 1–3. *S. armigera* Say, Mohawk, N. Y.
Figs. 4–6. *S. crassilabris* (Type), Hamtramck, Mich.
Figs. 7–9. *S. wheatleyi* Lea, Princeton, Ala.

DESCRIPTIONS OF NEW SPECIES OF LYMNÆA.

BY FRANK C. BAKER.

LYMNÆA DALLI n. sp.

Lymnæa parva Baker, NAUTILUS, XIX, p. 52, 1905. (Not of Lea.)

Lymnæa dalli Baker, Bull. Ills. State Lab. N. H., VII, p. 104, 1906.

Shell very small, thin, ovate-conic, turreted; color greenish or whitish-horn; surface dull to shining, marked by heavy, crowded growth-lines, which are elevated into distinct ribs in some specimens; protoconch very small, flatly rounded, light-horn colored; whorls $4\frac{1}{2}$ to 5, rounded and distinctly shouldered; spire generally obtusely conic, turreted, a trifle longer than the aperture; sutures very deeply impressed; aperture elongate, ovate or elliptical, the peristome continuous in many specimens; outer lip acute; inner lip forming a rather flat extension over the umbilical region, leaving a rather pronounced chink; the lower part of the aperture is somewhat effuse; the columellar extension of the inner lip is appressed so as to form a pseudo-plait; the inner edge of the outer lip frequently forms a rib-like ridge in very old specimens.

Length 3.25, breadth 2, aperture length 1.5, breadth 1 mm. Lake James, Ind.

Length 4, breadth 2, aperture length 2, breadth 1 mm. Lake James, Ind.

Length 3, breadth 2, aperture length 1.25, breadth, .9 mm. Lake James, Ind.

Length 4.25, breadth 2, aperture length 1.75, breadth 1 mm. Lake James, Ind.

Length 4.5, breadth 2.5, aperture length 2, breadth 1.1 mm. (scalariform).

Length 3.75, breadth 2.75, aperture length 2, breadth 1.25 mm. Rockford.

Length 4, breadth 2.1, aperture length 2, breadth 1.1 mm. Rockford.

Types: Chicago Academy of Sciences; cotypes, Academy of Natural Sciences, Philadelphia; Smithsonian Institution, Washington.

Type Locality: Lake James, Steuben Co., Indiana.

Range: Indiana to Montana, south to New Mexico and Texas.

Station: Same as *humilis*, *curta*, and the other small Lymnæas.

Remarks: This little species, the smallest of our American Lymnæas, is related to *parva*, appearing at first sight to be a small example of that species. It differs from *parva* in its smaller size, rounder and more turreted whorls, more slender outline, longer and narrower aperture and smaller and less conspicuous umbilicus. The whorls are inclined to be shouldered also, a feature not emphasized in *parva*. There is some variation in the length of the spire, many specimens having a rather long spire, while in others the spire is much depressed, and the whorls are humped, this last being in slightly abnormal forms.

In THE NAUTILUS (XX, p. 52), this species was described as the *parva* of Lea, but a careful study of Lea's types in the Smithsonian Institution makes it evident that it is not that species, but a new one, hitherto unnoticed. Young specimens of *parva* are similar to *dalli*, but may be distinguished by the lesser number of whorls in shells of the same size and in the different shape of the whorls. The two small forms, *parva* and *dalli*, are related, but are easily separated when attention is given to the details of form and size.

This peculiar little species is named in honor of Dr. William H. Dall, Curator of the Division of Mollusks of the Smithsonian Institution.

LYMNÆA LEAI n. sp.

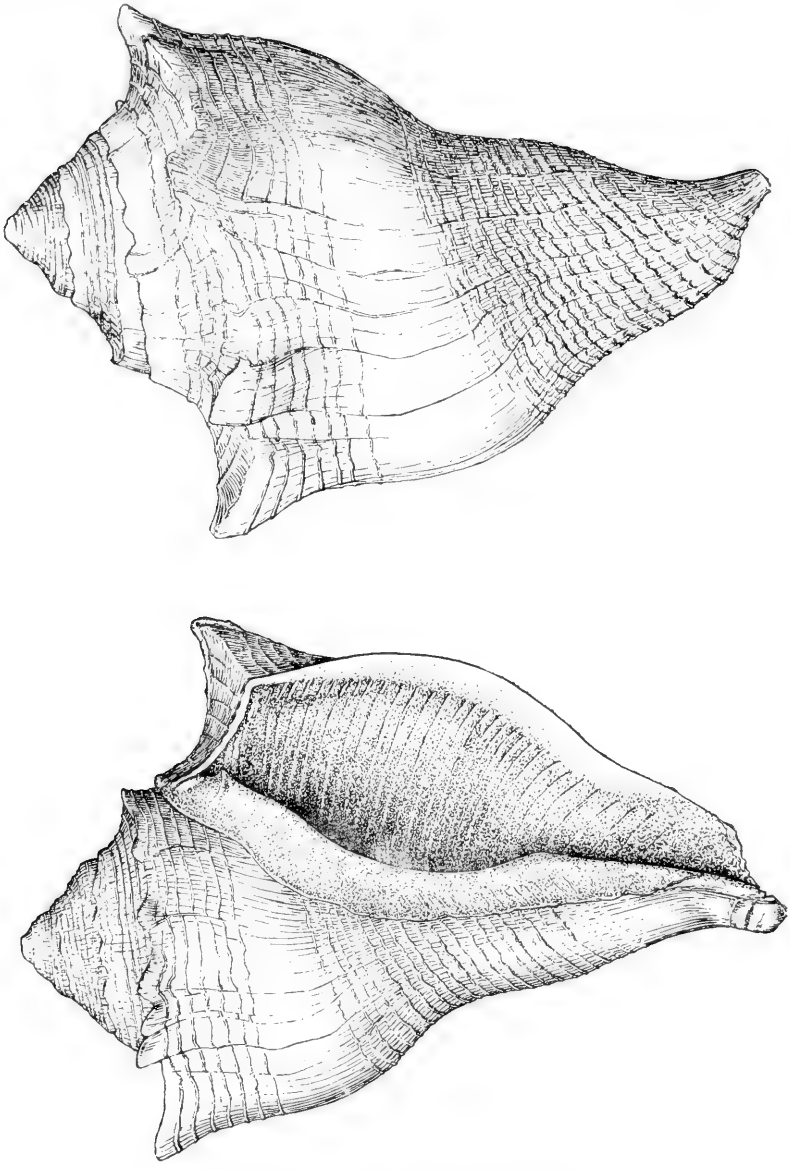
Shell large, ovate, thin; color, yellowish-horn; surface with fine lines of growth crossed by equally fine spiral lines; whorls 6, flatly rounded, very rapidly increasing in diameter, the last whorl very large; spire short, broadly, ovately conical; sutures well impressed; aperture elliptical or elongate-ovate, narrowed above, longer than the spire; outer lip thin, only slightly thickened by a longitudinal rib; inner lip thin, narrow, appressed to the umbilical region so as to leave a well-marked chink; callus on the parietal wall thin, wide, well marked; columella twisted, with a strongly developed ascending plait.

Length 30, width 13.5, aperture length 18, width 8.5 mm. Type.

Length 28, width 13.5, aperture length 17, width 8 mm. Type.

Length 31, width 14.5, aperture length 18.5, width 9.5 mm. Type.

Types: The Chicago Academy of Sciences; 1 specimen, cotypes, collection W. A. Nason, 2 specimens.



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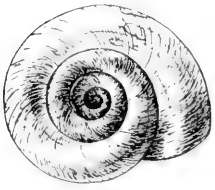

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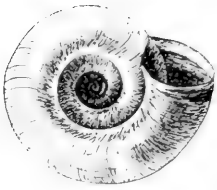

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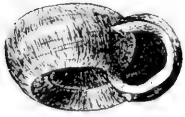

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1-3. SEGMENTINA ARMIGERA. 4-6 S. CRASSILABRIS

7-9. S. WHEATLEYI.

Type locality: Near San Francisco, California.

Range: California, near San Francisco (W. A. Nason); San Joaquin River (Mrs. E. E. Bush, Phil. Acad.); Merced Lake (Stearns, Dall, Smithsonian Institution); between Animas and La Plata, Colorado (Ingersoll).

Remarks: *L. leaii* seems to be a very distinct species, easily recognized by its short spire, very large aperture and heavy columellar plait. It is more nearly related to *L. proxima rowellii* Tryon than to any other species, but seems to be distinct. It has probably been heretofore identified as a form of the protean species *palustris*, but it is unquestionably distinct from any form of that species. It also resembles *L. reflexa hemphilliana* Baker, but differs in being very much broader and has a differently shaped and larger aperture. It is named in honor of one of America's best known conchologists, Dr. Isaac Lea.

THREE NEW SPECIES OF SCALA FROM CALIFORNIA.

BY WILLIAM HEALEY DALL.

During the last year or two, among the minute shells, collected by various correspondents on the Californian coast, there have been several undescribed forms of *Scala*, descriptions of which follow.

Scala berryi n. sp.

Shell small, white, six-whorled: nuclear whorls polished, smooth, without varices; later whorls with rather strong, reflected, faintly axially striated varices, on the last whorl about 20 or 21 in number; these varices are quite close-set, not angulated in front of the suture and markedly reflected, with the interspaces smooth; base with no basal disk or cord, the coil imperforate, the peristome rather callous on the pillar side. Long. 3.5., max. diam. 1.75 mm.

Dredged in 200 fathoms, San Pedro Bay, Cala., Mrs. Oldroyd; and in 12 fathoms off Del Monte, Monterey Bay by S. S. Berry. U. S. Nat. Mus. 107,724.

This species is, perhaps, nearest to *S. clathratula* A. Adams, and to the next species.

Scala rectilaminata n. sp.

Shell very similar to *S. berryi*, with the same number of whorls and varices, but having the nuclear shell smaller, the test less heavy,

the varices nearly vertical to the surface of the whorl, instead of reflected, which makes them appear sparser, though really the same number occur on the whorl; the varices are narrower and the peristome less heavy and wide. Long. 3.25, max. diam. 1.6 mm.

Dredged in twelve fathoms mud, Monterey Bay, S. S. Berry. U. S. Nat. Mus. 110,430.

The specimens seen are of a more yellowish-creamy-white than *S. berryi* which has a bluish subtranslucent appearance.

Scala (*Cirostrema*) *montereyensis* n. sp.

Shell small (probably not full grown), the nucleus lost but with five subsequent rapidly increasing whorls; shell substance in two layers, the inner translucent white, solid, the outer opaque white, frothy, porous, with numerous puncticulations arranged in harmony with the incremental lines, except on the basal disk where they form spiral lines; varices low, solid, with a spongy surface, nine in number; basal disk conspicuous, slightly concave; bordered by a conspicuous cord; aperture gibbous, patulous near the imperforate axis. Long. 2.5, diam. 1.5 mm.

Dredged in 25 fathoms mud, off Del Monte, in Monterey Bay, Cala., by S. S. Berry. U. S. N. Mus. 110431.

This shell represented by two specimens, of which one is in Mr. Berry's collection, is doubtless immature, but there is no other species known north of Cape St. Lucas belonging to this special group, and, though the characters require rather high magnification to see them clearly, it cannot be confounded with any other Californian species.

NOTE ON THE GENUS PSILOCOCHLIS DALL.

BY WILLIAM H. DALL.

This curious *Turbinella*, collected by Mr. McCallie in the Eocene of Georgia, was described in THE NAUTILUS for May, 1904, p. 9. Additional material shows that the mature shell is covered with a coating of enamel which extends to the very apex of the spire, obscuring the sutures, a feature not hitherto reported in connection with the genus *Turbinella* or any of its close allies; so that *Psilocochlis* described as a subgenus, seems fully entitled to generic rank. Only the typical species, *P. mccalliei* Dall, is at present known.

PUBLICATIONS RECEIVED.

A Review of the American Volutidæ. By Wm. H. Dall. (From the Smithsonian Miscellaneous Collections, vol. 48, 1907.) This paper is the revision promised by the author in his "Notes on some names in the Volutidæ," in The Nautilus for April, 1906. Some years ago Dr. Dall outlined two important groups of the *Volutidæ* as follows:

1. Subfamily *Scaphellinæ*, with a membranous protoconch which is lost early in the intracapsular development and is replaced by a shelly envelope, the secondary nature of which is evident in well preserved specimens.

2. Subfamily *Volutinæ*, a shelly protoconch. In these forms there is no membranous stage, the protoconch being shelly throughout its history. This shelly apex is never naturally lost.

His recent researches have shown that the type of the genus *Scaphella* belongs to the *Volutinæ*, and therefore the subfamily name *Scaphellinæ* has been given up and *Caricellinæ* substituted for it. In his review Dr. Dall employs not only the apical shell characters which he regarded as important in his earlier papers, but also many features of the soft anatomy. Stress is laid on "the presence or absence of a cæcum to the œsophagus; the characters of the radula; of the verge, or external male organ; and the presence or absence of an operculum." A new three-fold division of the *Volutidæ*, here outlined, is regarded as provisional. It may be briefly summed up as follows:

1. Subfamily *Volutinæ*. A shelly, persistent protoconch, sessile eyes, operculum usually absent and the radula teeth usually in one tricuspid series.

2. Subfamily *Caricellinæ*. A membranous protoconch, operculum absent, radula variable or absent. Otherwise as in *Volutinæ*.

3. Subfamily *Volutomitrinæ*. Protoconch supposedly shelly; adult unicolored, with a conspicuous periostracum; small stalked eyes, "radula of a single long series, the separate teeth unicuspidate, with deeply arcuate bases." No operculum.

The genera and species are distributed among the subfamilies as follows:

Volutinæ: Voluta (Linné) Lamarck, with the following species: ***musica*** **L.,** ***virescens***, Sol., ***ebræa*** L.

Lyria **Gray with the species** ***beauii*** Fischer and Bernardi.

Enæta Adams with the species *barnesii* Gray, *cumingi* Brod., *pedersenii* Verrill, *cylleniformis* Sowb., *archeri* Angas, *reevei* Dall, *guildingii* Sowb.

Plejona Bolten containing species "conchologically related to the *V. spinosa* Lamarck."

Caricellinae: Adelomelon Dall, with the species *ancilla* Sol., *subnodosa* Leach, *benthalis* Dall, *martensi* Strebel, *magellanica* Lamarck, *ornata* Lahille, *beckii* Brod., *tuberculata* Swainson, *brasiliana* Sol., *ferussacii* Donovan, *paradoxa* Lahille, *stearnsii* Dall, *philippiana* Dall.

Zidona H. and A. Adams with the species *angulata* Swainson.

Tractolira Dall with the species *sparta* Dall.

Aurinia H. and A. Adams with the species *dubia* Brod., *robusta* Dall, *gouldiana* Dall.

Maculopeplum Dall with the species *junonia* Hwass, *dohrni* Sowb.

Volutomitrinæ: Volutomitra Gray with the species *gronlandica* Beck and *alaskana* Dall.

Owing to the scarcity of specimens, we do not realize that on the coasts of North and South America there are 33 recorded species. There are considered to be two centers of distribution for the American species, the southern end of South America is taken as one center and the Antilles as the other. The paucity of species along the Pacific coast north of south latitude 40° is remarked upon.

Under the genus *Aurinia*, typified by *A. dubia*, Dr. Dall says: "This genus is the degenerate descendant in one line, as *Maculopeplum* is a normal descendant in another, from the Eocene *Caricella*. Its most prominent feature is the enfeebled plaits of the pillar, usually of diminished number as well as size, its thin shell and prominent Caricella-nucleus. The absence of the radula it shares with *Maculopeplum*, though *Halia*, evidently a close relative, and even more degenerate as regards the shell, has retained the radula." The type of the genus *Maculopeplum* is the well-known *Voluta junonia* Hwass.

In his note on the *Volutidæ* which appeared in THE NAUTILUS for April, 1906, Dr. Dall calls attention to the fact that the type of Swainson's genus *Volutilithes* is not *Voluta spinosa* but *Voluta muricina* Lam. This point was ably confirmed by Mr. R. Bullen Newton[1] in June, 1906.

[1] "Note on Swainson's Genus *Volutilithes*," Proc. Malac. Soc., Lond., June, 1906, p. 100.

Volutilithes muricina is evidently well removed from the forms usually described as *Volutilithes spinosus* and *Volutilithes petrosus*. The use of the generic name *Plejona* to designate such forms as the the latter, seems, however, to be without warrant. As Mr. Newton has pointed out, Bolten refers his *Plejona fossilis* to four figures in d'Argenville. These four figures represent not only four different species, but four different genera!

The very existence of the name *Plejona* rests, therefore, on a poor basis, and it is hard to see how its type *P. fossilis*, can be restricted to *V. spinosa*.

But to return to the application of *Plejona* to American Eocene forms, the study[1] of very large and carefully collected series from our Gulf States has convinced the reviewer that the forms described as *Athleta tuomeyi* by Conrad are nothing but races of his *Voluta petrosa* which have been subjected to an unfavorable environment. They are of one genetic stock, and the differences can in no sense be regarded as generic; in fact they are not even specific.

M. Cossmann[2] in reviewing this study pointed out that if its results are to be accepted, *Athleta* must be substituted for *Volutilithes* Swainson (1840 *non* 1831).

Athleta rarispina is the type of *Athleta* and is probably related to Lamarck's *Voluta spinosa* in about the same way that *A. tuomeyi* is related to Conrad's *Voluta petrosa*. With our present knowledge it seems better to adopt *Athleta* for Conrad's *Voluta petrosa*, its variations, mutations and allies, than to revive *Plejona*.

In conclusion it is noted with regret that Dr. Dall has not provided this interesting and important paper with figures, which would have been of the greatest assistance to workers having only small collections or small libraries at their command.—BURNETT SMITH.

FOSSIL MOLLUSCA FROM THE JOHN DAY AND MASCALL BEDS OF OREGON (Univ. of California Publications, Bull. Dept. of Geology, V, no. 3, pp. 67–70). By Robert E. C. Stearns. The new species are *Epiphragmophora dubiosa*, *Pyramidula lecontei* and *Lymnæa maxima*. The first is apparently related to *fidelis* or *mormorum*;

[1] Smith, Burnett: "Phylogeny of the Races of Volutilithes petrosus," Proc. Acad. Nat. Sci., Phila., May, 1906, p. 52.

[2] Revue Critique de Paléozoologie, p. 222, October, 1906.

the second to *Oreohelix strigosa*. Together with Dr. Stearns' previous report on John Day land shells (*Science*, 1902, 153), this paper is of great interest, showing the antiquity of the present generic groups of land shells, which were manifested in forms not unlike those now existing in the same region, as far back as the miocene.—H. A. P.

Catalogue of the Mollusca of Illinois. By Frank Collins Baker (Bull. of the Ill. State Laboratory of Natural History, VII, article 6, 1906). This catalogue "is intended to record every reference to the mollusca occurring in the state, which may be found in the published lists, and also all scattered references wherever published." Under each species the author quotes every locality from which specimens have been recorded, giving the authority for each in parenthesis. 241 aquatic and 91 terrestrial species are recorded. No less than 28 species and varieties have been based upon Illinois specimens, seven of them being now considered synonymous. From only ten counties, says Mr. Baker, have careful lists been made. In this catalogue records have been obtained from 69 counties, of from 1 to 145 species. What has been done, and the great amount of work still to be done, is graphically shown in the map. The richest portions of the State, along the Wabash and Ohio rivers, are still very little known; but in the upper counties several energetic naturalists have thoroughly worked up the fauna, so that this first attempt at a State catalogue is very creditable to the author, as well as the other naturalists, Messrs. Ferriss, Hinkley, Handwerk, Marsh, Nason, Strode, Hart and others, who have contributed records.

It is inevitable in a first attempt to cover so large an area, that some doubtful records, demanding careful verification, must be included, and this catalogue is naturally no exception. Baker and his co-workers will doubtless now set about the task of investigating these questionable records. A paper by Prof. Shimek on his investigation of *Pyrgulopsis* in Rock River seems to have been overlooked. Together with Baker's "Mollusks of the Chicago Area," this catalogue forms an excellent basis for further work in Illinois.

The Fossil Mollusca of Florissant, Colorado.—By T. D. A. Cockerell (Bull. Amer. Mus. Nat. Hist., xxii, 1906). The following species are described as new. *Omphalina* (?) *laminarum*, *Planorbis florissantensis*, *Lymnæa sieverti*, *scudderi*, *Sphærium florissantense*. The new name *Columna haydeniana* is proposed for *Bulimus teres* M. & H., not Olivier.

The Nautilus.

Vol. XX. APRIL, 1907. No. 12.

NOTES ON SOME NEW MEXICAN ASHMUNELLAS.

BY H. A. PILSBRY AND JAS. H. FERRISS.

Since the publication of the results of our work on Ashmunella in 1905,[1] various correspondents have contributed specimens which throw light upon a number of dubious points relative to the group of species inhabiting the Sierra Blanca and Sacramento ranges, in New Mexico, east of the Rio Grande.

There can be no doubt that a systematic campaign in this region by collectors who are not afraid of hard work, and who get live shells, would be well rewarded by a most interesting catch. It is absolutely essential, however, to get to the mountain-tops, and to dig deep in the rock-heaps. You will need a Ferriss hoe and stout gloves, and you must forget fatigue.

ASHMUNELLA RHYSSA TOWNSENDI (Bartsch). Plate VIII, figs. 1, 2.

Ashmunella townsendi Bartsch. Smiths. Misc. Coll., xlvii, p. 13 (Aug. 6, 1904).

Ashmunella rhyssa townsendi Bartsch, Pilsbry. Proc. A. N. S., Phila., 1905, p. 231.

This race differs from *A. r. miorhyssa* chiefly by its strongly-ribbed surface, like *A. altissima*, which, however, is far smaller, more depressed and more openly umbilicate. Three of the original lot of *townsendi*, taken by Prof. Townsend in the Sierra Blanca

[1] Mollusca of the Southwestern States, Proc. A. N. S., Phila., 1905, pp. 223–253.

above Ruidoso, N. M., sent by Prof. Cockerell, one with the spire broken, measure:

Alt. 8.8, — 8 mm.

Diam. 14.1, 14.8, 13 mm.

Whorls $5\frac{1}{2}$, — $5\frac{1}{2}$.

Ribs on the last whorl 60, 48, 46.

The number of ribs on the last whorl is only approximately stated, since on account of irregularities and minor wrinkles or ripples it is impossible to make a quite definite count.

The weak trace of a parietal tooth is visible in one of the specimens.

The two specimens examined by Mr. Bartsch measure 8.2 x 15 mm. The number of ribs is not stated.

These specimens are intermediate in character between the smaller and more strongly-wrinkled examples of *A. rhyssa*, collected by Mr. Ashmun, and the following form.

Thirteen examples, all dead and bleached, were taken by Mr. F. J. Phillips on the north slope of a small brook near Nogal Creek, at an elevation of 7500 ft., Lincoln Co., N. M., and recently sent to one of us, one being drawn in figs. 1, 2 of plate VIII. In general character the lot is quite uniform. There are 30 to 35 ribs on the last whorl; in a few cases as many as 40, by splitting or breaking up of a number of ribs. Ten of them, unbroken, measure as follows:

Alt. 8.1, 8, 7.9, 7.5, 8, 7.8, 7.8, 7.5, 7.1, 6.6 mm.

Diam. 13, 12.9, 12.8, 12.25, 12.2, 12, 12, 12, 12, 11.5 mm.

In 8 out of 10 fully adult shells a parietal tooth is developed, varying from a mere trace in some to a well-developed though small tooth in three or four. In two fully adult shells there is no trace of a tooth. A low basal tooth is present in all, but in two or three it is barely perceptible. The largest shell has $5\frac{1}{3}$ whorls, the smallest barely 5.

This colony has the character of *townsendi*—small size and heavily-ribbed surface—more emphatically expressed than in the original *townsendi*, and compared directly with *rhyssa* it appears to be quite distinct; yet it is connected with *rhyssa* through the more finely-ribbed forms from above Ruidoso, so that the use of a trinomial seems to express its relations better than an arbitrary specific separation.

Ashmunella rhyssa (Ckll.) Plate VIII, figs. 3, 4, 5.

Professor Cockerell having found the unique type specimen of

A. r. hyporhyssa kindly sent it for study. It is wholly bleached, has lost the cuticle, and measures, alt. 9, diam. 15 mm., umbilicus 3.1 mm., and has $5\frac{1}{2}$ whorls. There is a very slight basal lip-tooth, and a small oblique parietal tooth, about 1.8 mm. long. The sculpture is decidedly finer than in *A. rhyssa*, agreeing closely with specimens of *A. r. miorhyssa* collected by Ashmun, which, however, differ by having a slighly smaller umbilicus, 2.3 to 2.5 mm. wide in a shell of nearly 16 mm. diam., and the aperture in *miorhyssa* is slightly larger. I can find no other differences between *miorhyssa* and *hyporhyssa*.

A. r. hyporhyssa was taken by Prof. C. H. T. Townsend "on the lower slopes of White Mt., above head of Ruidoso, Aspen belt, at about 9500 ft."

A. rhyssa and *A. r. miorhyssa* are from the Sierra Blanca.

Ashmunella rhyssa edentata Ckll.

A. rhyssa hyporhyssa Pils. Proc. A. N. S., Phila., 1905, pp. 228–231, pl. 12, f. 7–13, exclusive of synonym "*Polygyra r. hyporhyssa*" and quoted description of same.

Similar to *A. r. miorhyssa*, but frequently more depressed, with wider umbilicus, and generally without a parietal tooth, which is present in less than 5 per cent. of the specimens examined.

Sacramento Mountains, at various elevations, as given in the paper cited above. While but weakly differentiated from the Sierra Blanca forms, it is well to have a name for the Sacramento race, common in James Canyon near Cloudcropt.

I formerly united this race and *A. r. hyporhyssa*, in the absence of the type of the latter.

ABALONES AND THE EARTHQUAKE.

BY ROBERT E. C. STEARNS.

The Japanese abalone fishermen who have made their headquarters at Carmel Bay, a few miles south of Monterey, had planned to extend their operations to the more southerly part of the coast, on the shore of San Luis Obispo County. This was in August. Upon examination later on of the rocky region near Morro, where they expected to make a great haul, it was found that the sea-bed was coated with a greasy slime of a supposed bituminous character, which

had killed the abalones. Abalones were found in abundance for miles along the shore, so it was reported, but all dead. As the "meats," as the dried soft parts are called, constitute the chief profit of the fishery, no doubt the Japanese were disappointed.

The earthquake of April 18th, which was felt very slightly at Morro, was credited with the killing, though it may have been caused by some subsequent seismic disturbance. The abalones that occur along this part of the shore belong principally to the species *Haliotis rufescens* and *H. cracherodii.*

The Japanese parties engaged in the fishery at various places, in some instances, use a diving-suit for working in or below the laminacian zone, and are stripping some localities quite thoroughly. The Chinese are said to confine their collecting generally to shallow water. The greater part of the dried meats, if not all, are exported to China.

There is one cannery in or near San Pedro where the abalones are packed, the can-labels bearing the trade name of "Eno-labo," which it will at once be seen is merely Obalone spelled backwards. Here is an instance on a small scale where commercialism overreaches itself. The dear public don't know what "Eno-labo" means, and, as my grocer tells me, don't buy the goods. Fresh-packed "Eno-labo," however, is quite palatable and wholesome food, good enough for anybody.

Los Angeles, Cal., February 1, 1907.

EPIPHRAGMOPHORA (MICRARIONTA) HUTSONI N. SP.

BY GEO. H. CLAPP.

Shell openly umbilicate; rather thin but strong, smooth and shining when fresh; reddish-horn color on the upper surface, much paler to creamy-white below, with a rather narrow brown band, about 1 mm. wide, above the periphery, visible only on the last $1\frac{1}{2}$ whorls, the band margined above and below by wider white bands, the lower shading off into the light-colored base. Whorls about $4\frac{1}{3}$, the inner ones convex, the last somewhat flattened above, well rounded below and at the periphery. The embryonic shell consists of $1\frac{2}{3}$ whorls,

terminating with an inconspicuous whitish line; the first $\frac{1}{3}$ whorl is depressed and highly polished; the remaining embryonic whorls are evenly and densely covered with elongate-oval papillæ arranged in spiral lines. In the following $1\frac{1}{2}$–2 whorls, beginning the neanic stage, the epiconch bears *exceedingly delicate*, very short hairs arranged in obliquely descending series, but less regular than the papillæ of the embryonic whorls. These are entirely lost in mature shells, although the hair-scars are generally visible on fresh specimens. The body-whorl shows the usual slight growth-lines, but is otherwise smooth except for varical impressions showing resting periods, of which there are usually 2 on the body-whorl and others clear up to the nuclear whorls. The body-whorl enlarges rapidly, and is suddenly deflected and expanded at the aperture, which is large, almost round, oblique, with a slightly reflected and thickened margin; lips widely expanded at the columella and partly reflected over the umbilicus. Ends of lip converging, forming about four-fifths of a circle. Gr. diam. $14\frac{1}{2}$, lesser $11\frac{1}{2}$, alt. 8 mm. Aperture 7 mm. high, 7 mm. wide. Umbilicus $2\frac{1}{2}$ mm.

The figured specimen measures, alt. 7.5, diam. 14 mm. The largest and smallest shells that I have seen measure 15 and $12\frac{1}{2}$ mm. diam. respectively; both are dead shells.

Collected by Geo. S. Hutson, after whom the species is named, about 8 miles from Quartzsite, Yuma Co., Ariz., in the foothills, at an alt. of about 1600 ft.

Types, No. 5659 of my collection; co-types, coll. A. N. S. P.

The sculpture of the embryonic whorls of this beautiful little shell puts it in the group of *Sonorella wolcottiana* Bartsch (Smiths. Misc. Coll., xlvii, p. 187, pl. xxviii). A large series from young shells of $2\frac{1}{2}$ whorls to adults show the sculpture and epiconch in all stages, the latter being so thin and delicate, however, that it apparently entirely disappears by the time the shell has completed the third whorl. The shells are remarkably uniform in size and color, and most fresh specimens show occasional translucent spots scattered over the body-whorl. The resting periods are shown by well-marked varical impressions at all stages of growth, as is common in most species from a semi-arid region. The body of the animal is intensely black, with a gray mantle.

ON THE SOFT ANATOMY OF E. (MICRARIONTA) HUTSONI.

BY H. A. PILSBRY.

The animal is purplish-black, with gray mantle-edge. The surface is finely and evenly granulose. There is a weak impressed line on the ridge of the tail, and a pair of contiguous dorsal grooves, scarcely noticeable except between the tentacles. Foot-margin very narrow, hardly differentiated. The sole is conspicuously tripartite in color, the sides being purplish or slaty-black, while the middle field is of a much paler gray tint. The pale area is somewhat wider than the dark sides.

The genitalia, fig. 6, show a very short penis, swollen basally, an epiphallus of about the same length or somewhat larger, and a flagellum longer than either. The long retractor muscle is inserted on the epiphallus, and distally on the lung floor. At the base of the vagina a well-developed dart sack (*d. s.*) is inserted; on each side of its base enter the ducts of the mucous glands, which ascend as high as the dart sack and then descend, their flattened, glandular portions being bound to the vagina and atrium. The general relations of the dart sack and mucous glands are shown diagramatically in fig. 8. As usual, the two glands are unequal. The spermatheca is ovate, on a long, slender duct. Length of penis 2 mm.; of epiphallus 2.8; flagellum 4 mm.; length of spermatheca and duct 16.5 mm.

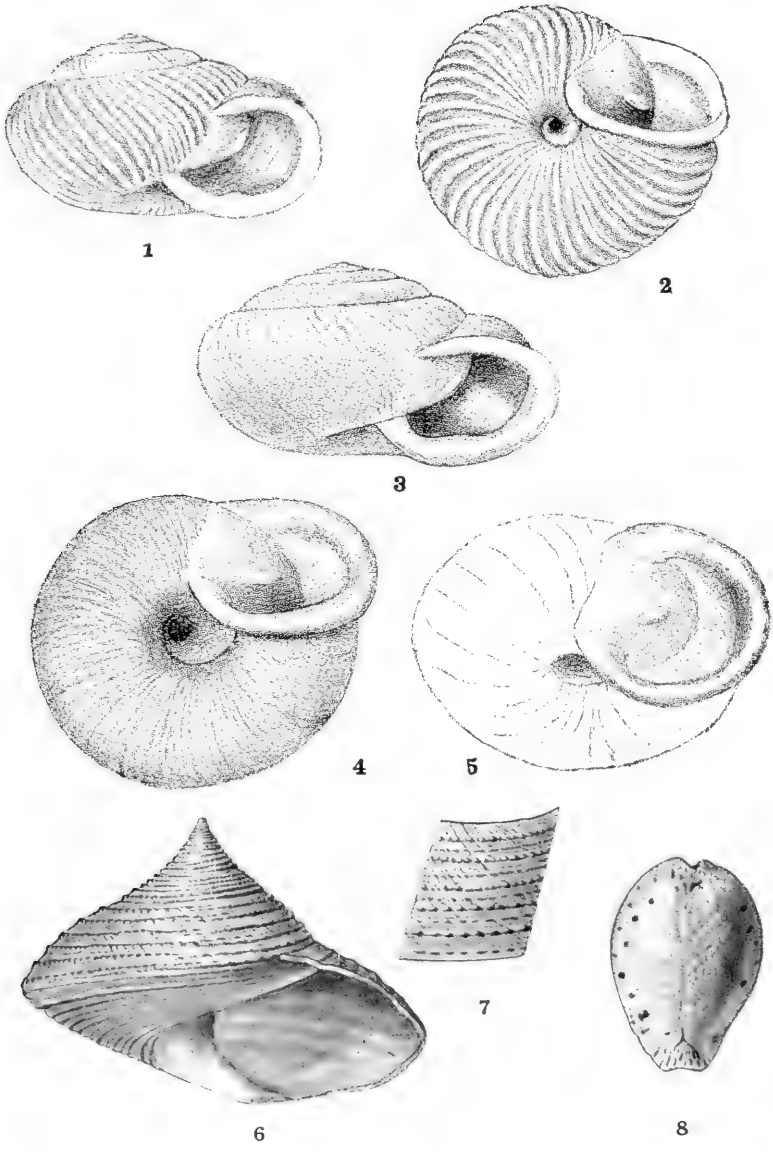
The right ocular retractor passes between the ♂ and ♀ branches of the genitalia.

The general features of the alimentary tract are as usual in the Helices. The crop is long, the salivary glands equally lengthened, lying on the upper side of the crop, and concrescent throughout their length.

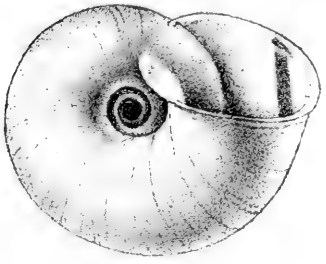
The jaw is of the usual arcuate shape, with only three ribs, grouped in the median third (fig. 7).

The radula has 17,10,1,10,17 teeth (pl IX, fig. 5). The central and lateral teeth have simply mesocones without side cusps. The marginal teeth have the ectocones developed, and in the outer ones the larger cusp is bifid. I noticed no teeth with the ectocone bifid. The transition from lateral to marginal teeth is quite gradual.

The venation of the lung is faintly outlined with gray pigment. The kidney is about half as long as the lung, and nearly twice the length of the pericardium.



PILSBRY: ASHMUNELLA FROM NEW MEXICO.
PRESTON: CALLIOSTOMA AND CYPRÆA.



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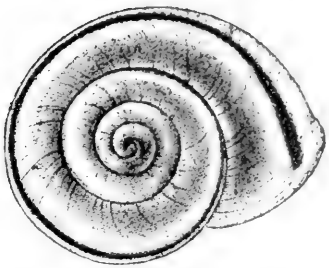

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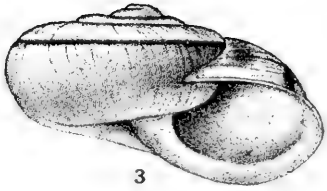

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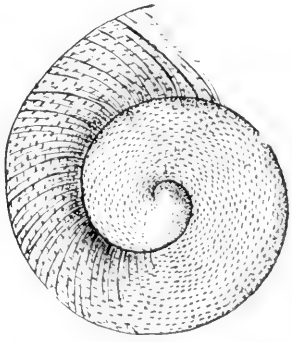

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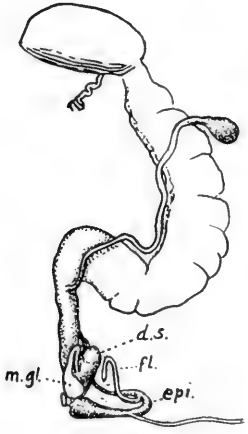

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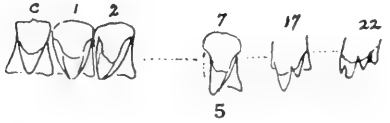

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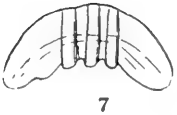

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8

While the shell of this species has all the appearance of a *Sonorella*, the soft anatomy shows that it belongs to the subgenus *Micrarionta*, of *Epiphragmophora*, represented by *E. gabbi, facta, stearnsiana*, etc., the genitalia being typical for that group. In *Sonorella* I have figured the anatomy of eight species and subspecies. All agree in having a well-developed penis, and the flagellum is excessively short or wanting, usually about half a millimeter long, in one case one mm. long, but its length is always a very small fraction of that of the epiphallus. In no *Sonorella* is there any trace of dart sack or mucous glands. This is very unlike these organs in *E. hutsoni*.

The unexpected internal anatomy of this species emphasizes the uncertainty of dealing with *Sonorella*-like Helices without examination of the soft anatomy. How many of the supposed *Sonorellas* of southeastern California may really prove to belong to *Micrarionta* is problematic, but perhaps all those with the embryonic sculpture like *E. hutsoni* will eventually be removed from *Sonoralla*.

EXPLANATION OF PLATE IX.

Figs. 1–3. *Epiphragmophora hutsoni*, shell.
4. Apex, enlarged.
5. Teeth.
6. Genitalia.
7. Jaw.
8. Diagram of dart sack and mucous glands. *d. s.*, dart sack; *epi.*, epiphallus; *fl.*, flagellum; *m. gl.*, mucous glands.

DESCRIPTIONS OF CYPRAEA BERNARDINÆ AND CALLIOSTOMA CARNICOLOR N. SP.

BY H. B. PRESTON.

CYPRAEA BERNARDINÆ n. sp. Pl. VIII, fig. 8.

Shell oval, with a well-defined dorsal line dividing into a small fork near the anterior extremity; dorsal surface brownish-gray flecked with white spots and streaks; sides white, sparsely spotted with chestnut, a number of dashes of the same color appearing at the anterior extremity and slightly crenulated at the margins of the dorsal surface; extremities obtuse; base white; columella somewhat straight, bearing seventeen rather fine, white teeth; peristome very slightly curved, having fifteen teeth; aperture narrow.

Length 28.50 mm., greatest breadth 20 mm.

Hab.: Celebes (?).

A striking shell, whose nearest ally is perhaps *Cypraea turdus* Lk. From this, however, it may be easily distinguished by the remarkable white flecking on the dorsal surface, by the finer and more numerous teeth on the columella and the narrower and straighter aperture; moreover, it is much flatter than is the case with *Cypraea turdus*.

CALLIOSTOMA CARNICOLOR n. sp. Pl. VIII, figs. 6, 7.

Shell conical, keeled, imperforate, somewhat glossy, flesh-colored; spire concave; whorls 8–9, the last three rapidly increasing and much flattened, sculptured with nodulous spiral ridges, almost every alternate nodule being of a rich chestnut-brown; sutures not well defined above, and only slightly impressed between the last whorls; base very inflated and sculptured with closely-set spiral ridges intercepted by lines of growth, thus presenting a coarsely, granular appearance; columella arched, reflexed outwards, forming a thick callosity over the umbilical area, a slight callosity extending upwards to the lips above; peristome simple; aperture subquadrate; interior of shell nacreous and irridescent.

Alt. 41 mm., diam. maj. 53 mm.

Aperture, alt. 25 mm., diam. maj. 25 mm.

Hab.: Celebes (?).

The above shell at first sight much resembles *Calliostoma cunninghami* Gray, from New Zealand; the spire is, however, more concave, the last whorls are much more flattened and expanded outwards, and the nodulous spiral ridges are far less numerous than is the case with that species; moreover, the inflation of the base easily separates it from *C. cunninghami*.

DESCRIPTION OF A NEW BIFIDARIA (B. AGNA).

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

When working on *Bifidaria pentodon* some time ago we found one specimen of a species evidently distinct though related to that, from "Silver Lake, Kansas," collected by Mr. J. B. Quintard. Recently a few more examples of the same form were found in river débris

taken last October at Trinidad, in southeastern Colorado, by Mr. J. H. Ferriss and the senior author.

1

2

3

BIFIDARIA AGNA n. sp.

The shell is rimate, cylindric, the last three whorls of about equal diameter, the summit very obtuse; surface nearly smooth; of a sperm-aceti-whitish color. There are $4\frac{3}{4}$ convex whorls, the last with a strong rounded crest behind the outer lip, rather close to it above, but being more oblique, it is further behind the lip at the base. Behind this crest the whorl is a little flattened laterally, and shows the lower palatal plica, though as a white spot. The aperture is brought forward nearly in line with the ventral convexity of the whorls. The peristome is thin, slightly expanded, strengthened a short distance within with a low callous rib. The parietal lamella appears distorted and angular in front view; seen from the base it is seen to consist of an angular and a parietal lamella, completely united inwardly. The columellar lamella is sinuated or bent and strongly developed. The basal fold is strong, arising on the callus but extending inward beyond it. The lower palatal fold is large and pliciform, more or less immersed, standing chiefly inward from the palatal callus. The upper palatal fold is much smaller, and stands rather near the lower, upon the palatal callus. There is a small or minute suprapalatal fold, also on the callus.

Length 1.75, diam. 1 mm.

Trinidad, Colorado, type no. 93052 A. N. S. P.; also Silver Lake, Kansas.

This species resembles some forms of *B. pentodon* (Say), especially those from northern Alabama, in which the lower palatal fold is long

and enters somewhat beyond the palatal callus; but it differs by the distinctly bifid parietal tooth. The very strong crest behind the lip is characteristic of *B. agna*. Like the related forms, this species has the somewhat translucent whiteness of spermaceti or paraffin.

In the specimen from Kansas the teeth are somewhat smaller than in the type. It may be less mature.

CORRESPONDENCE.

Editor Nautilus: I have to thank Mr. Burnett Smith for his extended review of my paper on American *Volutidæ* in the March NAUTILUS. There are, however, a few points on which further light is desirable, and I wish to note them briefly.

1. So far from this being the general revision of the family upon which I have been for some time at work the recent publication is only a small part of it, which I thought I had made clear in my remarks on page 341. My regret at not being able to illustrate the paper is quite as great as that of my reviewer, but only those cognizant of the facts know, since we lost Dr. McConnell, how many fruitless, or almost fruitless, efforts have been made to obtain a competent draughtsman. An important paper has been for more than a year at a complete standstill, owing to the absence of an artist who could do the drawings.

2. I pointed out in 1890 the identity of the so-called *Athleta tuomeyi* with *Volutilithes petrosa* Conrad, and ascribed the deformity to some special conditions of the environment. We have some two thousand specimens in the National Museum, a part of which are normal. But while the most conspicuously deformed specimens are from Wood's Bluff and the lower Eocene generally, we have also distorted forms from Jackson, Miss., and several other Jacksonian localities, and one specimen from the Claibornes ands. These I shall be happy to show Mr. Smith if he can pay us a visit.

That the true *Athleta rarispina* bears any such relation to *Voluta spinosa* Lam. as *V. tuomeyi* does to *petrosa* is impossible, for Mr. Smith's suggestion is incompatible with the fact that *A. rarispina* is confined to the upper Oligocene, Miocene and Pliocene of Europe, while *V. spinosa* is restricted to middle Eocene (Calcaire Grossiere). There is no species contemporaneous with the *Athleta* which could take the place of *V. spinosa* in such a relation, and, further, the two species of *Athleta* are normal and not abnormal shells.

3. The remarks about *Plejona* which were made by both Mr. R. B. Newton and Mr. Smith indicate unfamiliarity with nomenclatorial questions, which indeed are sometimes sufficiently puzzling. But there is no ambiguity or difficulty in the case of *Plejona*, if the rules are complied with. Bolten's genus (for the period remarkably homogeneous) contains 24 species, all of which are identifiable, in terms of the older authors, and only one of which is a fossil. The first (fossil) species is based upon four very fair figures of "spiny murices," which Argenville referred to one species, but which represent three or four, as species are now reckoned. If we prefer to take our type from the first species in Bolten's list, it reduces itself to a simple process of elimination which leaves us with *V. spinosa* (one of those figured) as the type. If we regard the solution as vague, there still remains my absolute right to revive Bolten's name for any species contained in his list, and for which there is no prior valid name. This I did several months before Mr. Newton proposed *Volutospina* for the same shell.

If we reject Bolten's *P. fossilis* as vague, we are left to take *Voluta ebraea*, his second species, as type, which involves the loss of the generic name *Voluta* (Lam.), as now universally used, which it seems to me would be foolish, since the preceding method enables us to retain *Voluta* for *V. musica* and its allies without upsetting any accepted name.

I regard *Athleta* (*rarispina*) Conrad as a good genus, perfectly distinct from *Plejona* (*spinosa*) Bolten, as well as from the *V. petrosa* deformities. The latter were erroneously referred to the genus *Athleta*, which they really only superficially resemble, and consequently any attempt to use *Athleta* for the *spinosa* group is fallacious. *Athleta* does not occur in America, but there are probably three European species.

Wm. H. Dall.

Smithsonian Institution, March 6, 1907.

PUBLICATIONS RECEIVED.

West American Mitridæ.—By Mrs. M. Burton Williamson (Proc. Biol. Soc., Washington, xix, Dec., 1906). *Mitra idæ, fultoni, lowi*, and the Peruvian *M. orientalis* are discussed at length and with the exception of *M. lowi*, figured. A useful work, since these black Mitres have been involved in some confusion.

THE UNIONIDÆ OF KANSAS, part I, by Richard E. Scammon, (Kansas University Science Bulletin, iii, no. 9). "In this catalogue are listed 61 species and 5 subspecies. There is no doubt that future collecting will add many more species to the list. The author has tried to make certain of the identification and localities of every species listed, and with three exceptions has examined native specimens of each." Nearly all of the species are illustrated by line drawings occupying 23 plates, and all are described. Since only about 40 species were previously known, it will be seen that one-third of those now recorded are new to the state. Mr. Scammon proposes two new descriptive terms: "*interdentum*," for that part of the hinge-plate lying between the pseudocardinal and lateral teeth, and "*branchial outline*," to designate the slight groove in the cavity of the more solid Unios, caused by the edge of the branchiæ. It is proposed in future papers to discuss the geographic distribution and soft anatomy of the species.

NOTES.

In a recent letter Prof. Josiah Keep says: "The principal part of my edition of 'West American Shells' was destroyed in the great San Francisco fire, so there are no more copies in the book stores. Fortunately the cuts were stored in my home, and may be used again if there should be a considerable demand for a revised edition. Of this matter, however, I do not feel certain, though I have received some very kind letters upon the subject." We are sorry to learn of Prof. Keep's great loss, and hope that he will receive sufficient encouragement to undertake a new edition of his work.

ZONITOIDES ALLIARIA IN COLORADO.—A couple of weeks ago Guy H. Mason found in the Knudson greenhouse, Boulder, Colo., a specimen of *Zonitoides alliaria* Drap., a species well known to European conchologists, but of which American records seem to be rare, and confined, so far as they have come to my attention, to greenhouses. It occurs to me that the rarity of records may have resulted from American conchologists unfamiliar with the species placing it in their collections under some other name, particularly *Z. cellaria*. We are indebted to Dr. Wm. H. Dall for confirmation of the identification, he having compared it with British specimens as named by Jeffreys. It was at once recognized by Prof. Cockerell as of that species, but his long absence from Europe made him feel somewhat uncertain about it without opportunity to make direct comparisons. The specimen is now in the University of Colorado Museum.—JUNIUS HENDERSON.

THE

NAUTILUS

A MONTHLY JOURNAL
DEVOTED TO THE INTERESTS OF
CONCHOLOGISTS

VOL. XXI.

MAY, 1907, to APRIL, 1908.

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THE NAUTILUS.

VOL. XXI. MAY, 1907. No. 1.

THE DIFFERENCES BETWEEN THE TWO NEW ENGLAND SPECIES OF ACMAEA.

BY HENRY JACKSON, JR.

During the summer of 1906, at North Haven, Penobscot Bay, Maine, I collected about fifteen specimens of *Acmaea testudinalis* (Müller) and thirty *Acmaea alveus* (Conrad), *alveus* being by far the more common. I put *A. alveus* here as a species rather than a variety of *A. testudinalis*, in accordance with one of the latest lists of New England mollusks which gives Conrad's species *alveus* specific rank. From this material I procured the radulas with the intention of studying the differences between the species *testudinalis* and *alveus*, The shell in *testudinalis* is a roundish and as a rule regular shell, there not being so much variation in form as in *alveus*. The shell of *alveus* is a narrower, laterally more compressed shell than that of *testudinalis*, and is found on eel grass, wharf piles and occasionally on rocks, but at North Haven it is most commonly found on eel grass which grows in great profusion, much to the disadvantage of boats and boatmen, all along the muddy shores. *A. testudinalis* is commonly found on flat stones between tide marks. The coloring of *testudinalis*, as far as observed at North Haven, has much less variation than that of the form *alveus*, which runs from nearly white to dark, blackish-brown, with many intermediate shades. This narrow, compressed form of *alveus*, it would seem, might have been caused by its being on eel grass which has narrow leaves and might cause a shell to be narrow by the lack of space to grow on. But Mr. Blaney has found *alveus* at Iron Bound Island, Frenchman's Bay, Maine,

on the under side of stones on a coarse, pebbly beach, and here it still retained its characteristic, long, narrow form. See Proceedings of Boston Society of National History, Vol. 32, No. 2, Nov., 1904.

All the illustrations here are of the same magnification. In the fifteen specimens of *Acmaea testudinalis* collected and studied the radulas were all the same with no observed variation, see Pl. II, Fig. 1. All had two central (C C), two lateral (L L), and two outermost teeth (U U), while among the thirty *A. alveus* were several abnormal radulas, in all of which abnormal cases there were three teeth in the center, Pl. II, Fig. 4, instead of two, Pl. II, Fig. 2, which is the normal number for *alveus*. The additional or third tooth (A), see Pl. II, Fig. 4, is on the left side and is a narrower tooth than the other two (C C). These abnormal radulas came from three very different individuals: one from a large, blackish, distorted shell, an adult, and one from a small, regular, white specimen of the nepionic age, and so on, all being different. There are several differences between the radulas of *testudinalis* and of *alveus*, and these differences were constant throughout the specimens examined.

Fig. 5.

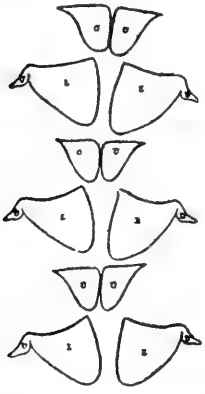


Fig. 6.

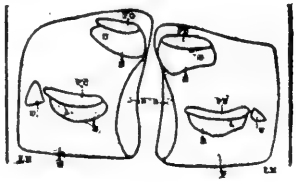


Fig. 5 (in text). *Acmaea testudinalis* (Müll). Normal adult radula. Developing teeth of the posterior portion of the same radula as Fig. 1. Lettering the same.

Fig. 6 (in text). Portion of anterior part of radula of *Acmaea testudinalis*, showing small bases (B), proximal portion of cusp (P C),

where the rest has been broken off, and plates (P) on lingual membrane (L M). U, outermost; L, lateral; C, central teeth. R, turned over part of plate. B, base.

There is a distinct dip in the proximal portion of the cusp of *testudinalis* in the laterals: this does not appear in *alveus*. In *testudinalis* the bases project from the proximal portion of the cusp at an obtuse angle, while in *alveus* the proximal portion of the cusp is the same size as the adjoining portion of the base. In *testudinalis*, Pl. II, Fig. 1, the apex of the cusp is just inside of the letter (L), from here it slopes down to the base; while in Pl. II, Fig. 2, *alveus*, the apex of the cusp runs the whole length of the foremost line bordering the shaded portion. In *testudinalis* the lateral teeth form a letter v, while in *alveus* they form an inverted v, thus ʌ. In *alveus* the laterals are less underneath the centrals than in *testudinalis*. The teeth of *testudinalis* are sharply rounded at the apex of the cusp, while those of *alveus* are nearly square, Pl. II, Fig. 2, and the younger, undeveloped teeth of the radula of an adult shell of *alveus* are perhaps the squarest of all, Pl. II, Fig. 4. This figure is of the developing teeth of the posterior portion of the same radula as Pl. II, Fig. 2. That is that portion hidden within the throat which will later come forward to take the place of worn-out teeth. I thought of the various causes of these differences, but it could not be individual variation, because the differences were constant throughout the forty-five specimens examined. It could not be because the teeth were worn square, as the squarest of them in *alveus* are in the early, developing part of the radula and before they had been used at all, see Pl. II, Fig. 3. There were five less important differences between the radulas of *testudinalis* and of *alveus*, these are: First the outermost tooth (U) is, in *alveus*, larger in proportion to the lateral tooth (L) than the outermost tooth of *testudinalis* is to its lateral tooth (L). In both species this little outside tooth (U) is nearly at right angles to the next tooth and the cusp of U faces in center of the lingual membrane (L), also it is very close to it, and at first glance appears to be the same tooth, only being a cusp of the larger denticle, but when viewed in a sideways, sectional view it is seen to be distinct. In the species *testudinalis* the tooth (U) cannot take much part in cutting food as it so much underlies the larger tooth (L), but in *alveus*, where it is more outstretched, it may do a good deal of work. Secondly, in *A. testudinalis* the cusps and bases alternate

large and small, see Pl. II, Fig. 1, that is, the base of the centrals (C C) being large and the cusps small; whereas in the laterals (L L) the bases are very small and the cusps large. The teeth in both species are set on separate plates, two on each plate. These plates are arranged in two rows, one down each side of the lingual membrane. The divisions between these separate plates are not distinct in the developing portion of the radula, but the plates seem to wrinkle with age, and in the center of the radula an elongated oval space is seen between the two. The first two or three rows of teeth in *A. testudinalis* are slightly blunter than those behind, but by no means so blunt as in *A. alveus*. What I mean by first teeth are those teeth in the anterior portion of the radula, these teeth are replaced by new ones which come forward from the developing portion.

Fig. 6, drawn by the author, showing plates and proximal portion of cusps in *A. testudinalis* where the rest is broken of.

Again the cusps of the teeth of *testudinalis* are very much more slanting backward or posteriorly than those of *alveus*, especially the laterals (L L). Lastly, the cusps of *testudinalis* are minutely granulated, while those of *alveus* are indistinctly striated. This was seen in some cusps broken off their bases, placed on a separate slide and viewed with a one-sixth inch objective.

In summing this matter up, one might say without much doubt that these two shells were distinct species. Also one may say that both radulas are exceedingly strange. They have no central tooth speaking strictly, as, with the exception of the abnormal radula of *A. alveus*, all radulas had an even number of teeth. Their deep chestnut color is another curious feature. Also they are very hard radulas to draw as they are raised more than most teeth and the angles and focuses are hard to get.

My thanks are due to Mr. R. T. Jackson, of Cambridge, and to Mr. J. A. Cushman, of the Boston Society of Natural History, for drawings of the radula.

EXPLANATION OF PLATE AND FIGURES.

Fig. 1. *Acmaea testudinalis* (Müll). Normal adult radula. L, lateral; C, central; U, outermost teeth. The cusps are shaded.

Fig. 2. *Acmaea alveus* (Conrad). Normal radula. Lettering the same as before. The outermost teeth (U) are so close to the laterals (l) that in this view they seem to be joined.

Fig. 3. *Acmaea alveus* (Conrad). Normal radula. Developing teeth of the posterior portion of the same radula as Fig. 2. These teeth have little or no coloring. Lettering the same.

Fig. 4. *Acmaea alveus* (Conrad). Abnormal radula. L, lateral; C, central; U, outermost; A, additional teeth.

PULMONATES OF THE MATINICUS ISLANDS, MAINE.

ARTHUR H. NORTON.

The Matinicus Islands form a group of off-shore islands outside of Penobscot Bay. They constitute the most isolated land mass of any size in the state, their nearest point of approach to the mainland being thirteen nautical miles. In the group there are eight islands, seven dry and numerous half-tide and sunken ledges. The total acreage I have roughly estimated at about fifteen hundred acres.

Matinicus is the largest of the group, containing about eight hundred acres. It is quite well wooded and diversified in topographical features. Exploration of this island would doubtless increase the following list materially.

Seal Island lies six miles east of Matinicus harbor, and Matinicus Rock five miles south of the harbor, both forming isolated points of great exposure and long separation.

Several plants are found in abundance on these two points which are nowhere else abundant on this coast west of Petit-Menan point. Both are destitute of trees. As would be expected from their long isolation and great exposure, they are completely "rock bound," in fact, enormous ledges, with their valleys and seams filled with soil, which is partly coarse gravel, deeply overlaid with decayed vegetation, and everywhere strewn with fragments of rock, rent by frost and the action of time, or hurled by the fury of unusually severe storms.

The southwestern exposures of both are bluffs dropping immediately into water of considerable depth. At the rock, the history of which has been made known through the medium of the light-house establishment, the surges generated by gales from the southeast not infrequently break over the island notwithstanding the fact that it is about fifty feet above mean high-water mark.

The character of the soil, and the copious moisture from dews and fogs are conducive to very rank growth of several species of maritime plants, affording suitable conditions for the mollusca enumerated.

During my visits to the islands, shell collecting has been entirely secondary. Yet the isolation of the islands lends so much interest to the collection that the following records do not seem entirely superfluous, especially as a thorough investigation is not practicable at present:

Helix hortensis Müller. In June, 1896, I found this species in great abundance on Seal Island. They inhabit the rank vegetation toward the western end. The yellow, unbanded phase predominated, only three or four banded ones being found. Some young specimens having but two and a half whorls were also found on the occasion of this visit. I have not found it on any other island of the group. It was recorded by Mr. C. W. Johnson from Seal Island in THE NAUTILUS for November, 1906, page 77.

Vallonia costata Müll. Rather abundant on Seal Island in 1896 among rank herbage and driftwood.

Pupilla muscorum Linn. Four specimens were found with the last-named species. They are but 3 millimeters long, half a millimeter shorter than specimens taken on the adjacent mainland. One is a rich brownish, the others opaque white, all edentulous.

Cochlicopa lubrica Müll. One specimen was found under a log, stranded high on Matinicus Rock, August, 1905.

Vitrina limpida Gould. Found rather plentiful among stranded chips and rank vegetation on Matinicus Rock, July, 1903.

Zonitoides arborea Say. Matinicus Rock. Three specimens under logs, stranded high above normal tide mark, August, 1905.

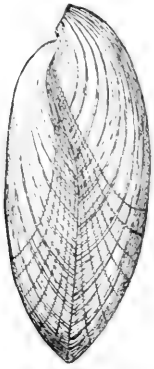
Agriolimax agrestis Linn. Several specimens were found under logs and stones or hidden by rank vegetation on Matinicus Rock, August, 1905.

Pyramidula alternata Say. A single dead and broken shell was found at the northern part of Matinicus Island, August, 1905.

Pyramidula striatella Anth. Common with the other small species on Seal Island, June, 1896.

Succinea obliqua totteniana Lea. One found on Matinicus Rock, July, 1903.

Succinea avara Say. Two obtained at Seal Island, June, 1896, and one very small one at Matinicus Rock, July, 1903.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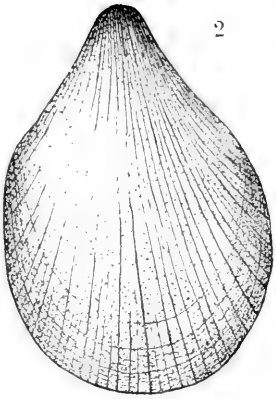
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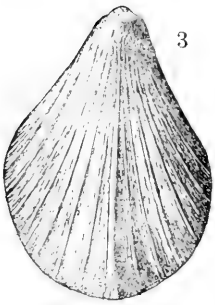
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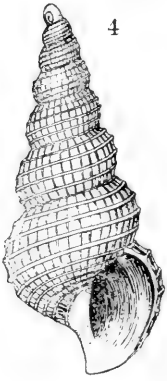
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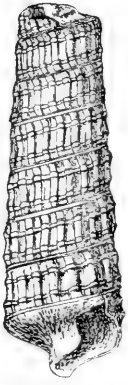
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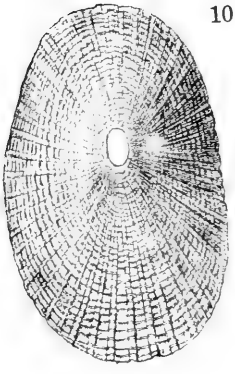
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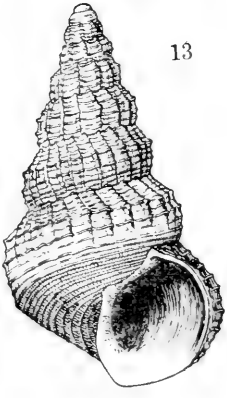
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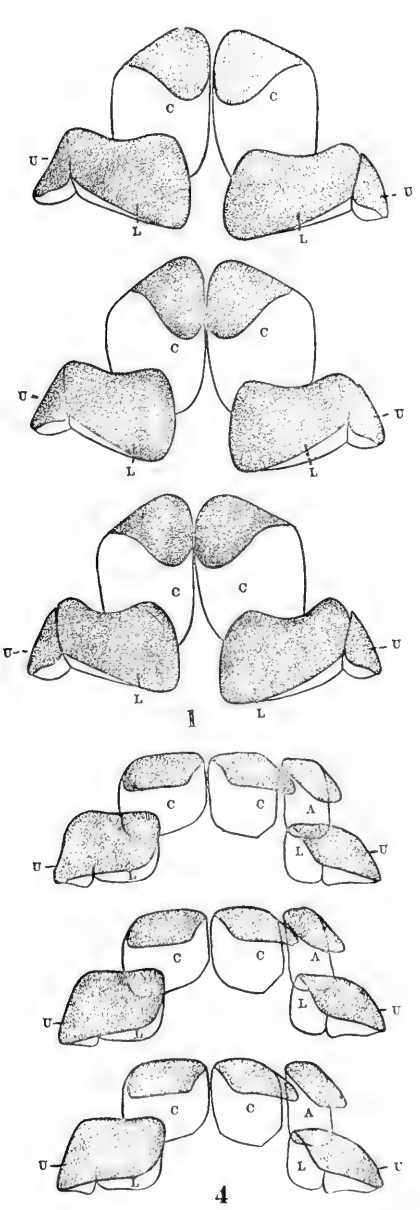
ALDRICH: NEW EOCENE FOSSILS.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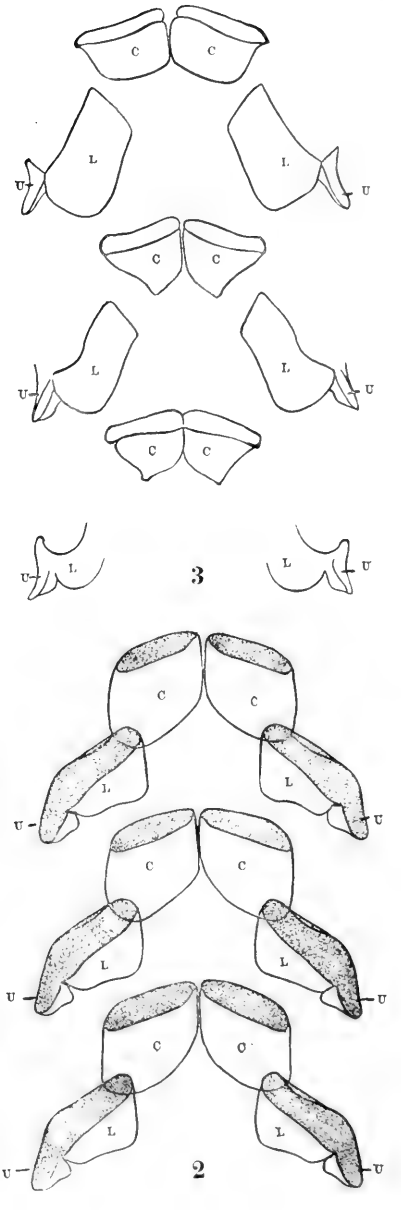
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A LIST OF LAND AND FRESH-WATER SHELLS OF YEMASSEE, SOUTH CAROLINA.

BY JOHN B. HENDERSON.

In the early part of March last I spent a week upon a plantation near Yemassee, Beaufort Co., South Carolina, the greater part of my time being spent in snail hunting. Beaufort is a low-lying county within the Atlantic coastal plain. Its features are of three distinct sorts: a sandy, dry-pine area, the "knolls" of live oak with rather dense deciduous vegetation, and the swamp lands. The swamps are extensive, often containing forests of cypress and rank growths of aquatic vegetation. In places these swamps are drained and converted into rice fields, the latter furnishing excellent stations for fresh-water mollusca. The pine lands harbor a scant molluscan fauna. The great majority of land shells are to be found only in and about the edges of the deciduous forests. In the depths of the swamps I found almost nothing, the fresh-water species seeming to prefer more open and smaller bodies of water—particularly the little ditches which drain the rice fields.

The prevailing *Polygyra* is *hopetonensis*, a typical costal plain species, as it ranges along the Atlantic border from Norfolk to St. Augustine. It obviously belongs to the *fallax-tridentata* series and I think is a descendant of the former, which, having migrated into the lowlands of the coast, has been modified by its new environment. The species has become well enough marked to separate it readily from the upland *fallax*. It admits, however, of several local races which may some day be christened with varietal names. The extreme forms are *hopetonensis obsoleta* Pils. of Newbern and Wilmington, N. Car., a large form entirely without teeth upon the outer lip, and a Yemassee race which is very small and with strongly developed denticles.

I was surprised to find *Euglandina truncata* an abundant species so far north. The Yemassee specimens are large, stout fellows of very brilliant pink, rather darker than typical Florida specimens.

The following is a complete list of my catch, though it cannot be faunally complete. The entire absence of *Amnicolids*, *Unionidæ*, *Viviparidæ* and of *Ancylus* is rather striking. I owe many thanks to Dr. Pilsbry for his critical identification of my shells:

Polygyra thyroides Say.

Polygyra hopetonensis Strebel.

Polygyra postelliana Bland.
Polygyra pustuloides Bland.
Euglandina truncata Gmel.
Circinaria concava Say.
Gastrodonta cerinoidea Anth.
Zonitoides arborea Say.
Zonitoides minuscula Binn.
Vitrea indentata Say.
Helicodiscus parallelus Say.
Euconulus chersinus Say.
Bifidaria contracta Say.
Bifidaria procera Gld.
Succinea campestris unicolor Tryon.
Succinea aurea Lea.
Planorbis parvus Say.
Planorbis tumidus Pfr.
Physa cubensis Pfr.
Physa heterostropha Say.
Lymnaea columella Say.
Sphaerium partumeium Say.
Pisidium sp.

SOME NEW EOCENE FOSSILS FROM ALABAMA.

BY T. H. ALDRICH.

The shells described below are all in the cabinet of the writer, and are believed to be new. They are mostly small species or else very rare, and represented by very few or single specimens.

TEREBRATULINA BRUNDIDGENSIS n. sp. Pl. I, figs. 1, 2, 3.

Shell medium, narrower than high, radial threads very strong in the young shell becoming finer in the older, and in the oldest forms appearing as very fine lines only. A central, raised rib doubled shows on the ventral valve, replaced with a depression between two ribs on dorsal valve; foramen oblong. Longest diameter 14 mm., width 11 mm. Smallest form figured is $9\frac{1}{2}$ mm. and 7 mm.

Locality: Eocene of Brundidge, Ala.

Remarks: This species occurs in a stratum of white limestone which was exposed in a large well close to the R. R. station. This well was dug for water for a supply for the engines, but when the

limestone stratum was dug into it failed as a water tank. Associated with the species is *Terebratula wilmingtonensis* L. & S., *Ostrea vomer* Morton and several other species which occur in the white limestone or Jackson horizons. The area surrounding the well is typical Nanafalia lignitic deposits. So far no other outcrop of this limestone has been observed in the vicinity, but careful search is yet to be made. This discovery was called to my attention by Dr. E. A. Smith, State Geologist of Alabama, who sent me a number of specimens. We subsequently visited the well together and went over the locality south of the town, failing to find an outcrop. Dr. Smith thinks his discovery is an "overlap" of the white limestone or Vicksburg, somewhat as in certain Georgia localities. All the different forms of *Terebratula wilmingtonensis* mentioned and figured by Prof. Dall in Vol. 3 of Wagner Free Inst. of Science, p. 1537, pl. 58, figures 14–20, are found here.

TURBONILLA (STRIOTURBONILLA) HARRISI n. sp. Pl. 1, fig. 8.

Shell as figured, small, with approximately parallel sides. Whorls eight, the two apical ones smooth; spire obtuse; whorls longitudinally striated with numerous impressed lines; base of shell smooth; aperture ovate, pillar lip bearing one fold. Length 3 mm.

Locality: Wood's Bluff, Ala.

Remarks: This species is doubtless the same one mentioned by Prof. G. D. Harris in Bulletins of American Paleontology, No. 11, p. 96, pl. 12, fig. 10, 1899, as *Turbonilla* sp.(?), but he evidently had an immature shell. Named in honor of Prof. Harris.

TURBONILLA (CINGULINA) ANITA n. sp. Pl. 1, fig. 12.

Shell medium, spire obtuse, whorls nine, the two apical ones smooth, balance with about six spiral impressed lines; lines of growth very fine and rather close set, aperture ovate. Pillar lip twisted and slightly prolonged at base. Length 6 mm, breadth of body whorl 2½ mm.

Locality: Wood's Bluff, Ala., and same horizon 6 miles east of Thomasville, Ala.

CERITHIOPSIS REGULAROIDES n. sp. Pl. 1, fig. 7.

Shell small, fragment from which this description is made with seven whorls; these have two raised spirals, which form nodules at the intersection with the longitudinal lines. The spirals are placed one above and the other below the centre of each whorl; longitudinals coarse and prominent; a smooth raised spiral encircles each

whorl below the suture. The base appears to be smooth, canal twisted. Length of fragment 7½ mm., breadth of basal whorl 2¼ mm.

Locality: Wood's Bluff horizon six miles east of Thomasville, Ala.

Remarks: This species has a general resemblance to *Cerithiopsis fluviatilis* Ald., but differs in the position of the raised spirals.

MATHILDA ELONGATOIDES n. sp. Pl. 1, fig. 6.

Shell small, exceedingly narrow and elongated, whorls about fourteen, well rounded, carrying three nearly equidistant strong spirals on the main part of each whorl and also a slight one just below the suture. The longitudinals between the spirals are numerous and close set, and rather fine. Body-whorl at base shows several spirals in addition to those above mentioned. Aperture nearly circular. Apical whorls reversed. Length 6 mm., breadth of body-whorl 1 mm.

Locality: Wood's Bluff, Ala.

MATHILDA SINGULARIS n. sp. Pl. 1, fig. 11.

Shell small, whorls profusely ornamented; number of whorls five, besides the embryonic apex; apical whorls twisted and pointed horizontally or at right angles to the axis of the shell. The main whorls are angulated by a very strong peripheral line with a smaller one above, and from one to two still finer ones between. Body-whorl shows several (about four) fine spirals below the central one, extreme base nearly flat. Aperture ovate; pillar lip reflected, and slightly prolonged into a canal.

Locality: Wood's Bluff, Ala.

MATHILDA LEONA Aldrich. Pl. 1, figs. 4, 5.

This species was described from the Wood's Bluff horizon. The present specimen is from the Matthew's Landing beds, one mile west of Oak Hill, Ala. The original description was drawn from a young shell, and in this example the embryonic whorls are twisted to the left and the spire projects horizontally. This specimen also shows a small umbilicus.

SCALA VETUSTA n. sp. Pl. 1, fig. 9.

Shell as figured, number of whorls unknown, but four showing in type; they are rapidly expanding and ornamented with about twenty raised ribs; suture defined with a strong carina which makes a raised and angulated boundary for the base; the ribs continue over this line, and disappear into a deep and wide umbilicus. The spiral lines do not show upon the base. The figure is natural size.

Locality: Midway stage on McConnico plantation, Wilcox Co., Alabama.

Remarks: This specimen is quite imperfect, but the species is so well marked that it deserves a name. It is probably the same form mentioned by Prof. Harris in Bulletin of Am. Pal., No. 4, p. 232.

SCALA DOLOSA n. sp. Pl. 1, fig. 13.

Shell rather small, cancellated; whorls eight, the first two smooth, balance with spiral lines which are coarse near the middle of each whorl, these lines give each whorl an angulated profile. The spirals are nodular in part at the intersections with the longitudinals. The figured specimen shows a varix; aperture nearly circular, outer lip expanded and rounded, interior smooth. Umbilicus open, and carrying a groove. Base of shell carrying numerous spirals, but no nodes, the lines of growth being very fine. Length 7 mm., breadth 4 mm.

Locality: Near Grave Yard Hill, Wilcox Co., Ala. Midway Stage.

FISSURELLA UNILINEATUS n. sp. Pl. 1, fig. 10.

Shell small, rather thin, depressed conic, cancellated. The radial lines are equal and regularly spaced, while the longitudinals are bowed between the radials, giving to the surface a wavy appearance, no nodules at the intersections, the lines crossing regularly. Hole oval, with a complete oval callus inside. Longest diam. 13 mm., breadth about 7 mm., height 3 mm.

Locality: Wood's Bluff, Ala.

NOTES.

ASHMUNELLA. On page 134 of the last number, the second line from bottom should read ASHMUNELLA RHYSSA HYPORHYSSA Ckll., in place of "*Ashmunella rhyssa* (Ckll.)." Owing to my absence in Florida I had no opportunity to see the proofs of this article.

H. A. P.

THE ORIGIN OF THE LUNG IN AMPULLARIA.

BY W. K. BROOKS.[1]

Through the courtesy of Dr. Alfred G. Mayer I was able to visit and partially explore the Everglades of Florida in March, 1906. As we pushed our way through the tall reeds and grasses that cover the

[1] From the Report of the Department of Marine Biology, Tortugas, Florida. Extracted from the Fifth Year-Book of the Carnegie Institution of Washington, p. 109, 1907,

shallow water of the Everglades, we found great numbers of small eggs attached to the stems of the reeds and grasses above the surface of the water but close to it.

The eggs were arranged in vertical rows, and were enclosed in calcareous shells, resembling in these respects the eggs of terrestrial pulmonate gasteropods.

We also found in the water in great abundance the prosobranchiate gasteropod *Ampullaria*, and when some of the older eggs were opened they were found to contain young specimens of this genus.

The *Paludinidæ*, which are closly related to the *Ampullaridæ*, are aquatic, viviparous, and breathe by gills, and their structure indicates that they are true prosobranchs, descended from and closely related to the marine prosobranchs. *Ampullaria* has gills, is partly aquatic, and seems to be a true prosobranch, so far as its general structure is in question, but as it has a lung, and is able to breathe air and live out of the water, and as it also lays, in the air, eggs in calcareous shells, like those of the terrestrial pulmonates, the question whether it is primarily a pulmonate, with secondary resemblance to the prosobranchs or primarily a prosobranch with secondary resemblance to the pulmonates, suggests itself.

As the embryonic history of the breathing organs may be expected to throw light upon this question, a quantity of the eggs were collected and taken to the Marine Laboratory in the Dry Tortugas. There the eggs were opened, the embryos removed and sketched, and then hardened and preserved for embryological examination.

On my return to Baltimore I placed the material in the hands of Mr. B. McGlone, who has studied the development of the respiratory organs under my supervision, and has nearly completed his work, which will soon be ready for publication. He has shown that the lung of *Ampullaria* is a member of the series of gill-filaments, and that it must be regarded as a modified gill, homologous with a ctenidium, or with more than one. It is therefore an organ which has been secondarily acquired, and not derived from the lung of the terrestrial pulmonates.

Both lung and gills arise very early in the embryonic history of *Ampullaria*, and at about the same time. In a very young embryo, soon after the mantle makes its appearance, a ridge or thickening of the epithelium of the inner surface of the mantle indicates the region from which the gill-filaments, the lung and the osphradium are to arise. The osphradium is developed from one end of this ridge, the gill-filaments from the other, and between the two the ridge becomes infolded into the substance of the mantle to give rise to the lung, which may be regarded as a modified and invaginated gill-filament.

The similarity between the lung of the pulmonates and that of *Ampullaria* is therefore nothing more than a new illustration of a resemblance between organs that have been acquired independently under like physiological conditions.

THE NAUTILUS.

VOL. XXI. JUNE, 1907. No. 2.

A NEW POLYGYRA FROM NORTH CAROLINA (P. SOELNERI).

BY JOHN B. HENDERSON.

On a collecting trip to the coastal plain region of North Carolina last autumn, with Mr. Soelner, of Washington, the following undescribed *Polygyra* was found:

POLYGYRA SOELNERI n. sp. Plate III, figs. 1, 2.

Shell globosely depressed; spire low conoid, periphery rounded; perforate, the opening half covered by columellar lip. Surface very glossy, closely, deeply and evenly ribbed throughout except on first $1\frac{1}{2}$ whorls which are smooth. Whorls $5\frac{1}{2}$, regularly increasing, the last falling abruptly and shortly in front, having a pale spot at the deflection. Narrowly and deeply contracted behind the lip. Aperture oblique and irregularly crescentic. Lip reflexed with a flange-like internal thickening which is widest basally and terminates short of the columellar end of the lip. A rather long curved white parietal tooth stands upon a hardly perceptible parietal film. Color mahogany, with a glossy satin-like sheen; lip purplish outwardly, the inner flange buff. Alt. 7, greater diam. 11, lesser diam. $9\frac{1}{2}$ mm.

Habitat among cypress logs in a swampy region on the north shore of Lake Waccamaw, North Carolina.

This remarkably pretty little *Polygyra*, which is very distinct from any other known species, might be included in the section *Mesodon*, its nearest ally being *P. christyi*, from which, however, it differs in being larger, less depressed and umbilicated. I take pleasure in naming the species after Mr. Soelner, my enthusiastic companion in the field when it was first found.

NOTES ON GUNDLACHIA. I.

BY BRYANT WALKER.

The validity of the genus *Gundlachia* Pfr. is one of the disputed points in systematic conchology.

The article by Hedley, reprinted with notes by Dr. Pilsbry in the NAUTILUS in 1895 (Vol. IX, p. 61), gives a very complete summary of the data down to that date. The only omission in regard to the North American forms that I have found, being the citation of *G. ancyliformis* Pfr. from Palma Sola, Manatee Co., Fla., by Simpson in 1888 (Con. Ex., II, p. 96).

So far as I have been able to ascertain, no additional data in regard to our species have been published.

In the NAUTILUS for January, 1904, Dr. Dall called attention to a very interesting account by Nordinskiold of a septa-forming *Ancylus* from South America and expressed the opinion that the so-called *Gundlachiæ* are merely *Ancyli*, which under favorable conditions are able to protect themselves from drought and cold by forming an epiphragm and subsequently "to secrete an enlarged and somewhat discrepant shell."

The occurrence with typical *Gundlachia* of non-septate individuals indistinguishable in shell characteristics from *Ancylus* has been noted by several writers. Hedley, who believes the genus a valid one by reason of anatomical differences, apparently inclines to the view that "in unfavorable circumstances a septum is never formed." While Dr. Pilsbry (NAUT., IV, p. 48), speaking of this apparent coexistence of two forms, remarks, that if correct, "*Gundlachia* will furnish the most extraordinary case of dimorphism known among our American mollusks."

During the last few years I have had occasion to examine critically large numbers of our Eastern American *Ancyli*, and until within the last year, with the exception of a small series collected by Ferriss near Joliet (to be discussed later), I have discovered no tendency whatever to septa-forming in any instance.

Recently, however, material from Ohio, Indiana, Alabama and Mississippi has been received, which is of considerable interest as bearing on the question, and the evidence thus afforded is herewith submitted for consideration.

The examination of this material leads necessarily to a study of the described forms of North American *Gundlachia*, and the results of this work may properly precede the consideration of the new material referred to.

I.

Gundlachia stimpsoniana Smith. Plate IV.

This species was described in 1870 (Ann. N. Y. Lyc. N. H., IX, p. 399, fig. 6) from specimens collected in ponds at Greensport, Long Island, N. Y., and on Shelter Island. Only the "primary" stage was figured. It has not been found elsewhere, so far as I know.

Through the kindness of Mr. J. B. Henderson, Jr., I have been able to examine the original lot of this species from the Smith collection. It consists of 71 specimens from Greensport and 1 from Shelter Island.

The Shelter Island example is a young shell that has completed the septum and is similar to the one figured (figs. 10–12). The Greensport set may be divided into four groups:

1. 60 examples of the primary stage, with the septum in all stages of development, from the first beginnings at the posterior margin to the completed septum. With one exception, these specimens, although varying somewhat in size and shape, are similar in all other respects. The matured, or rather, perfected examples, vary from $1\frac{1}{2}$ to 2 mm. in length, $\frac{3}{4}$ to 1 in width and from $\frac{1}{2}$ to $\frac{3}{4}$ in height. The shape is an elongated oval, the ends bluntly rounded, the anterior extremity being usually somewhat more expanded. The sides are nearly parallel, usually somewhat constricted in the centre, and rather more so on the right than on the left, but in the smaller specimens are occasionally slightly convex. The apex is blunt, slightly projecting and inclined to the right. It is radiately striate as in *Ferrissia*. The anterior surface is distinctly ribbed with fine radiating ribs, which, however, do not extend to the apex. The septum for the posterior half or two-thirds is either flat or, more usually, slightly convex. From about the centre of the shell it is flattened and descends slightly to the aperture. This depression is, no doubt, caused by the body of the animal in moving in and out of the constantly decreasing aperture. The lines of growth are curved and delicate, but quite distinct. On completion of its growth the edge of the septum is abruptly turned upwards to the level of the edge of the shell, and the whole margin of the aperture thus formed is slightly

thickened and becomes continuous as shown in figure 11. The exceptional specimen noted above is noticeably larger, but proportionately more depressed than the other, measuring $2\frac{1}{2} \times 1\frac{1}{4} \times \frac{1}{2}$ mm. But in sculpture it is precisely the same, and I have no doubt that it belongs to the same species. In this, the septum is but partially developed. A very similar specimen in size and appearance, but without any appearance of a septum, is noted under group 2. Nearly all of these specimens are "amber-colored," as stated by Smith, but this is caused by a slight ferri-oxide deposit on the surface, which disappears on the application of oxalic acid, and leaves the whole shell of a clear, transparent, corneous color.

2. Five examples of the primitive stage with no trace of septum. Evidently that growth had not yet begun. Four of them are of the usual size and shape of the "primary" shell. The fifth is somewhat larger and, barring the lack of septum, almost a duplicate of the aberrant individual noted in group 1.

3. Three examples in which the secondary growth had been made without forming a septum. In all of them the primary stage is sharply defined by the difference of color, and in color and shape agrees substantially with the usual appearance at that period. In one of them (figs. 3, 6, 9) the posterior slope is not continuous externally, there being a well-marked "break" between the two stages of growth, and internally the secondary growth flares out at a decided angle all around the posterior margin of the primary shell.

In the other two examples, the primary shell is rather more contracted laterally than usual, but the secondary growth is, on all sides, in a substantially direct continuation of the primary shell. It becomes more or less irregular, however, as it progresses and the general effect of the entire shell is that of abnormal growth. None of these shells, however, are referable to any of the described species of *Ancylus*. Smith states that the Greensport *Gundlachia* were associated with *Ancylus fuscus* and with "more elevated specimens, probably belonging to another species." If his identification of *A. fuscus* was correct, the difference in the apical sculpture, to say nothing of the general contour of the shell, forbid the union of the two forms. What his other species were, must remain uncertain until his specimens can be examined. Possibly they were non-septate examples of "*stimpsoniana*," in which the line of demarcation between the primary and secondary growths was not so distinctly indicated as in these specimens, which he included with his *Gundlachiæ*.

4. Three examples having both a septum and a more or less complete secondary growth. Smith states that of about one hundred examples collected in the course of three years, only two were fully mature. Of the specimens now in the collection, only one is apparently mature, and that is much smaller than the dimensions given by Smith for the fully mature shell, *i. e.*, $5\frac{1}{4} \times 3\frac{1}{4} \times 1\frac{1}{2}$ mm. As shown by the figures (figs. 2, 5 and 8), it is somewhat defective along the left margin. Allowing for the broken edge it measures $3\frac{3}{4} \times 2\frac{1}{2} \times 1$ mm. In shape, however, it agrees substantially with Smith's description, and in the absence of a better, may be considered as typical.

The second specimen, if ever mature, has had the secondary growth broken back on all sides nearly to the primary shell, so that it is quite impossible to say what the original size or shape was.

The third example is apparently the one referred to by Smith (p. 400) as having begun the secondary growth with a septum covering "less than a quarter of the aperture." As shown by the figures (figs. 1, 4 and 7), it has been broken along the posterior margin, but enough remains to give a good idea of its original appearance. It measures $2.75 \times 2 \times \frac{3}{4}$ mm. If this is the specimen mentioned by Smith, and is "about two thirds" grown, the shell represented by figs. 2, 5 and 8 is not far from being fully matured. The shape of this specimen is quite different from that of the "typical" shell, owing probably to the difference in the size of the septum. The resemblance in outline between it and the non-septate specimen figured is quite strong, as shown by figures 4 and 6.

This species is apparently quite distinct from both *G. meekiana* and *G. californica*, being characterized by its larger and more widely-expanded secondary growth. More material showing the mature form is very desirable, and it is to be hoped that collectors resident on Long Island will make its rediscovery a matter of special consideration.

MOLLUSCAN FAUNA OF MONTEREY BAY, CALIFORNIA.

BY S. S. BERRY.

During the summer of 1906, the writer attended a six weeks' session of the Marine Biological Laboratory of Stanford University, at Pacific Grove, California. While there considerable attention was

given to molluscan life in particular and an extremely interesting collection was made of the different forms. 394 species were obtained, a practically complete list of which follows. In addition to the mollusks, four species of brachiopods were collected.

The major part of the collecting was done along the shore about Pacific Grove, especially at what is locally known as the "Third Beach," and an interesting expanse of rocks called the "Big Tide Pool." In addition to this, a number of dredging excursions were undertaken with the aid of a gasoline launch, which resulted very successfully. Most of the dredging was done in quite shallow water, although one trip was made to a point off Moss Landing near the middle of the bay. On this occasion we twice pulled up the dredge filled to the brim with living echinoderms of the genus *Echinarachnius*, the common "sand-dollar," some two bushels in all. All of the mollusca collected on such occasions were given over to the writer, and his sincere thanks are due to Professor George Clinton Price, in charge of the laboratory, to Mr. Frank A. Woodworth, of Pacific Grove, and to many of his fellow-students for much valuable aid in the way of numerous specimens, pertinent suggestions and help of every description in the preparation of this paper.

The writer is also greatly indebted to Dr. William H. Dall and Mr. Paul Bartch, of the United States National Museum, who kindly determined all doubtful material and who have now in hand the description of the many new or undescribed species found. The new species are marked with an asterisk.

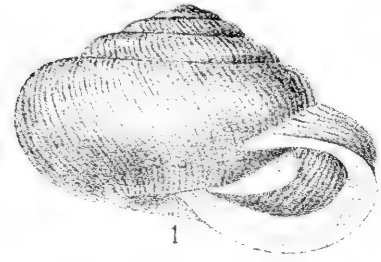
BRACHIOPODA.

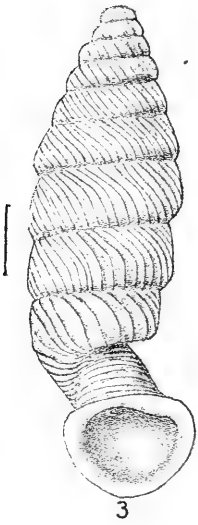
Glottidia albida Hinds. Several living specimens were obtained at from twelve to forty fathoms' depth.

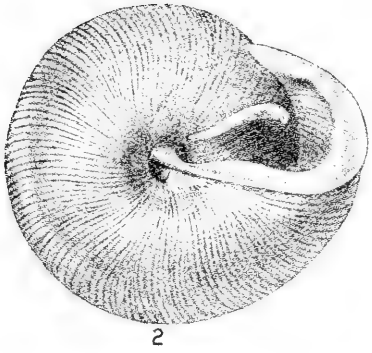
Terebratulina caput-serpentis Linné. A few very young specimens, presumably of this species, were dredged. Adult specimens are occasionally brought in from deeper water by the fishermen, usually attached to coral. They are of the form which used to be known as var. *unguicula* Carpenter.

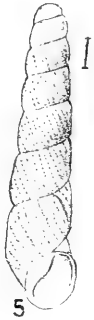
Terebratulina transversa Dall. A few poor specimens were dredged at various depths, adhering to fragments of hard blue clay, shells, etc.

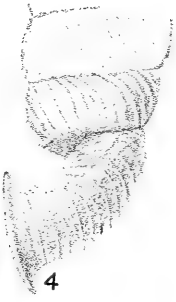
Laqueus californicus Koch. We obtained no good specimens of this handsome brachiopod, but I saw numbers of fine ones which had been brought in by the fishermen.

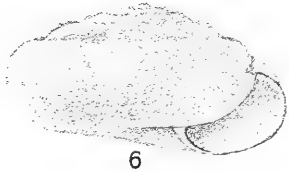


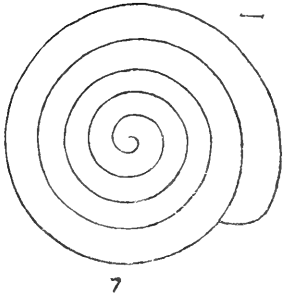


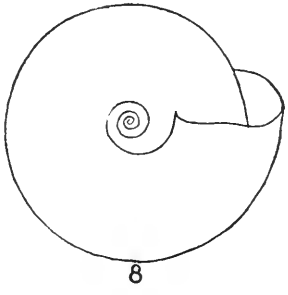












HENDERSON: POLYGYRA SOELNERI.
PILSBRY: MEXICAN LAND SHELLS.

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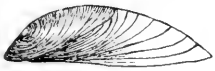

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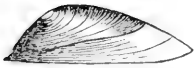

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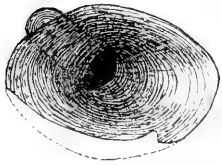

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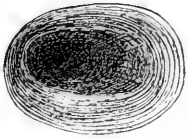

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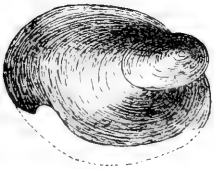

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11

12

MOLLUSCA.

Nucula belloti A. Adams. One live specimen from about 40 fathoms.

Leda taphria Dall. Many empty valves and a few small live specimens were obtained almost everywhere that we dredged in the bay. 12 to 40 fathoms.

Leda hamata Carpenter. Occasionally found with the preceding.

Barbatia gradata Sowerby. Living; 12 fathoms.

Glycimeris intermedia Broderip. No living specimens were obtained, but fresh valves were dredged in twelve fathoms of water.

Philobrya setosa Carpenter. 12 fathoms. Found attached by its byssus to bunches of coralline, which it closely resembles in color and is exceedingly difficult to distinguish. Not rare, and many were doubtless thrown away before we discovered the habitat of this tiny but none the less interesting mollusk.

Mytilus californianus Conrad. This animal covers the rocks just above the low-water mark and may be gathered by the tubful, if one is willing to risk the almost certain wetting he will get, if he clambers too far out on the exposed headlands, which are the mussel's favorite haunts.

Septifer bifurcatus Reeve. Not rare between tides.

Modiolus fornicatus Carpenter. 12 to 40 fathoms.

Modiolus rectus Conr. 20 fathoms.

Modiolus rectus var. *flabellatus* Gould. One enormous specimen of this variety was obtained which had been brought in by the fishermen. It far exceeds in size any other Mytilid in my cabinet.

Adula falcata Gould. Living in the hard blue clay with other borers. 12 fathoms.

Lithophagus plumula Hanley. With the above; not uncommon.

Crenella divaricata Orbigny. 25 fathoms.

Pecten hastatus Sowerby. 12–40 fathoms. No very large or brightly-colored specimens were obtained.

Pecten hericeus Gould. One fine valve came up in the dredge from the blue clay region off Del Monte. 12 fathoms.

Pecten diegensis Dall. Young specimens were dredged with *P. hericeus* and *P. hastatus*. The fishermen sometimes bring in beautiful adult specimens from the coral banks.

Pecten (*Hinnites*) *giganteus* Gray. A few were found at low-tide attached to the under surfaces of rocks. At the great Tide Pool,

where a good "minus" tide lays bare several acres of rocks and weeds, and which teems with all sorts of marine life, this species seems fairly common.

Lima dehiscens Conrad. Living; 12 fathoms.

Monia macroschisma Deshayes. Living; from shore line to 12 fathoms.

Cardita subquadrata Carpenter. Living; shore line to 12 fathoms.

Milneria minima Dall. 12 fathoms; not common, as we found it.

Kellia laperousii Deshayes. Found living on shore and also dredged at 12 fathoms.

With it occurs the following:

Kellia suborbicularis Montagu.

Rochfortia tumida Carpenter. Shore line to 40 fathoms.

Diplodonta orbella Gould. Valves were found on the beach and the species was dredged at 25 fathoms.

Phacoides californicus Conrad. Low-tide to 40 fathoms. Fairly common.

Phacoides approximatus Dall. 40 fathoms.

Phacoides annulatus Reeve. One valve was dredged at a depth of about 25 fathoms.

Chama pellucida Sowerby. Low-tide to 12 fathoms.

Cardium quadrigenarium Conrad. 12 fathoms; only a few very young valves found.

**Cardium fucanum* Dall. One live specimen and several valves dredged at 20 fathoms. It is notable that *C. corbis* Mart. was not obtained. See description in NAUTILUS, XX, p. 111.

Protocardia centifilosa Carpenter. Living; 12 to 30 fathoms.

Pisidium occidentale Newcomb. Found in numbers in an old watering-trough at Pacific Grove.

Transennella tantilla Gould. Living; between tides.

Tivela stultorum Mawe. Between tides.

Tivela (?) *marginata* Cpr. One valve, found between tides, was thus identified at the National Museum.

Saxidomus nuttalli Conrad. 40 fathoms.

Marcia subdiaphana Carpenter. 25 fathoms; valves only.

Paphia staminea Conr.

Paphia staminea var. *petiti* Deshayes.

Paphia staminea var. *orbella* Carpenter. All found nestling among the rocks between tides.

Paphia tenerrima Carpenter. 12 fathoms; immature valves only.

Venerupis lamellifera Conrad. Some very pretty specimens of this species were found from the shore line down to 12 fathoms.

Psephidea ovalis Dall. 12 fathoms.

Petricola carditoides Conrad. 12 fathoms; in the blue clay.

Petricola californica Conrad. 25 fathoms; valves only.

Psammobia californica Conrad. Low-tide to 12 fathoms; not common.

Tellina salmonea Carpenter. 40 fathoms; rare.

Macoma yoldiformis Carpenter. 40 fathoms; off Moss Landing. One specimen.

Semele rubropicta Dall. 25 fathoms; valves only.

Semele pulchra Sowerby. 12 fathoms; valves only.

Cumingia californica Conrad. Not uncommon at low-tide.

Cooperella scintilliformis Carpenter. 40 fathoms; one live but immature specimen.

Sphenia californica Conrad. Low-tide to 15 fathoms; not rare.

Corbula luteola Cpr. 15 fathoms.

Saxicava arctica Linné. Low-tide to 12 fathoms.

Saxicava pholadis Linné. Low-tide to 12 fathoms. Several very large specimens were found in the abandoned holes of borers.

Siliqua lucida Conrad. Living; 15 fathoms; rare.

Solen sicarius Gould. Living; 40 fathoms.

Spisula planulata Conrad. Very common at about 12 fathoms' depth.

Spisula catilliformis Conr. One valve only; 40 fathoms; off Moss Landing.

Lyonsia nitida Conrad. 12 fathoms; rare.

Lyonsia spongiophila Dall. Low-tide to 12 fathoms; quite rare.

Mytilimeria nuttalli Conrad. Found at low-tide curiously embedded in sponges or colonies of ascidians. The live animals would be passed over and found rarely, except by accident, were it not for the distortion in the masses of their hosts caused by their presence, or for the oddly-shaped openings which permit the sea water to reach them.

Entodesma saxicola Baird. Among the rocks at low-tide.

Parapholas californicus Conrad. 12 fathoms. At this depth the dredge often brought up large fragments of a hard, blue clay which, upon examination, was found to be filled with dead and living specimens of this and other boring mollusks, such as *Petricola*, *Adula*,

Pholadidea, etc. Other crevices of this same blue clay yielded *Ocinebra* and many of the finest *Chitons* obtained.

Pholadidea penita Conrad. Found with the above.

Pholadidea sagitta Stearns. Found with the above and at a depth of 40 fathoms off Moss Landing.

Pholadidea parva Tryon. In *Haliotis* shells.

Pholadidea (*Netastomella*) *darwinii* Sowerby. 12 fathoms; in the blue clay.

Dentalium neohexagonum Pilsbry. 12 fathoms.

Dentalium rectius Carpenter (?). 12 fathoms. One beautiful specimen over an inch long is probably referable to this species.

Cadulus nitentior Carpenter. 12 fathoms; not uncommon.

Tornatina harpa Dall. 12 to 40 fathoms.

(*To be concluded.*)

A NEW CERITHIUM FROM THE FLORIDA KEYS.

BY WILLIAM HEALY DALL.

CERITHIUM STANTONI n. sp.

Shell solid, acute, conic, the nine whorls rapidly enlarging; sculpture of 7–9 strong, rounded, axial ribs extending from the suture to the periphery, crossed by small, sharply elevated, subequal, sometimes alternate, close set spiral threads which cover the whole shell; these threads behind the periphery are white, the striæ between them tend to be blackish-brown except on the most prominent part of the ribs where they are yellowish cream color; from the periphery to the canal the threads as well as the interspaces are brown, and on the canal become lighter again, but are probably more or less variable as in other species of the genus; last whorl with a single varix opposite the outer lip; aperture semi-lunar, on the body callous, with a strong subsutural ridge setting off a posterior sulcus; the pillar callous, twisted, very short, smooth; the outer lip thickened, reflected, internally sharply lirate; interior white. Lon. of shell 35, of last whorl 16, of aperture 12, max. diam. of shell 17, of aperture 6 mm.

Shoals near St. George Cay, Belize, Rev. W. A. Stanton (150294); Florida Keys (110469).

A hermit crab fragment retaining its coloration, sent by Father Stanton, was long believed to be due to foreign ballast, as nothing of the sort was known from the West Indies. The recent acquisition of a bleached but entire specimen from the Florida Keys has confirmed its American habitat.

The species is nearest the *C. guiniacum* Philippi (1849) from the Gaboon, West Africa, but is more conical, and wider in the last whorl, and rather larger. The sharp regular striation and few large rounded ribs are its most striking characteristics.

AMONG THE CEPHALOPODS.

BY R. E. C. STEARNS.

According to the papers, the big steamship *Northwestern* that went ashore last March on La Touche Island, southeastern Alaska, has been floated and is now at Valdez.

Divers making the survey of the bottom of the sea where the steamer rested, were driven away repeatedly by "great cuttlefish, which swarmed in the vicinity of the wreck." It was feared that these "sea monsters" would prevent the saving of the vessel, but the divers proved game, made the necessary survey, drilled the holes for the dynamite, and laid the charge which blew to atoms the rock that had trapped the steamer, without damaging the vessel.

May 3, 1907.

PUBLICATIONS RECEIVED.

THE MOLLUSCA OF COLORADO (University of Colorado Studies, vol. iv, no. 2, 3, Feb. and Apr., 1907). By Junius Henderson. This useful addition to the series of state hand-books of mollusks gives an epitome of earlier work by Ingersoll, Cockerell and others, with substantial additions to the list of species (some 25 being here first reported from Colorado), and to the locality records. A key to species and a bibliography are given. Most of the species are illustrated, the *Unionidæ* by excellent original figures, the snails by cuts

borrowed from Binney's works. "The study of the influence of altitude upon mollusks in this region has given chiefly negative results. Instead of dwarfing the species, as in Montana and other regions where the cold of high altitudes is more intense, the higher altitudes seem more favorable to land snails than lower levels, because of the increased humidity. The finest specimens of *Oreohelix strigosa* and *Vitrina alaskana* found have been at 11,000 and 9,300 feet respectively." "Among bivalves we have found *Pisidia* at 11,000 feet, *Calyculina* at 8,500 feet."

Regarding some of the older records the author remarks upon "doubts as to the accuracy of identification in many instances in the early reports." Such difficulties are always encountered, and their removal costs much time and labor. The identification of "*Zonitoides conspectus*," *Succinea salleana*, *nuttalliana*, *rusticana*, *Ancylus fragilis* and *caurinus* and *Physa heterostropha* should especially be looked into. The paper will form an excellent basis for further work in Colorado, and will be useful for work anywhere in the Rockies.

THE RESULTS OF DEEP-SEA INVESTIGATION IN THE TASMAN SEA. MOLLUSCA FROM EIGHTY FATHOMS OFF NARRABEEN. By C. HEDLEY (Records of the Australian Museum, vi, pp. 283–304, pls. 54–56). This paper contains descriptions of 18 new species, including a new genus, *Coriareus* related to *Lasæa*. The species are all beautifully illustrated.

NOTES.

ERRATA.—The differences between the two New England species of *Acmaea*. The NAUTILUS, May, 1907. About half way down the 3d page: " . . . radula of an adult shell of *alveus* are perhaps the squarest of all, fig. 4." This should be "fig. 3." Also several lines farther down " . . . nearly at right angles to the next tooth and the cusp of (U) faces the center of the lingual membrane (L)." The (L) should be after the word "tooth."

HENRY JACKSON, JR.

THE NAUTILUS.

VOL. XXI. JULY, 1907. No. 3.

DESCRIPTION OF A NEW MEXICAN PACHYCHEILUS.

BY ANSON A. HINKLEY.

PACHYCHEILUS VALLESENSIS n. sp. Pl. 5, figs. 1–10.

Shell conic, solid, smooth; suture impressed; aperture widely ovate, circular at the base, obtusely angular above, purple within; whorls 7, convex; on young and also well preserved specimens the apical ones are slightly carinate or striate; spire about half the length of the shell.

Operculum corneous, spiral, nucleus subcentral; when viewed from above has a little resemblance to a small *Planorbis*.

Length 32, diam. 16 mm.

Length 33, diam. 19 mm.

Habitat. Valles river, Valles, State of San Luis Potosi, Mexico.

"This species resembles short forms of *P. lævissimus*, from which it differs by the absence of fine spiral lines, the more heavily calloused columellar lip, and the darker interior. No other *Pachycheilus* has been found so far north." [1]

The species is named from the river in which it is the most plentiful mollusk. Figure 1 may be considered the type, though its size is above the average. There is often a flattening of the body whorl and occasionally a constriction or shallow groove, as on some of the *Pleurocera*. Mature specimens usually show 6 whorls; when the spire is well preserved, as in fig. 8 and fig. 9, there are 8. In young specimens the aperture is angular below, see fig. 5. In mature

[1] Note from Dr. H. A. Pilsbry. The plate illustrating this species will appear in the next number.

specimens the callous deposit on the columella is heavy, and where it meets the labium above, it is very thick. This is well shown in figs. 3 and 8; within the aperture the outer lip is bordered by a lighter-colored or white zone.

All mature specimens and many of the immature ones are more or less covered with a deposit of calcareous matter, which is often so thick as to mislead as to the form of the shell, see figs. 4 and 9.

Individuals are very numerous in some places, and scattering ones can be found almost anywhere in the river. The very young were found where there was little or no current, on sand or mud bottom, or on roots and plants at the water's edge; older ones were common on rocks or the river bed where the current was strong.

At two places the alluvial soil, though above any indication of high-water, contained large numbers of this species, reminding the writer of the remains of *Tulotoma magnifica* at places along the Coosa river in Alabama.

Figures 8 and 9 are from the stream of a spring, and are more perfect in the spire than those from the river, fig. 8 has the deposit all removed, and fig. 9 has enough removed to show the spire. Fig. 10 is not mature; it will be seen that the heavy columellar callus is not yet formed. Fig. 2 is an extra large one; it and figs. 3 and 7 are more than usually inflated. Much smaller ones were found than the one shown in fig. 5.

DESCRIPTIONS OF NEW MEXICAN LAND SHELLS.

BY HENRY A. PILSBRY.

A full account of the mollusks collected by Mr. A. A. Hinkley in the vicinity of Tampico and in the State of San Luis Potosi will later be submitted by him; meantime some of the new forms are described below.

Polygyra (?) *martensiana* n. sp. Pl. V, figs. 11, 12.

The shell is rather thin, depressed, about the shape of *P. texasiana*, umbilicate, the umbilicus rapidly contracting within; surface glossy, pale brownish-corneous with a faint brown band above the periphery, weakly marked with unequal growth-lines. Upper surface nearly flat, the spire being very low conic; periphery above the middle, the base convex. Whorls $4\frac{1}{2}$ to $5\frac{1}{4}$, convex, slowly increasing, the first

smooth, the last whorl very indistinctly subangular in front of the aperture, elsewhere rounded peripherally, slightly descending in front. The aperture is very oblique, wider than high, about one-fourth of its circumference is excised by the preceding whorl; peristome evenly, rather narrowly reflexed throughout, slightly dilated at the axial termination; parietal callus thin and transparent.

Alt. 6, diam. 11, width of umbilicus 2 mm.

Alt. 8.8, diam. 4.8 mm.

Tampico, Mexico, type loc.; also Valles, farther inland, in the State of San Luis Potosi.

This species is remarkable for the complete absence of teeth in the aperture, in other respects having a general resemblance to Polygyras of the *texasiana* group. Its generic position can be decided only by examination of the soft anatomy. It may possibly be a *Praticolella*. Six examples were taken at Tampico, one at Valles. Named for the late Professor E. von Martens.

Holospira hinkleyi n. sp. Pl. III, figs. 3, 4.

The shell is fusiform, widest above the middle, at the seventh whorl, above which it tapers rapidly and below slowly; whitish. Whorls nearly 10, the first smooth, projecting, flattened above, with a central dimple, the second whorl narrower, very convex, smooth; following whorls sculptured with very oblique well raised threads, rather sparse on the early whorls, then more numerous, but separated by spaces wider than the threads. The whorls of the cone are somewhat flattened, except near the lower suture where they are abruptly curved, and the threads are a little enlarged. On the penult and last whorls the threads become strongly arcuate; the whorls are convex, with very deep sutures. The latter part of the last whorl becomes free and descends deeply. It is somewhat flattened on the upper and outer faces, elsewhere rounded. The aperture is transversely ovate, brown within, with a continuous, very broadly expanded, flattened, thin peristome. Internally there are four laminæ: a strong parietal which arises in the latter part of the penult and continues to where the last whorl becomes free; a shorter columellar, in the median part of the last whorl; a high basal lamina in the first half of the last whorl, and a thin but well-developed palatal lamina, below the middle of the outer wall, in the first half of the last whorl.

Length 9.8, diam. 2.9 mm.

El Abra, State of San Luis Potosi, Mexico, collected by A. A. Hinkley.

This species is well characterized by the freely descending last whorl, the "neck" being much longer than in any other member of the typical subgenus of *Holospira*. The four internal laminæ are well developed, and situated somewhat lower than in *H. goldfussi*. Eight specimens were taken, part of them immature.

ZONITOIDES PENTAGYRA n. sp. Pl. III, figs. 6, 7, 8.

The shell is slightly larger than *Z. minuscula*, umbilicate, the width of the umbilicus contained between 4 and 4½ times in that of the shell; thin, whitish in the dead specimens seen, similar in color to *Z. minuscula*. Surface glossy, marked with very weak growth-lines, and with very faint fine spiral striæ on the base, more distinct in immature shells.

Spire quite convex. *Whorls 5, narrow and very slowly increasing*, convex, the last well rounded peripherally. Aperture somewhat oblique, quite *small, and narrowly lunate*. Peristome simple as usual.

Alt. 1.4, diam. 2.7 mm.

Tampico, in river drift, with *Z. minuscula* and *Z. singleyana* and various *Pupillidæ*, etc. Type no. 93796 A. N. S. P., from Mr. Hinkley's collection.

This species is readily distinguished from the two associated forms of *Zonitoides* by the closely coiled whorls and the small, narrowly lunate aperture. It has some resemblance to *Pycnogyra berendti*, of the region of Vera Cruz. It is comparatively rare in the river debris, while *Z. minuscula* and *singleyana* occur in copious quantity.

SPIRAXIS TAMPICOENSIS Pilsbry. Pl. III, fig. 5.

Drift debris at Tampico. This very slender shell has been described in the current number of the *Manual of Conchology*, p. 24.

CECILIOIDES (CÆCILIANOPSIS) JOD n. sp.

The shell is imperforate, very minute, oblong, slowly tapering to an obtuse summit, whitish (probably clear corneous when living), smooth and glossy. Whorls 4½, slightly convex. Aperture less than half the total length, piriform, shaped like that of *Euglandina*, the outer lip arcuate, thin, columella very concave, covered with a thin callous film, distinctly truncate at the base. Length 2.1, diam. 1 mm.

Tampico, in river debris, abundant.

This tiny snail seems to be at least subgenerically distinct from *Cæcilianella* (*Cecilioides*) by the very obtuse summit and short wide spire. It is closely related to *A. consobrina* Orb.

IN RE CYTHEREA PETECHIALIS OF CARPENTER'S MAZATLAN CATALOGUE.

BY ROBERT E. C. STEARNS.

In Dr. Dall's "Synopsis of the Family Veneridæ,"[1] etc., he remarks "*Cytherea petechialis* Lamarck, 1818, is listed by Carpenter from Mazatlan having been found among the Reigen shells, but it is certainly exotic, none having appeared from there for half a century."

It is not unlikely that the shell collected by Reigen was an example of the exceedingly rare and handsome variety of *Macrocallista* (*Chionella*) *squalida*, the color markings of which are suggestive of the Asiatic *petechialis*. In my paper on "The Shells of the Tres Marias,"[2] etc., etc., under *Cytherea* (*Callista*) *chionæa* I refer to the matter. I have never seen more than half a dozen examples of the variety. The National Museum contains if I am not mistaken two or more specimens.

I am quite familiar with *squalida* as well as *petechialis* having had a great many of both species, and for many years distributed both freely in the course of exchanges. The West Coast species is common in Scammon's Lagoon with *Macron Æthiops* Reeve (= *M. Kellettii* Hinds) and elsewhere on both sides of the peninsula and in the Gulf of California.

THE U. S. COAST SURVEY EXPEDITION TO ALASKA IN THE YEAR 1867.

BY ROBERT E. C. STEARNS.

If not a stroke of genius, it was a timely inspiration that caused Dr. C. Hart Merriam to expand what might have been hardly more than a notable pleasure excursion into an important scientific expedition. Probably never before were so many eminent scientific men brought together, and under such agreeable circumstances, as formed

[1] Proc. U. S. Nat. Museum, p. 408, vol. xxvi, 1902.

[2] Proc. U. S. Nat. Museum, p. 153, vol. xvii, 1894.

the party that went north on the steamer *G. W. Elder*, constituting the Harriman Alaska Expedition.

It was also a happy thought that led Dr. Dall to utilize the opportunity for publication in the Harriman Expedition Series, of his volume on the "Land and Fresh-Water Mollusks," which has been appropriately reviewed by Dr. Pilsbry.[1] It will doubtless be a standard reference book for the next quarter of a century.

The number of species collected by the expedition is nowhere stated. With a copy of Dr. Dall's volume before me, memory recalls what was an important event in its time, forty years ago, the U. S. Coast Survey Expedition to Alaska,[2] in charge of Professor George Davidson, which left San Francisco, July 21, 1867, and returning, arrived in San Francisco on the following 18th of November.

In this, the first expedition under the flag in connection with the acquisition of Alaska, or perhaps more accurately, Russian America, provision was made for biological investigation, hence my special interest in it, and further, for the reason that two members of the biological staff were kindly appointed by Professor Davidson on my suggestion. Mr. W. G. W. Harford was the conchologist and general collector. The season proved unfavorable, the weather being bad, and the collection of mollusks, therefore, in number of species, was small. Of the marine forms 69 species were taken; the *Buccinidæ* were determined by Dr. William Stimpson, the rest by the writer. The few land shells as named below, were identified by Dr. J. G. Cooper.

Helix columbiana Lea, Sitka; Chilcot River, 59° 9′ N.

Helix vancouverensis Lea, Sitka; Vancouver Island.

Helix ruderata Stud., Ounalaska.

Helix fulva Drap., Sitka; Ounalaska.

Vitrina pellucida Müll. (?).

Zua lubrica Müll., Sitka; Kodiak.

The list as it appeared in the Coast Survey volume, contained many typographical errors; it was subsequently revised and published by me.[3]

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[1] The NAUTILUS, Vol. XIX, December, 1905.

[2] Report of the Supt. U. S. Coast Survey, during the year 1867. Appendix No. 18, pp. 187–329. Washington, D. C., 1869.

[3] Shells collected by the U. S. Coast Survey Expedition to Alaska in the year 1867. Proc. Cal. Acad. Nat. Sciences, Dec. 2, 1867.

This and the other paper[1] mentioned in the foot-note, which contained a few pages on the circumboreal distribution of molluscan species, were omitted from the bibliography of Dr. Dall's volume.

A FEW NOTES ON SAY'S EARLY WRITINGS AND SPECIES.

BY V. STERKI.

Again and again, these last years, I have looked over a copy of T. Say's "Conchology" in the "British Encyclopedia" (Nicholson's),[2] and found a few things which caught my attention particularly and appear worth mentioning and discussing if compared with our present interpretation. It is unnecessary to say that the remarks are not written for the sake of criticizing the father of conchology in this country. His difficulties were doubtless great with respect to both working up his material and having the articles printed according to his intentions.

Of the introduction and general description, I would refer only to one point or two. Say justly protests against the view then prevalent, that the beaks of a bivalve mark the under side, stating that in the natural position of the mussel they are above. At the same time, what we now regard as anterior and posterior parts, he designates as the right and left sides, evidently from lack of knowledge of the organization of the soft parts. Hence also the terms: "æquilateral and inæquilateral," for which we now must say "equipartite and inequipartite." He calls the distance from the beaks to the opposite or "posterior" margin as length, the one at right angles to it as breadth, as some noted conchologists have done up to recent years. It is interesting to note, however, that soon he approached a more correct conception, even in the same article: in descriptions, *e. g.*,of *Unio ovatus* and *ochraceus*, and *Anodonta marginata*, he speaks of a front and a posterior end, only mistakes them for each other, a view which also has been held tenaciously for a long time by many conchologists. In this way apparent contradictions are

[1] On the History and Distribution of the Fresh-water Mussels, etc. Proc. Cal. Acad. Sciences, Nov. 20, 1882.

[2] Probably of 1818 or 1819; there is no date, and nothing referring to the time of publication, except that the author mentions his "detached essays in the Journ. Acad. Nat. Sc.," and to the "former editions of this work."

easily explained. That Say terms primary teeth what we now call cardinals or pseudocardinals, may be mentioned by the way.

As to the arrangement it is interesting to note that the first genus is *Helix* (made up of our *Polygyra*, *Zonitidæ*, *Vallonia*, *Strobilops*, *Patula* [*Pyramidula*], *Helicodiscus*, variously mixed up); then follow: *Polygyra* (P. s. str.), *Oligyra* (= *Helicina*), *Planorbis*, *Lymnæa* (including *Physa*), *Succinea*,[1] *Cyclostoma* (*Valvata*), *Ancylus*, *Palu-*

These things are mentioned just for an historical reminiscence, and also to show the changes brought on by anatomical examination and more minute distinction.

Some notes on species:

Helix lineata. Reference is made to Journ. Acad. Nat. Sc., I, p. 18, but no mention of *Planorbis parallelus.*

Succinea ovalis. Alt. 11.25, aperture alt. 8.75 mill.[2] Say states that the species is common; how is it, then, that no larger specimens were found, if *ovalis* were identical with *obliqua?* and that Say described the latter as new, only a few years later? (as 17.5 mill. high). A. Binney (Terr. Moll., II, p. 71) asserts that the two are identical, or varieties of the same species, yet does not use the older name; and he does not state whether there are any undoubtedly authentic *ovalis* Say on hand, giving evidence of the identity. In the absence of such, doubts should be permitted. Dr. Dall seems to have the same view.

Unio crassus. From the description it is evident that not only several species are included under the name—as the author himself suspects—but that rather forms of *Unio*, resp. *Quadrula* are understood, including *undulata* Barnes,[3] and probably *tuberculata* Raf. A description of *Lamps. ligamentina* would be quite different, and especially so of the prevalent form of the Ohio river (= var. *gibbus* Simpson). The figure has resemblance to a female *L. liga-*

[1] Yet he adds the remark: "The characters of the inhabitant (= soft parts) are widely distinct from the animal of the *Lymnæa*, and are somewhat allied to those of the inhabitants of the *Helices.*"

dina (our *Amnicola*, *Pomatiopsis*, *Lioplax*, *Goniobasis*, *Vivipara*, *Campeloma*), *Pupa*, *Polyphemus* (= *Glandina*), the bivalves: *Unio*, *Alasmodonta*, *Anodonta*, *Cyclas*, *Cyrena.*

[2] Say gives the dimensions in inches; for convenience of comparing, they are reduced to millimeters.

[3] As even more evident from the description of *U. plicata*, following.

mentina. Except eventually for that, *U. crassus* cannot be regarded as a synonym of the species named, and it would be best to drop the name.

Unio plicata. Unfortunately, the author failed to cite the dimensions. To judge from the description and also the locality, Lake Erie, it seems that not the large "typical" *plicata* of *e. g.*, the Mississippi and Ohio rivers was understood, but the well marked "variety," known also *e. g.*, from the Kankakee river.

U. ochraceus. Description and figure evidently are drawn from a young, resp. adolescent specimen, two or three years old, and the differences as pointed out from *cariosus* (the figure represents a mature female) are mostly due to this fact.

Cyclas similis. The description shows decidedly that the mussel understood is not what has been taken for *Sphærium simile*, resp. *G. sulcatum* Lam.; the size given is: long. 10, alt. 8.75 mill. Any specimen of *G. sulcatum*, 10 mill. long, is rather young, not "suborbicular," but elongate, and little inflated. The figure also, however imperfect it may be, cannot represent a *G. sulcatum.* The species described seems to be either *G. striatinum* Lam, or *stamineum* Con., probably the former. The statement that "a specimen measured in length[1] nearly three-fifths of an inch," makes it probable that a *G. sulcatum* was mixed in. Whether there are any authentic specimens in a collection, and what they prove, I know not; but from what has been said, we will do well to revert to the name *G. sulcatum* Lam., which seems well established.

There are a number of typographical and other errors, and mistakes in the article; *e. g.*, under *Paludina*, three species are designated as "L.": *Subcarinata*, *Virginica*, *Vivipara;* evidently the author had ranged them under *Lymnæa* previously, and then forgot to change the genus initials. Under *Anodonta marginata*, pl. 3, fig. 3, is cited; evidently it should be fig. 5, although the dimensions do not agree exactly with the description, as they do with respect to other species. *Helix thyroidus* is described. What good reason is there now to spell *thyroides*, after the original spelling had been generally adopted until 1850, and partly later? I allude to this, as compared with *Planorbis exacuous*, which is not in the article considered, that Say himself changed, corrected, the nonsensical and

[1] Probably altitude, in conformity with Say's terminology; no "breadth" is given.

impossible word into *exacutus*, or others did, is enough to show that it was an error. The purpose of nomenclatural rules is to prevent mistakes and misunderstandings; the means, to adhere to the original spelling, so far as consistent with sense. In the case of *Pl. exacutus* for *exacuous*, there is no possibility of a mistake, and I, for one, shall write *exacutus* after this.

In Say's article there is under Cyrena: "Shell triagonally rounded . . .," evidently an error; it should be "trigonally." If this were in a name it would be perpetuated like "exacuous."

MOLLUSCAN FAUNA OF MONTEREY BAY, CALIFORNIA.

BY S. S. BERRY.

(*Continued from p. 22.*)

Cylichna eximia Baird. 12 fathoms.

Cylichna attonsa Carpenter. 28 fathoms; one young specimen.

Tethys (= *Aplysia*) *californica* Cooper (?). The common sea-hare of Monterey Bay seems to differ somewhat from those of the southern part of the state, and may prove to be distinct when a careful anatomical examination has been made of both. The form obtained is quite common along the shore. It is large and of a brown color, irregularly blotched.

Tethys (*californica*, var.?). A small red form was dredged at 12 fathoms depth, which may or may not prove distinct from the shore form. At any rate, it is very different in appearance.

Archidoris montereyensis Cooper. 25 fathoms. Whether one collects along the shore or dredges in the bay, the Nudibranchs form one of the most striking and characteristic features of marine life in the Monterey region. Neither individuals, nor species, nor even genera, are few in number, as the following incomplete list will show. For the identifications, Professor MacFarland's careful paper on the Monterey Bay opisthobranchs (Bulletin of the Bureau of Fisheries, Vol. XXV) is the best work, and was constantly used by us as a text book in their study. It is beautifully illustrated, and should be in the library of every Pacific coast student.

Anisodoris nobilis MacFarland. Very common at low tide.

Rostanga pulchra MacFarland. A few of these bright-red animals found at low tide.

Diaulula sandiegensis Cooper. Low tide.

Cadlina marginata MacFarland. Very common from the shore line to 25 fathoms.

Chromodoris (sp.?) One specimen dredged. A most elegant creature; brilliant blue marked with yellow. It is now in the hands of Professor MacFarland for dissection and determination.

Doriopsis fulva MacFarland. Shore line to 25 fathoms; very common.

Cregires albopunctatus MacFarland. At low tide.

Laila cockerelli MacFarland. A few found at low tide.

Triopha carpenteri Stearns. Between tides; common.

Triopha maculata MacFarland. Between tides; common.

Polycera atra MacFarland. One specimen found at low tide.

Acanthodoris brunnea MacFarland. 12 fathoms; one specimen.

Hopkinsia rosacea MacFarland. A beautiful rosy pink in color, its body covered with long, tapering papillae, this is one of the most exquisite beings imaginable. It is by no means an uncommon creature in the little rocky tide pools along the shore.

Aeolid (sp.?). Numerous aeolids of many sorts were found along the shore and were dredged, particularly off Moss Landing. Some species were exquisitely beautiful in form and color, but they proved almost impossible to preserve and none were determined.

Selenites duranti Newcomb. Several were found under bits of bark on Cypress Point.

Vertigo (sp. *undet.*). Found rather commonly on Cypress Point.

Punctum conspectum Bland. Cypress Point; one specimen.

Punctum conspectum, var. *pasadenæ* Pilsbry. Near Pacific Grove; one specimen.

Helix aspersa Müller. Pacific Grove; in gardens.

Epiphragmophora californiensis Lea. Cypress Point; rather uncommon there at least.

Epiphragmophora dupetithouarsi Deshayes. Cypress Point, etc. Common, as land shells go in California. One curious specimen obtained is half albino.

Siphonaria peltoides Carpenter. Found at low tide, and live ones were also dredged at 12 fathoms, to my great surprise.

Gadinia reticulata Sowerby. At low tide; Santa Cruz, etc.

Physa heterostropha Say (?). Santa Cruz, etc.

Planorbis parvus Say. Del Monte pond.

(*To be concluded.*)

NOTES.

Note on Cypræa Coxeni Cox.—Having recently had the good fortune to obtain a specimen of this rare and interesting species, my attention is directed to certain particulars in which it differs materially from the only figure and description at present available to me—those contained in Mr. Roberts' monograph in Tryon's Manual of Conchology. This specimen, which appears to be somewhat worn, has the irregular chestnut-brown markings described as characteristic of the species, but is otherwise entirely white. Instead, however, of being a tapering shell, as shown in the figure referred to, or of being similar to *C. cribraria,* to which it has been compared by Mr. Brazier and Mr. Roberts, it is cylindrical, opaque and heavy in appearance, and its form throughout is almost precisely that of *C. rhinoceros* Souv. (*C. interrupta* Gray, var.?), the white base and margins being the same, but the columellar teeth extending further across the base, as mentioned by Mr. Melvill in his "Survey of the Genus Cypræa" (p. 230). This species should not be confused with *C. Coxi* Braz., a thin yellowish or cream-colored shell, which Dr. Cox believes (MS. letter) is not entitled to specific rank and which Mr. Roberts thinks may have been based upon a young specimen of *C. errones.*—Fred. L. Button.

PUBLICATIONS RECEIVED.

The Conchological Magazine: A monthly devoted to the study of Japanese shells. Published by Y. Hirase, Kyoto, Japan.[1] A new expression of the activity of our neighbors across the Pacific is before us in this handsomely printed and illustrated Magazine edited by Mr. Hirase, of which four numbers have come to hand. It is a gratifying evidence that the progress of Japan is to be intellectual as well as material. The April number contains articles on collecting shells, the philology of shell names. Japanese marine mollusks, the classification of Japanese land shells, etc., etc., a total of 34 pages and three excellent phototype plates. The text is of course in Japanese, but the plates make it interesting to conchologists of the Western World, and should give the Magazine a circulation outside of Japan among all interested in Pacific shells. The Nautilus heartily welcomes the new *Conchological Magazine.*

[1] Subscription to foreign countries $1.50 per annum.

The Nautilus.

Vol. XXI. AUGUST, 1907. No. 4.

A NEW SUBSPECIES OF POLYGYRA MULTILINEATA.

BY JAS. H. FERRISS.

POLYGYRA MULTILINEATA CHADWICKI n. var.

This is a dentate form. In a lot of thirty specimens twenty-five had a lunate parietal tooth or thickening of the callus about three mm. in length extending obliquely across the aperture nearer the outer lip. In other respects, compared to multilineata, the shell is heavier, the spire higher, the whorls more ventricose, the suture deeper; it is moderately polished, the sculpturing is less acute, the furrows shallow; the aperture is less oblique, less lunate; the peristome thicker, face more rounded, contracting the aperture more. In some examples the parietal callus is a mere ribbon in front of the aperture 5 mm. in width, not extending within the aperture itself. The greatest diameter 21 mm., alt. 13 mm.

In color these run from yellowish-white to light cherry. In five specimens only were the revolving lines observed, and these faintly. In general appearance it is quite like the Arkansas mountain forms, bearing a neighborly likeness to *albolabris alleni*, *indianorum*, *binneyana* and *edentata*. It was collected on the banks of the Kaw river, near Lawrence, Kansas, by W. C. Chadwick, of Cleveland, Ohio, and is named in his honor.

In the Illinois river valley we have two sizes of *multilineata*, one in the open bog measuring from 18 to 23 mm. in diameter, the other in wet timber land measuring from 25 to 28 mm. in diameter, well supplied with revolving lines. The smaller size varies in color from

a solid cherry-brown to white, and when lined there is a wide variation in the number of lines.

NEW LAND AND FRESH-WATER SHELLS FROM MEXICO.

BY H. A. PILSBRY AND A. A. HINKLEY.

POLYGYRA POLITA n. sp. Pl. 5, fig. 11.

The shell is narrowly perforate, with a rather long rimation, discoidal, the spire very slightly convex; whitish corneous (probably partially bleached), glossy, with faint sculpture of weak growth lines only. The whorls increase slowly; the last one is rounded at the periphery and descends abruptly at the aperture; it is constricted and opaque white behind the lip, and there is a short oblique groove within the umbilicus. Aperture very oblique. The peristome is thick, expanded outwardly, reflexed below, the ends connected by a rather thick callus, which bears a rather long, obliquely V-shaped tooth, the upper branch of which, though not so high as the lower, is well developed and connects with the peristome. There are two strong lip teeth, the upper one peripheral in position, tubercular, the lower one basal, compressed, entering across the lip-callus; a low, rather sharp lip-callus, more immersed at its lower end, is above the upper tooth.

Alt. 4, diam. 9.6 mm.; width of umbilicus 2.6 mm.; whorls 5.

Tampico, in river débris, coll. by A. A. Hinkley.

This species closely resembles *P. texasiana hyperolia* Pils. and Ferr., but it differs by the wider constriction or furrow behind the peristome, and the decidedly more deeply immersed upper lip tooth. The umbilical rimation is also longer than usual in that form.

POLYGYRA AULACOMPHALA n. sp. Pl. 5, fig. 12.

The shell is very narrowly perforate, with a rather long rimation, subdiscoidal, with low spire; whitish corneous (probably bleached), glossy, faintly, finely striate above, smoother below, where faint traces of spiral striæ are visible. Whorls slowly increasing, the first projecting slightly, the last rounded peripherally, descending a little in front, constricted behind the outer and basal margins of the peristome, with shallow pits in these positions. A long, deep furrow on

the last whorl within the umbilicus runs parallel to the rimation, but does not quite reach to the peristome. The aperture is oblique, peristome thin, well expanded, reflexed below, terminations converging, joined by a rather heavy callus, which bears a large obliquely and narrowly V-shaped parietal tooth, the upper branch connecting with the peristome, the lower branch somewhat sinuous. The upper lip tooth is peripheral, the lower basal, both compressed and entering. There is an acute, obliquely entering ridge within the lip, above the upper lip tooth, and connected with its inner end. Inside the last whorl a low columellar lamella indicates the position of the external furrow.

Alt. 4.3, diam. 10, width of umbilicus 3 mm.; whorls 5.

Tampico, in river débris, coll. by A. A. Hinkley.

This species is closely related to *P. polita*, but differs from that by the very long and deep groove on the last whorl within the umbilicus, the thin lip, longer teeth and smaller perforation. Further fresh specimens are needed to complete the descriptions of both, since the types are bleached shells from river débris.

PALUDESTRINA TAMPICOENSIS n. sp. Pl. 5, fig. 13.

The shell is very minutely perforate or imperforate, rather narrowly conic, thin, corneous, nearly smooth, the glossy surface but slightly striatulate; apex acute. Whorls 6, moderately convex; suture moderately impressed, with a gray margin by transparence. Aperture slightly oblique, ovate, angular above; lip thin and simple, the columellar margin concave, hardly reflexed.

Alt. 3.7, diam. 1.8 mm.

Tampico, in river débris, coll. by A. A. H.

Of this little species only a few specimens were taken. It is related to *P. monroensis* Ffld., and is not close to any species yet known from Mexico or Texas.

MOLLUSCAN FAUNA OF MONTEREY BAY, CALIFORNIA.

BY S. S. BERRY.

(*Continued from page 35.*)

Conus californicus Hinds. Shore to 12 fathoms.

Pleurotoma carpenteriana Gabb. Several individuals of this

beautiful species were dredged in from 12 to 15 fathoms. It is one of the most attractive shells to be found in the Bay.

Daphnella fuscoligata Dall. One good specimen was found between tides by some little children who gave it over to me.

Drillia inermis Hinds. 12 fathoms; living; one specimen.

Drillia torosa Carpenter. 12 fathoms, and dead specimens on the beach.

Clathurella canfieldi Dall. Living under rocks at the big Tide Pool.

Mangilia angulata Carpenter. 12 fathoms.

Mangilia hexagona Gabb. 12 fathoms.

Mangilia sculpturata Dall. 12 fathoms.

Cancellaria cooperi Gabb. 15 fathoms; one living, but immature specimen.

Olivella biplicata Sowerby. Between tides.

Olivella pedroana Conrad. 12 fathoms.

Olivella intorta Carpenter. 15 fathoms, sand; occurring with the "sand-dollars."

Marginella jewettii Carpenter. Between tides; dead, but good shells common on the beach.

Marginella pyriformis Carpenter. Shore to 12 fathoms.

Marginella regularis Carpenter. 12 fathoms; with the preceding.

Mitra maura Swainson. 12 fathoms; several specimens. One magnificent live individual was nearly three inches long.

Mitromorpha filosa Carpenter. Between tides.

Mitromorpha aspera Carpenter. 12 fathoms.

Fusus luteopictus Dall. On and under stones between tides; not rare.

Fusus robustus Trask. 12 fathoms; living; occasional examples.

Nassa mendica Gould. 12 fathoms; evidently exceedingly common at moderate depths.

Nassa mendica, var. *cooperi* Forbes. With the preceding and perhaps even more common.

Nassa perpinguis Hinds. 12 fathoms; few obtained.

Nassa fossata Gould. Fishermen.

Nassa californiana Conrad. Fishermen and a few examples dredged in 40 fathoms, off Moss Landing.

Amphissa versicolor Dall. Exceedingly common from the shore into 12 fathoms.

Columbella aurantiaca Dall. Between tides; rare.

Columbella tuberosa Carpenter. Low tide to fifteen fathoms; common.

Columbella gausapata Gould. Common from the shore line to 12 fathoms.

Columbella gausapata, var. *carinata* Hinds. With the preceding and in greater numbers.

Murex carpenteri Dall. 12 fathoms; one of the finest species in the Bay. It is very different in appearance from the *M. carpenteri* of San Pedro.

Murex petri Dall. A few young shells referred to this species by Dr. Dall were dredged with *M. carpenteri* and the *Calliostoma* in the blue-clay region.

Murex foliatus Martyn. 12 fathoms; with the preceding; three or four splendid examples.

Murex nuttalli Conrad. At low tide.

Murex (*Ocinebra*) *barbarensis* Gabb. 12 fathoms; two good live and several dead shells.

Murex (*Ocinebra*) *squamuliferus* Carpenter. Two living examples dredged with the preceding.

Murex (*Ocinebra*) *gracillimus* Stearns. Between tides.

Murex (*Ocinebra*) *circumtextus* Stearns. Fairly common at low tide. The specimens run much larger than in the southern part of the state.

Murex (*Ocinebra*) *luridus* Middendorf. Between tides; rather common. Specimens were found connecting this species with the following variety.

Murex (*Ocinebra*) *luridus*, var. *asperus* Baird. Between tides; not common.

Murex (*Ocinebra*) *luridus*, var. *mundus* Carpenter. Between tides; less common than typical *luridus*.

Murex (*Ocinebra*) *interfossus* Carpenter. Shore to 15 fathoms; not uncommon.

Murex (*Ocinebra*) *peritus* Hinds. One living specimen found at low tide.

Murex (*Ocinebra*) *subangulatus* Stearns. Low tide; one specimen.

Purpura saxicola Valenciennes. Between tides; very common.

Purpura lima Martyn. Between tides; rare.

Monoceros lapilloides Conrad. Between tides.

Scala hindsii Carpenter. Between tides; the most common species of the genus. It may be found living by searching among the sea-anemones.

Scala subcoronata Carpenter. With the preceding, but less abundant.

Scala crebricostata Carpenter. Living at 12 fathoms, off Del Monte, and dead on the beach at Santa Cruz.

Scala berryi Dall. A small species occurring in almost every dredge haul in some localities, but good specimens rare. 12 fathoms.

Scala rectilaminata Dall. 15 fathoms. (NAUTILUS, xx, p. 127.)

Scala (*Cirsotrema*) *montereyensis* Dall. 25 fathoms.

Scala (*Opalia*) *borealis* Gould. Between tides rather rare.

Scala (*Opalia*) *pluricostata* Carpenter. 12 fathoms; one specimen.

Scala (*Opalia*) *spongiosa* Carpenter. Two specimens of this pretty, but tiny species. 12 fathoms.

Eulima rutila Carpenter. 12 fathoms; rather scarce.

Eulima thersites Carpenter. With the above. Living example rare.

Turbonilla aurantia Carpenter. 12 fathoms.

Turbonilla (*Mormula*) *tridentata* Carpenter. 12 fathoms.

Turbonilla (*Strioturbonilla*) *torquata* Gould. 12 fathoms.

Turbonilla (*Strioturbonilla*) *serræ*. Dall & Bartsch. 12 fathoms. All of these are rare species, this being of most often occurrence.

Turbonilla (*Strioturbonilla*) *vancouverensis* Baird. 28 fathoms; one living specimen.

Turbonilla (sp. *undet.*). 12 fathoms.

Odostomia (*Chrysallida*) *oregona* Dall and Bartsch. Rare; 12 fathoms.

Odostomia (*Chrysallida*) *montereyensis* Dall and Bartch. 12 fathoms; not so rare as most of the other *Odostomia.*

Odostomia (*Amaura*) *montereyensis* Dall and Bartsch. 12 fathoms.

Odostomia (*Iolæa*) *amianta* Dall and Bartsch. 12 fathoms; not infrequent.

Odostomia (*Evalea*) *straminea* Carpenter. On abalone shells brought up from just below the low-tide mark. Common, but found in no other locality.

Odostomia (*Evalea*) *angularis* Dall and Bartsch. Shore line to 12 fathoms; rare.

Odostomia (Ividea) navisa Dall and Bartch. 12 fathoms.

Odostomia (Evalea) valdezi Dall and Bartch. 12 fathoms, two specimens.

Priene oregonense Redfield. Fishermen; rare.

Gyrineum californicum Hinds. Fishermen. Also dredged in 12 fathoms. Of rather frequent occurrence.

Pedicularia californica Newcomb. On corals brought in by the fishermen. One beautiful specimen is over half an inch in diameter.

Trivia californica Gray. 12 fathoms; one live specimen.

Radius variabilis C. B. Adams. The dealers and fishermen often show examples of this species said to have been found in the bay, but the first really authentic specimen from Monterey seen by the writer, was a single immature specimen dredged by him. 12 fathoms; living.

Radius barbarensis, Dall. Fishermen. Quite rare. The only specimen obtained is over an inch in length and one of the most beautiful products of the bay.

Erato columbella Menke. Low tide.

Erato vitellina Menke. Several beautiful examples were found alive at low tide.

Triforis adversus Montagu. Between tides.

Triforis montereyensis Bartsch. 12 fathoms; a single broken specimen.

Metaxia diadema Bartsch. 12 to 28 fathoms; rare.

Seila assimilata C. B. Adams. Between tides.

Cerithiopsis purpurea Carpenter. Between tides. Dead shells common.

Cerithiopsis munita Carpenter. 12 fathoms.

Cerithiopsis tuberculata Carpenter. Low tide.

Cerithiopsis interfossa Carpenter. On the beach; one specimen.

Bittium filosum Gould. Between tides; plentiful.

Bittium esuriens Carpenter. Between tides; not common.

Cæcum californicum Dall. 12 fathoms; plentiful.

Cæcum quadratum Carpenter. Found occasionally with the preceding.

Cæcum crebricinctum Carpenter. Rather commonly with the preceding. The specimens were unusually large and fine.

Vermetus lituella Carpenter. Between tides.

Vermetus squamigerus Carpenter. Between tides; not common.

Bivonia compacta Carpenter. Shore to 25 fathoms. Found either singly or in contorted masses and not at all rare.

Littorina planaxis Nuttall. Abundant.

Littorina scutulata Gould. Abundant.

Lacuna unifasciata Carpenter. Dead shells common and living individuals not rare at low tide.

Fossarus (Isapis) fenestratus Carpenter. Shore to 12 fathoms.

Diala marmorea Carpenter. Shore to 12 fathoms.

Rissoa acutilirata Carpenter. 12 to 25 fathoms; plentiful, but usually dead.

Rissoina bakeri Bartsch. 12 to 25 fathoms; rare.

Rissoina purpurea Dall. 12 fathoms; a single specimen.

Barleia haliotiphila Carpenter. Between tides; plentiful.

Calyptræa mamillaris Broderip. 12 fathoms; no living specimens found.

Crepidula adunca Sowerby. Shore to 20 fathoms and everywhere plentiful. Found almost invariably on shore attached to the shells of the black turban, *Chlorostoma funebrale*. Specimens dredged were usually of a lighter color, deeper, and distorted.

Crepidula nivea Gould. Found at low tide, adhering to the under surfaces of stones.

Crepidula dorsata Broderip. Low tide to 20 fathoms, particularly among sponges and kelp-roots.

Crepidula lessonii Broderip. Low tide to 20 fathoms; rather uncommon, but usually in old holes of Pholads, etc.

Amalthea antiquata Linné. Found in large colonies attached to the under surfaces of rocks at the Big Tide Pool.

Lunatia lewisii Gould. Fishermen, etc. Not rare.

Lunatia draconis Dall. Fishermen, etc. Also dredged alive in 12 fathoms of water. An examination of a number of individuals of each of these species, as to whether the shells showed any very noticeable sexual differences failed to reveal anything striking.

Eunaticina oldroydii Dall. Fishermen, etc. None were dredged by our party, though this mollusk seems to be a characteristic feature of the Bay.

Velutina lævigata Linné. 12 fathoms; one immature shell.

Lamellaria rhombica Dall. 15 fathoms; living; one specimen.

Acmaea asmi Middendorf. Not rare on the shells of the black turban (*Chlorostoma*), but occurring nowhere else. Perhaps this is a case of commensalism.

Acmaea incessa Hinds. On seaweed at low tide.

Acmaea instabilis Gould. With the preceding.

Acmaea triangularis Carpenter. 12 fathoms. Not rare among red sponge on the hard clay and always accompanied by the following species.

Acmaea rosacea Carpenter. 12 fathoms; all quite small specimens. Also on shore.

Acmaea mitra Eschscholtz. Between tides, but usually far out on exposed rocks. Shells always encrusted with a growth of "coralline," etc.

Acmaea patina Eschscholtz. Between tides; plentiful.

Acmaea patina, var. *scutum*. Between tides.

Acmaea patina, var. *fenestrata* Nuttall. Between tides; rather rare.

Acmaea scabra Reeve. Between tides; abundant.

Acmaea pelta Eschscholtz. Between tides; common.

Acmaea pelta, var. *nacelloides* Dall. Between tides; not rare.

Acmaea persona Eschscholtz. Between tides; common.

Acmaea spectrum Nuttall. Between tides; common.

Acmaea (*Lottia*) *gigantea* Gray. Between tides; abundant.

Phasianella compta Gould. Shore line to 12 fathoms.

Phasianella (*compta*, var.) *pulloides* Carpenter. With the preceding.

Eucosmia variegata Carpenter. Between tides; uncommon.

Eulithidium substriatum Carpenter. A few specimens dredged at 12 fathoms depth.

Pachypoma inequale Martyn. One of the finest species in the region. It occurs all the way from low water mark at least down to a depth of fifteen fathoms and is by no means rare. A few specimens obtained are extraordinarily large and heavy.

Leptothyra bacula Carpenter. Between tides; common.

Leptothyra paucicostata Dall. Between tides; one poor specimen.

Leptothyra carpenteri Pilsbry. Between tides; common. Also to 20 fathoms depth.

Norrissia norrissii Sowerby. 12 fathoms; one very yonng specimen.

Calliostoma annulatum Martyn. 12 fathoms; not rare. Several beautiful examples of this exquisite species.

Calliostoma canaliculatum Martyn. 12 fathoms, and a number of

exceptionally large examples obtained from the Chinamen. Young specimens were often found living also at the low water mark.

Calliostoma costatum Martyn. Shore to 12 fathoms; common. Young specimens often lined with bright blue.

Calliostoma supragranosum Carpenter. Low tide to 12 fathoms; rare.

Calliostoma splendens Carpenter. 12 fathoms; quite rare.

Calliostoma gloriosum Dall. Dead shells on shore, and a few living but small specimens dredged in 12 fathoms of water.

Margarita lirulata Carpenter. Between tides; common.

Margarita pupilla Gould. A few specimens were found at low tide. They are of the form known as var. salmonea Carpenter.

Gibbula parcipicta Carpenter (= M lirulata var.). 12 fathoms.

Chlorostoma funebrale A. Adams. Between tides; abundant.

Chlorostoma brunneum Philippi. C. funebrale covers the rocks everywhere, but one must go at low tide to successfully search for C. brunneum, although it is common.

Chlorostoma montereyi Kiener. 12 fathoms; dead. Also from the fishermen.

Chlorostoma pulligo Martyn. 12 fathoms; not rare but usually rather small.

Halistylus pupoides Carpenter. 12 fathoms; common, occurring invariably with Caecum crebricinctum, and the two species run through the same variations in color.

Scissilabra dalli Bartsch. 12 fathoms; one specimen.

Liotia acuticostata Carpenter. 12 fathoms.

Vitrinella eshnauri Bartsch. 12 fathoms.

Vitrinella berryi Bartsch. 12 fathoms. Described with other Vitrinellidæ in the Proceedings of the United States National Museum, Vol. XXXII, pp. 167, 176.

Cyclostremella californica Bartsch. 12 fathoms.

Haliotis cracherodii Leach. Between tides; abundant.

Haliotis rufescens Swainson. Especially plentiful just below low water mark.

Haliotis gigantea Chemnitz. 15 fathoms; one dead shell. An animal and shell in alcohol among the laboratory collections was undoubtedly collected in the bay. Both specimens were but two or three inches long.

Fissurella volcano Reeve. Between tides to 12 fathoms; common.

Fissuridea aspera Eschscholtz. Between tides to 12 fathoms; not rare.

Fissuridea murina Dall. Shore to 12 fathoms; some specimens quite fresh but all dead and then not of common occurrence.

Lucapina crenulata Sowerby. Low tide.

Megatebennus bimaculatus Dall. Quite a number found alive at low tide.

Subemarginula yatesi Dall. A single fine specimen was obtained which had been brought in by fishermen from deep water. It is evidently extremely rare.

Puncturella cucullata Gould. 12 fathoms. This also seems to be quite rare in this locality, though one living and several dead shells were dredged from a depth of twelve fathoms.

Lepidopleurus rugatus Carpenter. Not rare at low tide.

Lepidopleurus ambustus Dall. Several examples were found on the fragments of blue clay dredged in 12 fathoms of water.

Lepidopleurus (Oldroydia) percrassus Dall. 12 fathoms. On the blue clay with the other chitons were found two fine specimens.

Tonicella lineata Wood. Between tides to 12 fathoms. The species does not run so large here as further north, but is often very beautifully colored.

Trachydermon ruber Lowe. 12 fathoms; one specimen. It was a surprise to find this cold-water species at Monterey.

Trachydermon hartwegii Carpenter. Common on the rocks between tides everywhere.

(*To be concluded.*)

NOTES.

Additions to the "Catalogue of the Shell Bearing Mollusca of Rhode Island," 1889, are the following:

Lucina filosa, Stimps.

Odostomia impressa, Say.

Pisidium Streatori, Sterki.

Pisidium Roperi, Sterki.

Pisidium Noveboracense, Prime.—H. F. Carpenter.

Oysters are Wild Animals.—"Domesticated, tame or garden oysters are assessable as personal property, according to an opinion

of Attorney-General Jackson, written in answer to a query addressed to the tax commission by G. Frank Tuthill, supervisor of the town of Southold, inquiring whether oyster beds should be assessed as real or personal property and to what purpose the taxes derived therefrom are to be devoted. The courts have held, says Mr. Jackson, that oysters are wild animals and become personal property when they are reclaimed or artificially planted. Such domesticated, tame or 'garden' oysters would be assessable as personal property under the ordinary rules."—(*Boston Globe.*)

Students of the Unionidæ may be interested to know that on June 10th I have collected a number of female *Tritogonia tuberculata* (Barnes) gravid. All four branchiæ were charged with ova. More details will be communicated later.—V. Sterki.

PUBLICATIONS RECEIVED.

A Preliminary Catalogue of the Land and Fresh-water Mollusca of Ohio. By V. Sterki (Proc. Ohio State Acad. of Science, iv, part 8). This very valuable addition to our State catalogues gives an epitome of Dr. Sterki's work in Ohio in the past twenty years, with such other species as have been reported on good authority from the State. The total number, 310 species, is probably exceeded by no Northern State. Attention is called to species which should specially be looked for in Ohio, such as *Gastrodonta gularis*, *Omphalina lævigata*, etc. A separate list is given of species from pleistocene deposits. Dr. Sterki's notes on the various species will be read with interest by those engaged in similar studies, his intimate acquaintance with inland mollusks giving weight to the views expressed.

A New Parasitic Mollusk of the Genus Eulima. By Paul Bartsch (Proc. U. S. Nat. Mus., 1907). *E. ptilocrinicola* lives parasitic on *Ptilocrinus pinnatus* Clark, dredged by the steamer *Albatross* off British Columbia in 1588 fms. The proboscis is deeply inserted in the side of the body of the crinoid. This is like *Stylifer*, yet the apex is not mucronate as in that genus, and there is an operculum. The largest specimen is 9.5 mm. long.

THE NAUTILUS.

VOL. XXI. SEPTEMBER, 1907. NO. 5.

NOTES ON SOME EXOTIC UNIONIDÆ.

BY L. S. FRIERSON.

The collation of some private notes upon *The Synopsis of the Naiades* by Mr. Chas. T. Simpson called my attention to several errors in this great work. In the *Synopsis* Mr. Simpson dealt not only with a great number of species, but with an enormous mass of references to an involved and difficult literature. The following notes are therefore offered in no unduly critical spirit.

UNIO GIGAS (Swainson) Sby., U. CUMINGII Lea.

Page 608, Mr. Simpson places (it is true, somewhat in doubt) as a synonym of *Tritogonia tuberculata*, Barnes, the figure of *Unio gigas*, Swainson (Sowerby, in *Conchologia Iconica* xvi, 1867, Plate LVI, fig 287).

This really fine figure has been totally misunderstood by both Mr. Simpson and Mr. R. E. Call, the latter having more than once referred it to *Unio multiplicatus* Lea. It is probable that the habitat assigned the shell by Sowerby—the Ohio river—is responsible for these singularly poor determinations. Mr. Lea was not much misled by the habitat, for in his synopsis he placed it among the foreign shells, and in his scheme of classification he placed *U. gigas* immediately next to his *Unio cumingii*. The fact is that *gigas* is only *an adult cumingii*. The type of the latter was a shell not one-third grown, and hence only slightly resembling a full-grown specimen.

As Mr. Lea afterwards received several large *cumingii* he was of course acquainted with its appearance, and hence his placing the two shells together. But the tenacity with which Mr. Lea "hung on" to his names is an old story, and accounts for his placing them as *allied* but *distinct* species, in his classification.

However, even though synonymous with each other, it is probable that *gigas* has not precedence, since it was published by Sowerby long after Lea's *U. cumingii*. Moreover, *U. gigas* Sowerby is probably not the undescribed *U. gigas* of Swainson.

An adult specimen of the species under discussion is illustrated on Plate VI, from the writer's collection. It is 209 mm. long, and was received from China.

The remains of the high wing, and the broad biangulated posterior, the purplish color inside, and the *wrinkled umbones* amply distinguish *U. gigas* (*cumingii*) from either of the shells with which it was united by Mr. Simpson and Mr. Call.

ANODON MORETONIANUS Sowerby.

On page 925 of the synopsis Mr. Simpson makes a variety *moretonianus* Sowerby of *Glabaris trapesialis* Lamarck. The variety being shown in Sowerby, Conchologia Iconica xvii, 1867, Pl. IX, fig. 20. This appears to be a singular error. The shell figured not only is *not trapesialis* Lk., but is nothing like it. It is more than probable that Mr. Simpson in haste, made a "*lapsus pennæ*" and really intended to make a variety *susannæ* Gray; for this shell *is* close to, if not identical with *trapesialis*, and is figured on the *same plate* to which we are referred. But be this as it may, the *Anodon moretonianus* of Sowerby (as of Lea) is nothing like *Glabaris trapesialis* Lam.

UNIO PLICATULUS Lea.

A singular *lapsus* seems to have been made on page 353 when the genus *Ctenodesma* is described and the type assigned is the *Unio borneensis* Issel, better known perhaps as the *U. plicatulus* of Lea. But there can be but little doubt that this shell (i. e., the *U. plicatulus* Lea.) is not a member of the *Ctenodesma* at all, but unquestionably belongs to the next described genus *Rectidens*.

MOLLUSCAN FAUNA OF MONTEREY BAY, CALIFORNIA.

BY S. S. BERRY.

(*Concluded from page 47.*)

Trachydermon flectens var. montereyensis Bartsch. 12 fathoms; several specimens.

Chaetopleura gemmea Carpenter. Low tide to 12 fathoms; quite common in places. Most of the specimens are a rather bright orange-red in color.

Chaetopleura rosetta Bartsch. A very small species dredged in 12 fathoms depth. One specimen was likewise found at low tide.

Ischnochiton magdalenensis Hinds. This is the commonest shore chiton and lives under boulders in dozens. The young specimens are often very handsome and vary considerably in coloration and marking.

Ischnochiton mertensii Middendorf. Low tide to 12 fathoms. Not rare. This is also a variable species as regards color and markings, though generally of a brownish-red. The sculpture of fine specimens is wonderfully distinct and is but rarely obscured by foreign growths, or eroded as in the case of so many of the other species.

Ischnochiton cooperi Carpenter. Low tide; but few found.

Ischnochiton clathratus Reeve. A single oddly-marked specimen was found at low tide by a fellow-student at the laboratory.

Ischnochiton radians Carpenter. Low tide to 12 fathoms. Two of the specimens found were nearly black, almost unmarked, and with so exactly similar a color pattern (not in the least intergrading with the ordinary form) that the writer was very doubtful as to whether they were properly referred to this species, but they were identified as radians by Dr. Dall. They seem at least a very well marked variety.

Ischnochiton berryi Bartsch. Six adult specimens and a young one were found in the crevices of the blue clay from 12 fathoms. They were generally living with a purplish sponge which they resembled in color. The largest specimen taken measured one and a-half centimeters in length in the living state.

Ischnochiton veredentiens Carpenter. 12 fathoms; two or three specimens.

Ischnochiton regularis Carpenter. Three or four specimens were found at low tide. I am told that this is generally a common species around Pacific Grove, but we did not find it so.

Callistochiton palmulatus Carpenter. 22 fathoms. Two specimens.

Callistochiton palmulatus var. mirabilis Pilsbry. Low tide; not rare.

Callistochiton crassicostatus Pillsbry. Low tide; not rare.

Nuttallina californica Nuttall. Exceedingly common between tides on the rocks.

Mopalia muscosa Gould. Low tide to 12 fathoms. Very common.

Mopalia hindsii Sowerby. Low tide; not rare. No specimens showing any intergradation between this species and the preceding or the next were observed.

Mopalia lignosa Gould. Between tides; common.

Mopalia ciliata Sowerby. 12 fathoms; four specimens. All the specimens taken were predominantly red in color, but sometimes mottled with white, brown and green. A very striking and handsome species.

Mopalia ciliata var. wossnesenskii Middendorf. 12 fathoms; one specimen.

Placiphorella velata Carpenter. A number of specimens of this interesting species were found at low tide.

Katherina tunicata Sowerby. Several specimens were obtained far out on the rocks among the mussels.

Cryptochiton stelleri Middendorf. A few specimens found at low tide.

In conclusion it may be well to call attention to several interesting features of Monterey's mollusk fauna which are presented by the foregoing list: the extraordinary development of the chitons (some twenty-six species and four varieties); the large representation of Ocinebra (ten species and varieties), of Scala (eight species), and of the Pyramidellidae (fourteen species); and the prominence of Acmaeidae in the shore fauna, both as regards number of species and varieties (fifteen) and of individuals.

TWO NEW SPECIES OF LYMNÆA.

BY FRANK COLLINS BAKER.

LYMNÆA JACKSONENSIS n. sp.

Limnea catascopium BINNEY (part), Land and Fresh-water Shells of North America, II, 1865, p. 56, fig. 86, two central figures.

Shell ovately fusiform, solid; color very dark horn; surface shining, lines of growth coarse, crossed by deeply incised spiral lines sagrinating the surface; one or two rest periods are discernible as longitudinal bands on the body whorl or spire; apex smooth, very dark chestnut color; whorls $5\frac{1}{2}$, rounded, rather rapidly increasing in size; body whorl large, ovately-inflated; sutures well impressed; spire about equal to the aperture in length, broadly conical; aperture regularly elongate-ovate, narrowed at both ends, somewhat effuse anteriorly; outer lip with a chestnut-bordered internal lip; inner lip in the adult rather broadly reflected over the umbilicus, leaving a small, narrow chink; juvenile specimens are almost imperforate; parietal callus rather heavy in some specimens, in which case making a continuous peritreme; axis very slightly twisted; columella with a well-marked fold, more strikingly developed in young than in old specimens.

Length 19.0, width 10.0, aperture length 10.1, width 5.0, mm.
Length 16.5, width 9.5, aperture length 9.1, width 4.8, mm.
Length 14.5, width 8.5, aperture length 8.5, width 4.0, mm.
Length 14.0, width 7.5, aperture length 7.5, width 3.4, mm.
Length 12.5, width 7.5, aperture length 8.0, width 3.5, mm.

Types: Chicago Academy of Sciences, 6 specimens.

Cotypes: Collections of Acad. Nat. Sci., Phila., and of A. A. Hinkley.

Type locality: Jackson Lake, drained by the south fork of the Snake River, Wyoming.

Records: Oregon: Grindstone Creek (Hayden, Smithsonian collection). Wyoming: Jackson Lake; Philips Lake, eight miles north of Jackson Lake (H. O. Hinkley, A. A. Hinkley).

Remarks: This species was received from Mr. A. A. Hinkley, of Du Bois, Illinois, under the name of *L. binneyi.* Comparison with Tryon's types at once showed that it was not that species, which is larger, of a different color and with a differently-shaped shell, inner lip, umbilicus, etc. It approaches *L. gabbi* Tryon, but the aperture is more regularly elongate-ovate, the whorls are rounder, the inner lip is broader, there is an umbilical chink and the whole shell is more fusiform. Comparison has been made with Tryon's types and with a set in the Chicago Academy of Sciences received from Tryon from the original lot. The species resembles very closely in color and in the form of the columella certain forms of *apicina* (=*solida* preoccupied) but the spire of *jacksonensis* is longer and the aperture, narrower.

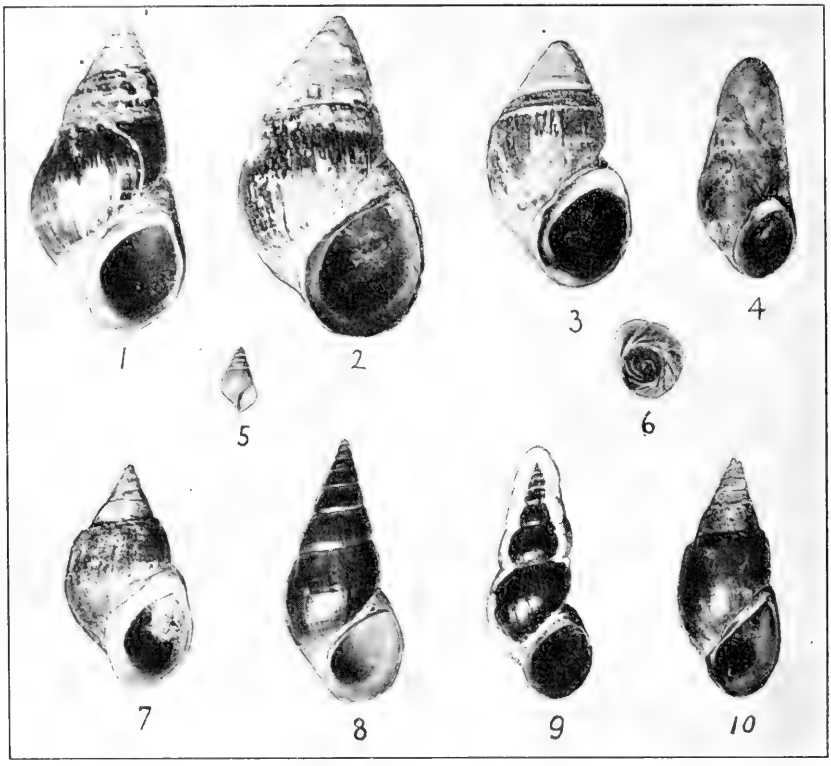
It has some resemblance to *L. catascopium* but the columella is quite different and the aperture is differently shaped. Binney's two central figures in Land and F.-W. Shells, fig. 86 accurately picture the species and the original specimens in the Smithsonian (No. 8804) seem to be the same. It has probably been named *binneyi* or *solida* in collections but it seems to be a distinct species, related to the *binneyi-solida-catascopium* group of Lymnæas. Mr. H. O. Hinkley collected the specimens.

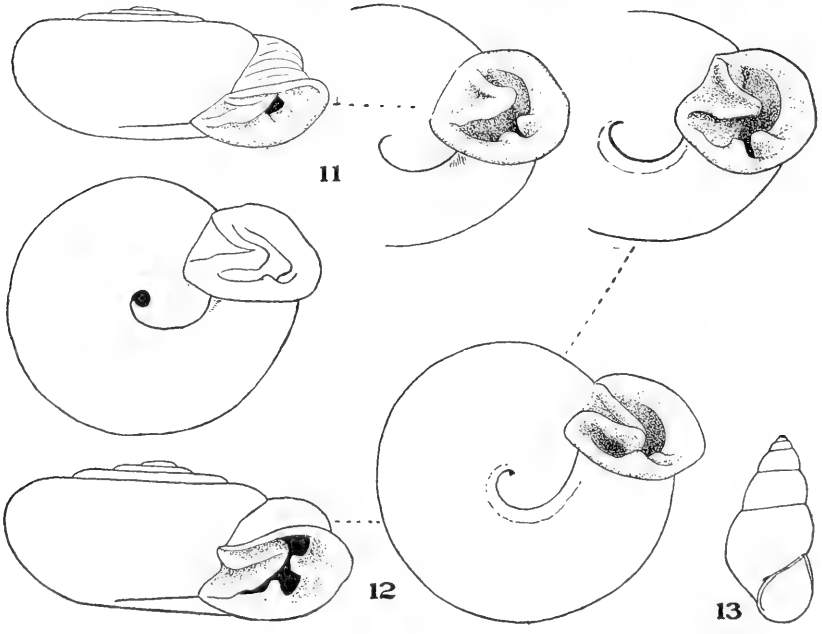
LYMNÆA PSEUDOPINGUIS n. sp.

Shell globose or globosely ovate, thin and fragile; color very light corneous inclining to yellowish, sometimes brownish; surface dull to shining, but not polished, growth lines very heavy and spiral lines deeply incised; whorls 4 +, rounded; the body-whorl globosely inflated, the whorls increase very rapidly in size, the last whorl occupying from $\frac{3}{4}$ to $\frac{5}{6}$ of the length of the shell; spire usually short, depressed, dome-like, sometimes more elongated; sutures well-marked, bordered below by a wide, yellowish band; aperture ovate or roundly-ovate, sometimes a trifle expanded and somewhat effuse anteriorly; inner lip rather broadly expanded, triangular, reflected over but not closing the umbilicus, which is a conspicuous chink; there is no columellar plait in the majority of specimens; the parietal callus is very thin or wholly lacking. The axis is but slightly twisted.

Length 9.0, width 6.5, aperture length 6.0, width 3.5, mm.
Length 9.0, width 6.0, aperture length 6.0, width 3.5, mm.
Length 9.5, width 6.75, aperture length 6.5, width 3.5, mm.
Length 8.2, width 5.5, aperture length 5.4, width 3.0, mm.
Length 8.0, width 5.5, aperture length 5.0, width 3.0, mm.
Length 14.0, width 8.0, aperture length 8.0, width 4.3, mm.
Length 12.5, width 7.5, aperture length 7.3, width 4.0, mm.
Length 11.0, width 7.0, aperture length 7.0, width 3.5, mm.
Length 7.2, width 5.0, aperture length 5.0, width 3.0, mm. Mt. Sinai.
Length 7.5, width 5.0, aperture length 5.0, width 2.5, mm. Mt. Sinai.

Types: Chicago Academy of Sciences; *Cotypes*, collection Miss Mary Walker, Buffalo, N. Y., Mr. Bryant Walker, Detroit, Mich., Academy Natural Sciences, Philadelphia and the Smithsonian Institution, Washington.





1-10, PACHYCHEILUS VALLESENSIS. 11, POLYGYRA POLITA.
12, P. AULACOMPHALA. 13, PALUDESTRINA TAMPICOENSIS.

UNIO GIGAS 'SWAINS.' SOWB (HYRIOPSIS CUMINGII LEA). CHINA.
(About $\frac{3}{4}$ nat. size).

Type locality: Crystal Brook, Long Island, N. Y.

Records: Crystal Brook and Mt. Sinai, Long Island, N. Y.

Habitat: In salt or brackish water, "at low tide in shore of bay fed by springs" (Crystal Brook); in ice-cold spring (Mt. Sinai.)

Remarks: This peculiar Lymnæa has been somewhat of a puzzle for a long time. It was at first thought to be a variety of *L. catascopium pinguis* but it differs from that form in its thinner shell, more globose form, more dome-shaped spire and particularly in its triangular, smooth, reflected inner lip and distinct umbilical chink. The form of the shell and of the inner lip resembles the *bulimoides* group of Lymnæas of the subgenus *Galba.*

It is probably a variation from the *catascopium* stock, produced by unfavorable conditions, which have dwarfed the shell. It is a significant fact that the icy-cold spring at Mt. Sinai has produced the same shell characteristics as the brackish water of Crystal Brook.

There is some variation in the height of the spire in the numerous specimens examined, some individuals having an elongated spire a trifle less than the aperture in length, while in others the spire is less than half the length of the aperture. This shell also varies in corpulency. The inner lip is peculiar and, together with the form of shell, will easily separate this species from *catascopium*, its nearest ally.

The shell was first brought to the notice of the writer by Miss Mary Walker of Buffalo, N. Y., who suggested its resemblance to *L. bulimoides*, and later by Mr. Bryant Walker, of Detroit, Michigan.

ANNOTATED LIST OF THE MOLLUSCA FOUND IN THE VICINITY OF LA JOLLA, SAN DIEGO CO., CAL.

BY MAXWELL SMITH.

Several winters ago I spent a few months at La Jolla, California. Here an old friend, Mr. Joshua L. Bailey, initiated me in the study of shells. The town lies twelve miles north of San Diego, directly on the coast, and at the base of Mount Soledad. Alternate stretches of beach and rock, caves and muddy shores, afford a congenial home for mollusks. Miniature canyons slope from the hills down to the coast. On the sides of these are found two species of land shells. A

short distance to the south stands Pacific Beach, facing both False Bay and the ocean. Several miles to the north are the Torrey Pines. Here stand, on the bluffs overlooking the sea, splendid specimens of *Pinus torreyanus*. At the base of these cliffs, in a wild spot, a number of interesting finds were made.

Where no locality is given the species is understood to have been found at La Jolla. No dredging was done. Species found on the surface of anemones are marked with a star.

Ostrea lurida, Cpr. False Bay. On stones.

Anomia macroschisma, Desh. After storms.

Anomia lampe, Gray. False Bay. Not rare, but difficult to detach from rocks.

Pecten æquisulcatus, Cpr. False Bay. In mud.

Pecten monotimeris, Conr. Washed ashore on kelp.

Hinnites giganteus, Gray. Single valves.

Lima dehiscens, Conr. Several specimens.

Modiolus californianus, Conr. On rocks.

Septifer bifurcatus, Conr. With above.

Adula falcata, Gld. In soft rock.

Lithophaga plumula, Hanl. A few in rock.

Arca reticulata, Gmel. One alive under stone.

Barbatia gradata, Sby. Many examples under stones.

*Cardita subquadrata, Cpr. Uncommon.

Milneria minima, Dall. On spire of Haliotis.

Diplodonta orbella, Gld. A few at very low tide.

Chama exogyra, Conr. Mostly dead.

Chama pellucida, Sowb. Beautiful examples.

Cardium substriatum, Conr. Small shells.

Cardium quadrigenarium, Conr. Brought in by fishermen.

Tivela stultorum, Mawe. In the sand.

Amiantis callosa, Con. False Bay. A few good examples.

Tapes staminea, Conr. With Donax.

Chione succincta, Val. A few living.

Chione undatella, Sby. Pacific Beach. Several examples.

Petricola carditoides, Conr. In rock.

Donax laevigata, Desh. Very abundant in sand.

Heterodonax bimaculatus, D'Orb. Pacific Beach. Soft parts gone.

Tagelus californianus, Conr. Pacific Beach. Living in mud banks.

Sanguinolaria nuttallii, Conr. False Bay. Mostly dead shells.

Tellina bodegensis, Hinds. Pacific Beach. Single valves.

Metis alta, Conr. False Bay. One example.

Macoma nasuta, Conr. Not rare.

Semele decisa, Conr. Pacific Beach. A single valve.

Semele rupium, Sby. A few beautiful examples.

Lyonsia californica, Conr. False Bay. Fine shells in the drift.

Pandora bicarinata, Cpr. Pacific Beach. Many single valves.

Platyodon cancellatus, Conr. Torrey Pines. Fresh specimens.

Solen rosaceus, Cpr. False Bay. Young specimens.

Parapholas californica, Conr. Not rare with Adula.

Penitella penita, Conr. In soft rock.

Dentalium neohexagonum, S. & P. Pacific Beach. In sand.

*Cadulus quadrifissus, Cpr. One fine shell.

*Cavolinia tridentata, Forsk. Worn specimens.

Actaeon punctocaelatus, Cpr. False Bay. Among the drift.

*Tornatina culcitella, Gld. A single young specimen.

Tornatina cerealis, Gld. False Bay. Abundant in drift.

Bulla gouldiana, Pils. False Bay. Very plentiful.

Haminea vesicula, Gld. False Bay. Empty shells.

Haminea virescens, Sby. South La Jolla. On alga-covered rocks.

Tylodina fungina, Gabb. On brown algae.

*Pedipes unisulcatus, J. G. C. Several hundred in two days.

Melampus olivaceus, Cpr. False Bay. Abundant with Cerithidea.

Siphonaria peltoides, Cpr. One washed ashore.

Gadinia reticulata, Sby. On the beaches.

Physa sp. indet. In a small reservoir back of the town.

Succinea rustica, Gld. San Diego Mission. On the muddy banks of a small stream.

Helix aspersa, Muller. I took several dozen to the town and released them in a garden. Today they may still be found.

Epiphragmophora tudiculata, Binney. Among the roots of cacti.

Epiphragmophora stearnsiana, Gabb. False Bay. A few specimens on the beach, probably washed from Point Loma.

Glyptostoma newberryanum, W. G. B. Plentiful ten miles inland.

Terebra simplex, Cpr. Pacific Beach. Uncommon.

Conus californicus, Hds. Plentiful under rocks.
Pleurotoma carpenteriana, Gabb. Torrey Pines. Several dozen.
Drillia moesta, Cpr. Under stones.
Drillia inermis, Hds. Pacific Beach. Several specimens.
Drillia penicillata, Cpr. Mostly dead.
*Mangilia striosa, C. Adams. Fine large specimens.
Cancellaria cooperi, Gabb. Torrey Pines. One example.
Olivella biplicata, Sby. Common in the sand.
Olivella pedroana, Conr. With above.
Marginella jewettii, Cpr. Several worn specimens.
*Marginella pyriformis, Cpr. Plentiful.
Marginella varia, Sby. Living, under stones.
Mitra maura, Swain. Several found living. The pure white animal contrasts strongly with the dark shell.
Mitromorpha aspersa, Cpr. Rare.
*Mitromorpha filosa, Cpr. Not plentiful.
Siphonalia kellettii, Fbs. Brought in by fishermen.
Macron lividus, A. Adams. Under stones.
Nassa fossata, Gld. One living shell.
Nassa mendica, Gld. Pacific Beach. A few worn specimens.
Nassa mendica, Gld., var. cooperi, Fbs. False Bay. One example.
Nassa perpinguis, Hinds. Mostly inhabited by hermit crabs.
Nassa tegula, Rve. False Bay. Common in muddy stations.
Columbella guasapata, Gld. On eel-grass.
Columbella guasapata, Gld., var. carinata, Hds. With above.
Amphissa corrugata, Rve. Several found living.
*Amphissa versicolor, Dall. One shell.
Murex festivus Hds. Under rocks.
Murex incisus, Brod. Common in rock pools.
Murex nuttallii, Conr. Pacific Beach. Many examples.
Ocinebra interfossa, Cpr. On the beaches.
Ocinebra poulsoni, Mutt. Pacific Beach. With Murex festivus.
Ocinebra gracillima, Strs. Among drift.
Trophon belcheri, Hds. Brought in by fishermen.
Monoceros engonatum, Cpr. Not rare.
Monoceros lapilloides, Conr. Several living shells.
Scala crenatoides, Cpr. Crevices of rock.
Scala hindsii, Cpr. Common.

Scala tincta, Cpr. Young specimens.
Janthina exigua, Lan. Found on beaches after storms.
Janthina sp. indet. False Bay. A single example.
*Eulima micans, Cpr. Several large shells.
*Eulima rutila, Cpr. One specimen.
*Eulima incurva, Ren. Bleached specimens.
Pyramidella conica, Ads., var. variegata, Cpr. A single example.
Turbonilla tridentata, Cooper. Large specimens.
*Odostomia nuciformis, Cpr. One fine shell.

(*To be concluded.*)

NOTES.

NOTE ON TRIVIA PILULA KIENER.—This minute species, heretofore known particularly through specimens from the Hawaiian Islands, was described by Kiener in his "Coquilles Vivantes," (no date, but about 1840) p. 151, pl. 54, f. 2, the habitat being then unknown. It was mentioned by Reeve (Conch. Iconica, 1845, p. 56, f. 524*) as a synonym of the very much larger West Indian species, *Tr. globosa* Gray. Sowerby in his "Thesaurus Conchyliorum" (1870), Melvill, in his paper on the "Survey of the Genus Cypræa, (1888), and Roberts, in his monograph in Tryon's Manual of Conchology" (1885) all followed Reeve in this respect. Weinkauff, however, in his Systematisches Conchylien-Cabinet" of Kuster (1881, pp. 159, 152), deemed it entitled to specific rank. This view, in which my study of these species has long since led me to concur, is is now further confirmed by the opinions of three other conchologists in the recent "Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar—Supp. Rept. on the Molluscan Shells, by Robert Standen and Alfred Leicester," (1906). Among the species found are mentioned both *Tr. globosa and Tr. pilula* (by typographical error named as "*Tr. fibula*"), with the remark added, as to the last named species, that they "agree with Mr. J. M. Williams (of Liverpool), to whom the specimens were submitted, that they are not the same as *Tr. globosa* Gray."

FRED L. BUTTON.

THE ANCEY COLLECTION OF SHELLS.—We learn that the collection of shells of the late C. F. Ancey, of Mascara, Algeria, has

been acquired by Monsieur Geret, Conchologist, 76 rue Faubourg, St. Denis, Paris, France. This collection, which is one of the most important in Land and Fresh-water shells, will be sold to suit the purchaser. Collectors can from now on send to M. Geret to reserve any species or type which they may desire from this magnificent collection.

ANGELO HEILPRIN.

Professor Angelo Heilprin, the well-known naturalist died in New York City, July 17. He was born in Hungary, March 31, 1853, and came to the United States in 1856. He was Professor of Invertebrate Paleontology and Geology, (1880–1900), and Curator, from 1883 to 1892 of the Academy of Natural Sciences, and Professor of Geology at the Wagner Free Institute of Science 1885–90. For several years past he held the Lectureship on Physical Geography at Yale University.

While most of the works of Prof. Heilprin pertained to geology and physical geography, there are a number which are of special interest to conchologists. "Animal Life of the Seashore," and the "Bermuda Islands": a contribution to the physical history and zoölogy, both treat extensively of the mollusca. "Explorations on the West Coast of Florida" (Trans. Wagner Free Inst. Sci. Vol. I). On this expedition the richly fossiliferous pliocene of the Caloosahatchie was discovered and many of the interesting species of mollusks described, together with a number of those from the "silex-bearing marl" of Tampa Bay, now classed as Oligocene. Professor Heilprin has also published numerous papers in the Proceedings of the Academy of Natural Sciences. His later works deal principally with volcanic phenomena, especially Mont Pelée, where he was one of the first scientific observers on the ground.

Professor Heilprin possessed to an unusual degree the ability to interest non-scientific people in scientific matters; and to the inspiration of his personal teaching many owe the beginnings of a deep interest in geology, geography and other natural history studies. Personally, Professor Heilprin was infectiously optimistic and confident. He successfully organized and led numerous scientific expeditions; and his death was due to the effects of a tropical fever, contracted on an expedition to the Orinoco river, about a year ago.

THE NAUTILUS.

VOL. XXI. OCTOBER, 1907. No. 6.

NOTES ON PLANORBIS.—I.

BY BRYANT WALKER.

PLANORBIS MULTIVOLVIS Case. Plate VIII.

This species was described by William Case, of Cleveland, O., in 1847 (Am. Jour. Sc. [2], III, p. 101), from specimens collected by Captain B. A. Stannard, "in the northern part of Michigan." Most, if not all, of these specimens, apparently, were given by Case to Dr. Gould, who distributed a few and deposited the balance in the collection of the Boston Society of Natural History. Examples were sent to the Cuming Collection (now in the British Museum), from which the species was well illustrated in the Conchologia Iconica by Sowerby, whose figures were copied in the Conchylien Cabinet.

A single specimen found its way into the Jay Collection now in the American Museum of Natural History, and another was given to the Smithsonian Institution. Subsequently Dr. Gould gave several specimens to Dr. W. H. Dall, which are now in the National Museum. So far as I have been able to ascertain, the original lot is not represented in any other collections.

From that time until 1906 nothing further has been known of the species. In 1888 (J. of C., V, p. 330), on the authority of the late Geo. W. Tryon, Jr., I announced the re-discovery of the long-lost species in Marl Lake, Roscommon County, Mich. But a subsequent comparison with genuine specimens showed that the identification was erroneous. The Marl Lake shells are probably *P.*

campanulatus rudentis Dall (See Harriman Alaska Exped., XIII, p. 90).

The citation of *P. multivolvis* from Newfoundland by Farrer in 1892 (NAUTILUS, VI, p. 36) was, as stated by him, based on a comparison with the Marl Lake shells, and his specimens are apparently referable to the same variety.

Through the kindness of Mr. E. A. Smith I have had the opportunity of examining specimens in the British Museum from Labrador labelled "*multivolvis*." They are not that species, however, but a form of *P. campanulatus*.

In the summer of 1906, Dr. Chas. A. Davis of Ann Arbor, Mich., while in the field for the State Geological Survey, had the great good fortune to rediscover the genuine *multivolvis* on the north shore of Howe Lake, Marquette County, Mich., about forty miles west of the City of Marquette. Nine specimens only were obtained. Three of these are figured on the plate (figs. 4 and 8 to 11) and for comparison with them are given figures of one of the original specimens in the National Museum (figs. 1–3) and of the specimen in the Jay Collection (figs. 5–7).

Through the kindness of Mr. L. P. Gratacap of the American Museum, I have been able to make personal comparison of the latter specimen with those from Howe Lake. As shown by these figures, there can be no question as to the identity of the Howe Lake shells with Case's species.

Both of the original specimens figured are apparently much less elevated than the Howe Lake shells, but the upper whorls of the "Jay" specimen were badly eroded so that it was difficult to make out the exact number of whorls, and the depressed spire of the National Museum shell is evidently owing to the very irregular growth, as shown in fig. 3. That some of the original lot were quite as elevated as the Howe Lake specimen is shown by Sowerby's figure 72*a*, for comparison with which fig. 4 is given. The dimensions of this specimen are almost exactly the same as those of Sowerby's figure, and figure 4 would almost pass as an outline facsimile of the other.

It is equally clear that *multivolvis* is a valid species and quite distinct from *campanulatus*. Compared with the latter it is distinguished by its elevated spire with more numerous and narrower whorls and the wide, deep umbilicus.

An apparent peculiarity of Howe Lake shells is the very irregular growth. Of the eight 1906 specimens before me only one (fig. 4) is entirely regular in the coiling of the whorls. Of the others the shell represented by figs. 9–11 is least distorted and figure 8 is most so. That this was also a peculiarity of the original lot is shown by figure 3.

P. multivolvis is apparently a scarce shell in Howe Lake at the present time. Two visits there in July, 1907, each involving a careful search of the entire north shore, only yielded three specimens. It seems probable that the species lives in comparatively deep water during the summer and only comes in towards shore, if at all, for spawning purposes. Such seems to be the habit of the Lymnæidæ in Pine Lake, Marquette County, which I have been familiar with for more than ten years, and a similar habit has been noticed by Kirkland in *Lymnæa mighelsi* in Crystal Lake, Benzie Co., Mich. (NAUTILUS, XIV, p. 8.)

The dimensions of the specimens figured are as follows:

	Major diam.	*Minor diam.*	*Axis.*
Figs. 1–3	14.00 mm.	11.50 mm.	6.00 mm.
Fig. 4	16.25 mm.	13.00 mm.	9.00 mm.
Figs. 5–7	16.25 mm.	13.00 mm.	7.00 mm.
Fig. 8	18.25 mm.	15.25 mm.	8.25 mm.
Figs. 9–11	18.00 mm.	15.00 mm.	9.00 mm.

The actual occurrence of this species in Michigan having thus been definitely determined, there still remains the question as to the locality where the type specimens were obtained. Unfortunately, Capt. Stannard failed to give any definite information on this point, and after the lapse of sixty years, there is no hope of getting any exact information. But it is a fair subject for speculation. One fact is clear, that although but a very small portion of the Upper Peninsula has as yet been explored conchologically, the work that has been done there has, with this one exception, failed to discover it. The species was described in 1847, and the specimens were probably collected within a year or two previous to that time. It is to be borne in mind that at that time the Upper Peninsula was an unbroken and practically an unknown wilderness. The rapid development incident to the growth of the copper, iron and lumber industries had not begun. Marquette was not settled until 1846,

and at that time Houghton was only known to the Indians and voyageurs. What little navigation there was on Lake Superior was between the "Soo" and a few small towns at the upper end of the lake, such as Eagle Harbor, Bayfield, Ontonogan, etc. Stannard was at that time captain of a small sailing craft which plied between these ports. On one of his voyages he discovered the famous rock in the center of the lake now known as Stannard's Rock. It seems clear enough, therefore, that the original locality for the *Planorbis* must have been somewhere on or near the south shore of the lake. The Hon. Peter White, who has lived in Marquette since 1849, informs me that the Indians told him that after Stannard discovered the rock in the middle of the lake, he was very cautious about sailing in stormy weather for fear of getting wrecked on some similar reef, and that at one time during a heavy stress of weather he took refuge under the lee of the Huron Islands and remained there for some days. Now the Huron Islands are only about three miles from the south shore of the lake, and Howe Lake is less than one mile inland and almost directly south of the islands. If during his enforced stay under the shelter of the islands Stannard had gone ashore to fish or hunt it is quite conceivable that he reached the north shore of Howe Lake and there found the shells he afterwards gave to Case.

While of course this is all speculation based on a mere tradition of fact, it certainly raises a possibility, at least, that Howe Lake may have been the original locality for this very interesting species. And, unless in the years to come, the species shall be found in some other locality, which seems more likely to be the original place of discovery, this possibility may prove to be a very good probability.

Note: My last visit to Howe Lake was on August 3d. On August 28th my sister made another visit to the lake and found seven more specimens all but one, unfortunately, more or less broken. During the interval several heavy storms had taken place which stirred up the lake and no doubt brought the shells in to shore. Of these specimens only one was irregularly coiled. The others were all similar to figures 4 and 10 which evidently represent the normal aspect of the form as it occurs in that locality. Considerable variation in size is shown, the largest specimen measuring $10\frac{3}{4}$x$17\frac{3}{4}$ and the smallest $7\frac{1}{2}$x$13\frac{3}{4}$ mm.

ANNOTATED LIST OF THE MOLLUSCA FOUND IN THE VICINITY OF LA JOLLA, SAN DIEGO CO., CAL.

BY MAXWELL SMITH.

(*Concluded from p. 59*).

Plate VII, view of La Jolla.

*Odostomia pupiformis, Cpr. Mostly worn specimens.

Gyrineum californicum Hds. Pacific Beach. Buried in mud.

Cypraea spadicea, Gray. After violent storms.

Trivia californica, Gray. False Bay. A few living, dead shells common at La Jolla.

Trivia solandri, Gray. Not rare.

Erato columbella, Menke. In the drift.

Erato vitellina, Hds. Seldom collected alive.

*Triforis adversa, Mont. Fine shells not rare.

Cerithiopsis tuberculata, Mont. A few small specimens.

*Cerithiopsis metaxæ, Della Chiaje. False Bay. A single shell.

Bittium quadrifilatum, Cpr. False Bay. On sponges.

Cerithidea californica, Hald. False Bay. With Melampus.

Cæcum californicum, Dall. Uncommon.

Cæcum crebricinctum Cpr. Under rocks resting on clean sand.

Vermetus squamigerus, Cpr. Plentiful under stones.

Littorina scutulata, Gld. On the rocks.

Littorina planaxis, Nutt. With above.

*Lacuna unifasciata, Cpr. Plentiful.

*Fossarus fenestratus, Cpr. Rare.

*Rissoa compacta, Cpr. Not often found.

*Rissoina aequisculpta, Cpr. Not often found.

Truncatella californica, Pfr. False Bay. In drift.

Truncatella stimpsoni, Sby. False Bay. With above.

Crucibulum spinosum, Sby. Pacific Beach. Several specimens have long spines.

Crepidula aculeata, Gmel. On the beaches.

Crepidula navicelloides, Nutt. In aperture of Natica. Identical with C. plana.

Crepidula onyx, Sby. Pacific Beach. On stones.

Amalthea antiquatus, Linn. Under layers of rock.

Amalthea cranioides, Cpr. With above.

*Amalthea tumens, Cpr. Young specimens.
Natica draconis, Dall. Rare with N. lewissii.
Polinices lewissii, Gld. Pacific Beach. Common, below tide.
Polinices recluziana, Desh. Pacific Beach. Abundant at low tide.
Polinices uber, Val. False Bay. A Lower California shell. Not before reported from California.
Lottia gigantea, Gray. Small specimens plentiful on the rocks.
Acmaea asmi, Midd. On Chlorostoma.
Acmæa scabra, Rve. Not uncommon.
Acmæa incessa, Hds. Several shells, soft parts gone.
Acmæa mitra, Esch. Torrey Pines. One specimen.
Acmæa paleacea, Gld. On eel-grass, common.
Acmæa patina, Esch. Abundant at all times.
Acmæa persona, Esch., var. umbonata, Nutt. Many examples.
Acmæa spectrum, Nutt. On rocks.
Acmæa depicta, Hds. On grasses.
Acmæa rosacea, Cpr. One faded shell.
Phasianella compta, Gld. In drift.
Leptothyra carpenteri, Pils. Two specimens.
Pomaulax undosus, Wood. Many shells at low tide.
Norrisia norrisii, Sby. In algæ.
Calliostoma canaliculatum, Mart. One small shell.
Calliostoma tricolor, Gabb. Pacific Beach. Under small round stones.
Calliostoma gemmulatum, Cpr. Dead shells, rare.
Chlorostoma aureotinctum, Fbs. Not uncommon.
Chlorostoma funebrale, Ad. Many examples.
Chlorostoma gallina, Fbs. Not rare.
*Halistylus pupoides, Cpr. Not common. A northern species.
*Ethalia supravallata, Cpr. Rare.
*Liotia acuticostata, Cpr. Several examples.
Liotia fenestrata, Cpr. Beautiful specimens.
*Vitrinella complanata, Cpr. Three shells.
Haliotis corrugata, Gray. Pacific Beach. One small example.
Haliotis fulgens, Phil. The most abundant Haliotis.
Haliotis rufescens, Swains. Several fine specimens.
Fissurella volcano, Rve. Under stones, common.
Fissuridea murina, Dall. Dead shells.
Lucapina crenulata, Sby. Occasionally found alive.

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LA JOLLA, CALIFORNIA.
(See article by Maxwell Smith, p. 55).

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WALKER: PLANORBIS MULTIVOLVIS

*Lucapinella callomarginata, Cpr. Mostly worn shells.
Megatebennus bimaculatus, Dall. In drift.
Mopalia muscosa, Gld. Fine specimens.
Mopalia ciliata, Sby. Several shells.
Nuttallina scabra, Rve. On rocks.
Ischnochiton conspicuus Cpr. Under flat rocks.

NOTES ON THE CONCHOLOGY OF POCONO MANOR, MONROE CO., PA.

BY JOSHUA L. BAILY, JR.

During the past summer it was my fortune to spend six weeks at Mt. Pocono, Monroe Co., Pa., the largest mountain summer-resort in Pennsylvania, and while there had an excellent opportunity to explore the molluscan fauna of a region which has been neglected by conchologists heretofore. The Pocono Inn, at which I stayed, the only hotel on Pocono Manor, is located on Little Pocono Mountain, about 1850 feet above sea-level. From the Inn a fine view may be had on clear days of the Delaware Water Gap. Three miles to the westward lies the source of Swiftwater Creek, which after passing the falls, reaches Lake Minausin, about 500 feet below the level of the Inn. On the other side of the mountain is a smaller stream known as Indian Run, which flows into the Swiftwater about a mile below the lake. The temperature of the water is 45° F. or lower, except in the lake, where the sun shines on it. Perhaps this is why I have never been able to find any fresh-water shells at all during four summers' collecting. And also, as implied by the name, the water is so swift that no mud settles on the bed rock, which is always clean. Shells there must be, somewhere, for I have frequently found clusters of eggs adhering to the aquatic vegetation, which is very abundant; but although I have searched the Swiftwater to its source, and the other stream nearly as far, I have never been rewarded by finding any of our friends at home when I called. Last year my brother found one specimen each of an undetermined *Physa* and *Pisidium* in Paradise Valley, but as this was five miles from Pocono Manor I will not include them in the list.

With respect to land forms, however, a greater variety is encountered. The country is exceptionally rocky, the predominating rocks being red shale. The soil is very fertile, and in the woods the

ground is covered several inches deep with decaying leaves. Most of my collecting was done on hillsides having a northeastern exposure and at an elevation of about 1550 feet. The list of species follows:

Tebennophorus carolinensis Bosc.

Vitrea indentata Say.

Vitrea hammonis Ström.

Vitrea ferrea Morse.

Zonitoides arborea Say.

Euconulus chersinas polygyratus Pils. Found under decaying leaves far from the water. Rare.

Pyramidula cronkhitei catskillensis Pils.

Helicodiscus parallelus Say.

Polygyra albolabris Say. Exceedingly common in a man-hole on the pipe line which takes water from the Manor Spring to the Inn.

Polygyra dentifera Say.

Polygyra tridentata Say. Only the typical form. I saw no var. *juxtidens* Pils.

Polygyra hirsuta Say. I was much surprised to find this species only under boards in fields exposed to the sun, and never in shady places at all.

Polygyra fraterna Say.

Bifidaria pentodon Say.

Cochlicopa lubrica Mull. Although I searched diligently I was never able to find this species alive, four dead specimens being the best I could do.

Succinea ovalis Say (*obliqua* Say). Another shell of which it is hard to obtain good specimens. The broken shells of this species are quite common.

Next year I hope to add some more names to this list.

Haverford, Montg. Co., Pa., Sept. 9, 1907.

SHELLS COLLECTED IN NORTHEASTERN MEXICO.

BY A. A. HINKLEY.

The species here listed were collected in December and January of the past winter. At Tampico land and fresh-water forms were scarce and had it not been for the rich find in a windrow of river débris or drift the list would have been much smaller. This drift

was sifted through a small net and the siftings were worked over after returning home.

In both Panuco and Tamesi rivers there seemed to be very little molluscan life. Nearly all the living fresh-water forms listed from Tampico were taken from small ponds near LaBarra.

The mouth of the Panuco river is protected by jetties, on the gulf side of which most of the living marine species were taken. Not a specimen of any species was noticed on the river side of the jetties. Two days were spent on the beach and jetties, but no other effort was made to secure the marine forms.

In the vicinity of Valles the land shells were no more plentiful than about Tampico, but the Valles river was much richer in both species and individuals than the rivers at Tampico. With two exceptions the small streams seemed destitute of molluscan life.

It has been thought desirable to publish the full list because the shell fauna of this part of Mexico is but little known. No information has before been published on the marine forms between Texas and Vera Cruz; and the only data on the land shells of the region is contained in Pilsbry's paper on Rhoads' collection, which was made somewhat further inland, north of the localities here dealt with. It is likely that some of the old species hitherto credited to Texas were really taken at or near Tampico, such as *Helicina chrysocheila* and *Euglandina corneola*. The occurrence of *Adelopoma* so far north is remarkable.

The larger part of the species of this list were passed on by Dr. H. A. Pilsbry. Thanks are also due to Dr. Wm. H. Dall for assistance with some of the marine and fresh-water forms.

MARINE MOLLUSKS.

Spirula spirula (L.). Only broken ones taken.

Ostrea sp. Scattering young were on the jetties. In different places along the river and canal are beds of oyster shells exposed to view, overlaid by the surface soil. These shells are often dug out and burnt for lime.

Chama arcinella L., odd valves.

Pecten exasperatus Sby., odd and broken valves, common.

Pecten gibbus irradians Lam., odd valves.

Pecten nodosus Linn., broken valves.

Pecten raveneli Dall (?), one lower valve.

Mytilus hamatus Say, common on the jetties.

Mytilus exustus Linn., associated with *hamatus*, from which it is easily separated by its finer striæ and smaller size.

Modiola polita Verrill, 3 young specimens.

Congeria cochleata Kirby, found among clusters of *M. hamatus* as if seeking protection.

Arca floridana Conrad, odd and broken valves were plentiful.

Arca incongrua Say, 3 living specimens taken, odd valves common.

Arca occidentalis Ph., odd valves and pieces.

Phacoides pectinatus Gmel., odd and broken valves.

Cardita floridana Conrad, odd valves plentiful.

Cardium iscoardia Linn., odd and broken valves common.

Cardium magnum Born, odd valves common.

Cardium robustum Sol. (?), one young odd valve.

Dosinia discus Reeve, a few living ones taken, dead ones common.

Donax variabilis Say, one of the most plentiful species on the beach both living and dead.

Chione cancellata L., odd valves.

Chione intapurpurea Conrad, odd valves.

Tellina radiata Linn., odd valves.

Macoma constricta Brug., odd valves.

Iphigenia braziliana Lam., a few live ones taken.

Martesia cuneiformis Say. An old water-logged banana stalk thrown up by the tide, contained a number of nice specimens which were secured by the aid of a knife; also the shell-lined burrows of a *Teredo* were in this stalk.

Pinna sp., broken pieces.

Siphonaria lineolata Orbigny., numerous on the rocks of the jetties.

Crepidula aculeata Gmel., one poor specimen.

Cerithidea iostoma Pfr., a few dead specimens.

Terebra cinerea Gmelin. Living ones were common, mostly quite young, exposed to view as the waves receded, always turning head toward the current and immediately burying themselves in the sand.

Natica duplicata Say, one young specimen.

Natica brunnea Link, two dead and not mature.

Columbella obesa C. B. Adams, three found on a log thrown up by the tide.

Melongena melongena L., one specimen, dead and poor.

Purpura haemastoma Linn., common on the rocks of the jetty, no full-grown ones found.

Modulus modulus L., a few poor specimens noticed.

Littorina nebulosa Lam., var. *columellaris* Orbigny. A few were found on logs along the beach, but it is common on the jetties. Dr. Dall referred it to *L. flava*. Pilsbry says "*L. flava* is very thick inside the lip, exactly like *irrorata*. It resembles *nebulosa* in color, but is evidently a distinct species close to *irrorata*. I have never seen *L. flava* from north or west of Trinidad."

Littorina ziczac Dillwyn., very numerous on the jetties.

Cassis inflata Shaw, two young and dead.

Nerita præcognita C. B. Adams, three on the rocks of the jetty.

Neritina lineolata Lam. Plentiful in low places along the river and young ones were found on the gulf side of the jetties.

Neritina virginea L., a few were found with *lineolata* on one jetty.

Solarium granulatum Lam., two dead specimens.

Fissurella alternata Say, a few dead ones.

Vermicularia spirata Phil., young and dead.

Melampus coffea L., a few immature specimens.

Melampus floridanus Shuttl. Only a few specimens of this small species were found. Dr. Dall referred them to young *Tralia cingulata* Binney.

HELICINIDÆ.

Helicina chrysocheila Binney. Tampico and Valles. Scattering specimens were found over considerable territory. The species is very variable in color. Dead specimens were numerous in some places.

Helicina flavida Mke. This species was found only in the drift on the river bank, mostly dead.

Schasicheila hidalgoana Dall. El Abra, on the mountain side with *Opeas* and *Holospira*, only 3 taken.

HELICIDÆ.

Trichodiscina coactiliata Fér. Tampico, in drift.

Praticolella griseola Pfr. This was the most widely distributed species found. It seems to prefer the open fields and pastures.

Polygyra martensiana Pils. Tampico and Valles.

Polygyra oppilata Moric. Tampico and Valles.

Polygyra implicata Beck. Tampico.

Polygyra polita Pilsbry and Hinkley. Tampico.

Polygyra aulacomphala Pils. and Hinkley. Tampico.

Thysanophora conspurcatella Morel. El Abra, found with *Opeas.*

Thysanophora fischeri Pilsbry. Tampico, drift.

Thysanophora horni Gabb. Tampico, drift. "Not before known from the littoral region of the Gulf" (*Pilsbry*).

BULIMULIDÆ.

Bulimulus dealbatus Say. A few dead specimens noticed in the vicinity of Valles.

Bulimulus schiedeanus Pfr. One dead specimen, Tampico.

Drymæus multilineatus Say. Valles. A few dead ones with colors nearly as bright as in life. Pilsbry says "The specimens are almost exactly intermediate between *D. multilineatus* and *D. discrepans* Sowb., having the coloration of the latter except that the apex is dark bluish, as in *multilineatus.* There is no dark subsutural band."

(*To be concluded.*)

NOTES.

We regret to record the death of Mr. Sloman Rous, of Brooklyn, N. Y., who died at sea on July 8th.

PUBLICATIONS RECEIVED.

The Mollusca of the Persian Gulf, Gulf of Oman and Arabian Sea, etc.—Pt. II, Pelecypoda, by James Cosmo Melvill and Robert Standen. (Proc. Zoöl. Soc., London, 1906, pp. 783–848, pls. 53–56.)

In this part some 426 species are enumerated, of which 35 species are new. The richness of the fauna is dwelt upon, the total number of mollusca recorded from this area being 1618. The two parts constitute a valuable addition to our knowledge of mollusks of this region.

New and Characteristic Species of Fossil Mollusks from the Oil-Bearing Tertiary Formations of Southern California, by Ralph Arnold. (Proc. U. S. Nat. Mus., XXXII, pp. 525–546, pls. 38–51, 1907.)

An interesting and profusely illustrated paper, in which 21 species and varieties are described as new. The geological formations represented are the Lower Miocene and Pliocene.

The Nautilus.

Vol. XXI. NOVEMBER, 1907. No. 7.

EYES OF HELICODISCUS LINEATUS.

BY EDWARD S. MORSE.

Last year in studying the eyes of the smaller Helices I discovered that *Helicodiscus lineatus* was destitute of any pigmental organ functioning as an eye. A further examination with a higher power reveals apparently rudiments of a structure which may indicate the traces of an eye but not the slighest evidence of pigmentation was seen. The body and tentacles are a clear white.

In the volume on Mollusks in the Cambridge Natural History series the Rev. A. H. Cooke gives an interesting resumé of what is known of the molluscan eye. He says, "In land mollusca which live beneath the surface of the ground or in absolute darkness the eyes are generally more or less modified. Thus in *Testacella*, which usually burrows deeply in the soil but occasionally emerges into the open air, the eyes are very small, but distinct and pigmented. Our little *Cæcilianella acicula*, which is never seen above the surface, is altogether destitute of eyes. A species of *Zospeum*, a *Helix* and a *Bithynella* from dark caves in Carniola have suffered a similar loss."

The habits of *H. lineata* do not differ apparently from the other smaller species with which it is associated. I hope later to make some experiments in phototaxis.

CAPE COD NOTES.

BY. REV. HENRY W. WINKLEY.

The month of July was spent at Provincetown. August at the head of Buzzard's Bay. Unfortunately without a dredge, I can report only low tide results. The hook on the end of Cape Cod is, geologically speaking, a late formation, composed entirely of coarse sand with limited vegetation; hence not a paradise for land and fresh-water forms. I examined two fresh-water ponds but found no shells. On the land *Helix hortensis* has a colony. No banded forms were found. The lemon-yellow and a very light nearly transparent form are the chief colorings. The latter compared with the specimens of this species found by Mr. C. W. Johnson, at Chatham, are of the same color but more nearly transparent. While the Cape is not an absolute barrier between northern and southern forms, it is usually counted as a boundary. Provincetown being at the tip end, I was curious to know its fauna, and can pronounce it southern. *Bittium nigrum* and *Odostomia trifida*, *bisuturalis*, *fusca*, *seminuda*, and an undescribed species occur more or less abundantly. Both *Lunatia heros* and *Neverita duplicata* occur on the sand flats. *Litorinella minuta* is abundant but small. *Mya arenaria*, living in the clean sand, is abundant and the whitest shells I ever saw. *Venus mercenaria*, *Clidiophora gouldiana* and other forms show the general character of the fauna. Without attempting to make a detailed list, the forms are the same one would find south of the Cape. *Purpura lapillus*, living on the wharves, gave a few curiosities. Several specimens of deep yellow color in last year's growth had changed in this year's addition to pure white.

The outer side of Cape Cod is the home of *Ceronia arctata*. A visit to Highland Light at North Truro gave me a half hour at high tide, but I found a good set of the species and of fine large size. Odd valves of *Astarte castanea* show that it abounds. One or two specimens of *Cochlodesma leanum* demonstrate its home there.

A day spent at Woods Holl gave me an hour's collecting at low tide in the eel pond. The only record I would make would be one or two species of *Turbonilla* secured from a row boat. It is the first time I have ever collected any species of this genus in shallow water. My headquarters during August were at Wareham on an arm of

Buzzard's Bay, not quite on the Cape but near enough. As Pat says, "contagious" to it. The marine forms here are affected by brackish water. In one arm I could get *Ilyanassa obsoleta* in abundance, but failed to find Bittium and the Odostomias. In another arm with the fresh water they occur, but more or less eroded. A colony of fine specimens of *Paludestrina salsa* occurs in a pot hole on the marsh, and my daughter, Miss Ruth Winkley, located the same form sparingly among the flags along the border of the Agawam river at East Wareham. More should be said of the fresh-water collecting. The Agawam river is rich in specimens. *Unio complanatus* abundant and large, *Anodonta cataracta* occasional, and *Anodonta implicata* abundant and the finest specimens I have seen. My largest is $6\frac{1}{2}$ inches long and weighs $5\frac{1}{2}$ ounces. (Gould gives the largest as $4\frac{1}{2}$ inches long.) *Sphaerium secure* is very abundant. I obtained an unusually fine series of Anodonta beaks at this spot. On the whole I may say that a section of this stream is the richest in animal life I have ever seen in New England.

Ditches in the older cranberry bogs and small brooks abound in specimens of *Pisidium*, and *Amnicola limosa* and *porata* occur sparingly. Other fresh-water species occur like *Planorbis*, *Physa*, etc., but they are in better form earlier in the season, so I neglected them. I failed to find land shells. It has been an exceedingly dry season, and that may be the reason. I regret that I had no dredge with me. The good results from shore collecting would indicate the same from deeper waters.

A NEW SPECIES OF FLUMINICOLA.

BY H. A. PILSBRY.

The genus *Fluminicola* of Stimpson comprises globose, *Somatogyrus*-like snails of streams and springs in and west of the Rocky Mountains. A list published by the writer in 1899[1] enumerates seven species and one subspecies. A new form was among the mollusks collected by the late Rev. Mr. Ashmun in Idaho, during the last year of his life.

[1] The NAUTILUS, XII, March, 1899, pp. 123, 124.

FLUMINICOLA MINUTISSIMA n. sp. Plate IX, fig. 1.

The shell is perforate, obliquely globose, thin, smooth, olivaceous yellowish, composed of three rapidly enlarging whorls, which are convex, and separated by an impressed suture, which becomes very deep in the last half-whorl. The spire is very short, the summit obtuse, the first whorl being nearly flat. The last whorl enlarges rapidly, and is well rounded peripherally, less so below ; its last half descends rapidly. The aperture is quite oblique, nearly circular, but is angular above. The outer lip is thin, distinctly retracted at the upper insertion; the slightly concave columella is very strongly calloused within, flattened on the face. Below the umbilical perforation there is a narrow, crescentic, slightly excavated area, bounded outwardly by a low angle.

Alt. 1.5, diam. 1.75 mm.

Price Valley, Weiser Canyon, Washington Co., Idaho. Types no. 94273 A. N. S. P., collected by the Rev. E. H. Ashmun.

This species is smaller than any other of the genus, and is further distinguished by its very short spire and the rapid descent of the last half whorl. The columellar callus is unusually heavy for so small a shell.

SHELLS COLLECTED IN NORTHEASTERN MEXICO.

BY A. A. HINKLEY.

BULIMULIDÆ.

Oxystyla princeps Brod. Tampico and Valles. Only dead specimens secured.

UROCOPTIDÆ.

Macroceramus mexicanus Martens. El Abra.

Holospira hinkleyi Pils. El Abra, on the mountain side with *Opeas*.

PUPILLIDÆ.

Strobilops hubbardi A. D. Brown. Tampico, scarce in drift.

Pupoides marginatus Say. Tampico, drift.

Bifidaria contracta Say. Tampico, drift, the most abundant species.

Bifidaria pellucida Pfr., var. *hordeacella* Pils. Tampico, drift, almost as numerous as *B. contracta*.

Bifidaria procera Gld. Tampico, found under pieces of wood in an open field, also in the drift.

Vertigo milium Gould. Tampico, two specimens in the drift.

ACHATINIDÆ.

Opeas gracile Hutton. El Abra, plentiful on the mountain side.

Opeas beckianum Pfr. Tampico, drift.

Opeas micra Orb. Tampico, drift.

Leptinaria tamaulipensis Pils. Tampico, scarce in the drift.

Leptinaria mexicana Pfeiffer. Tampico, drift.

Spiraxis tampicoensis Pils.[1] Tampico, drift, numerous.

Cecilioides (Cæcilianopsis) jod Pils. Tampico, drift.

OLEACINIDÆ.

Euglandina corneola Binn. Valles, a few dead ones.

Euglandina texasiana Pfr. Tampico and Valles, found about decaying logs, the most plentiful species of this family. Pilsbry says "Not *G. turris*. I find that they agree fully with Texas examples."

Euglandina sp. Valles.

Streptostyla gracilis Pils. Tampico and Valles, dead specimens.

Salasiella joaquinæ Strebel. El Abra, one specimen.

ZONITIDÆ.

Guppya elegans Strebel. Tampico, a few in the drift.

Zonitoides minuscula Binney. Tampico, numerous in the drift.

Zonitoides singleyana Pils. Tampico, common in the drift.

Zonitoides pentagyra Pils. Tampico, drift.

Zonitoides elegantula Pfr. Tampico, drift. This minute species was not plentiful. Pilsbry says "This is *Helix elegantula* Pfr., very badly figured as *Chanomphalus elegantulus*, by Strebel. Hitherto not known north of Vera Cruz. It has about the size and general appearance of a *Radiodiscus*, but the embryonic whorl is without spiral striæ."

LIMACIDÆ.

Agriolimax sp. undet. Valles, scarce.

ENDODONTIDÆ.

Pyramidula victoriana Pils. Tampico, in the drift, mostly immature examples.

[1] This species appears to belong to the genus *Cœlostele*, which has not hitherto been known in America.—Ed.

SUCCINEIDÆ.

Succinea luteola Gould. In the vicinity of Tampico this species was numerous in a pasture; near Valles they were found along the wagon road, but more plentiful on a railroad embankment. They are richly colored, reddish with pale and dark streaks; some albino specimens were taken.

Succinea luteola Gld., var. *subtilis* Marts. Valles; only two examples taken.

Succinea sp. Tampico. Found in a loose pile of decaying vegetation and on the skull of a cow. The specimens taken are not quite as large as *S. luteola*, and are thinner.

VERONICELLIDÆ.

Veronicella sp. Valles; scarce, in shaded places.

CYCLOSTOMATIDÆ.

Adelopoma stolli Martens. Tampico. A single specimen found in the drift. Pilsbry says "This small species was described by Prof. Von Martens as *Diplommatina stolli*. This example is a little smaller than typical *stolli*, with weaker ribs and less swollen penult. whorl. The last whorl is gibbous above the columella, a character not noticed by Von Martens in his description of *stolli*. The number of riblets is about the same as in *stolli*, or perhaps somewhat greater. Until further examples are found the value of these differences from *stolli* is uncertain."

LYMNÆIDÆ.

Lymnæa cubensis Pfr. Valles. Taken from a pool by the roadside.

Planorbis cultratus Orb. Tampico. This small flat species was noticed in but one place; they were taken from the edge and underside of a piece of board and other driftwood lying on the land near the edge of a small pond. A few *Seg. obstructa* were taken with them.

Planorbis liebmanni Dkr. Tampico and Valles; only dead specimens found in river débris.

Planorbis sp. Tampico. A very small form found in the drift.

Segmentina obstructa Morelet. Tampico and Valles. A common species in ponds; dead ones were numerous in places in the drift.

Physa mexicana Phil. Tampico and Valles. Young shells were numerous in some of the shallow pools, the larger ones being rather scarce.

Physa osculans Hald., var. *rhyssa* Pils. Roadside pool near Valles with *Lym. cubensis*, the only place these two species were found. Differs from *P. mexicana* in having a more attenuate spire, one more whorl, and the body whorl is less inflated.

Physa sp. This is thicker than the *P. mexicana* and has the chestnut-colored callus within the outer lip, which in the larger examples shows at previous stages of growth.

Ancylus excentricus Morelet. Found on plants in Tamesi and Valles rivers; scarce; a fragile species.

VALVATIDÆ.

Valvata humeralis Say. Valles river.

AMNICOLIDÆ.

Cochliopa riograndensis Pils. & Ferr. Valles river. More elevated than *Valvata humeralis* and differs from it in having several colored spiral lines, giving it a striking resemblance to a small *Helix*. The operculum and teeth, examined by Dr. Pilsbry, show it to be correctly referred to *Cochliopa*. The aperture is angular above, thus differing from that of *Valvata*.

Amnicola guatemalensis C. & F. Tampico, on pieces of wood in ponds.

Amnicola tryoni Pilsbry. Tampico, drift; a smaller species than *guatemalensis*.

Potamopyrgus coronatus Pfr. Tamesi river, Tampico. The spines on the shoulder are well developed for so small a species.

Potamopyrgus coronatus texanus Pils. Valles river, only two examples secured, they do not show the spines.

Paludestrina tampicoensis Pils. & Hinkl. Tampico.

MELANIIDÆ.

Pachycheilus vallesi Hinkley. Plentiful in the Valles river.

UNIONIDÆ.

Unio tampicoensis Lea. Valles river.

Unio popei Lea. Valles river. Pilsbry says of these shells "I think they are correctly referred to *popei* Lea, as a variety. It differs from typical Texan *popei* in the dark nacre and the more distinct green rays. It is related also to *U. soledadensis* Crosse &

Fischer, but differs in the wide posterior end and the distinct rays. *U. soledadensis* was omitted by Simpson, evidently inadvertently. It should go in the *Synopsis* next to *U. popei.*"

Unio sp. Valles river. The most plentiful *Unio* found. Dall referred it to *soledadensis.* Pilsbry says "A new species, related to *popei*, yet with some features of *U. medellinus.*"

CYRENIDÆ.

Cyrena carolinensis Bosc. Panuco river, Tampico; found but few.

Cyrena germana Prime. Panuco river, Tampico. A single example, more compressed, and lighter colored, but possibly intergrades with *carolinensis.*

Pisidium singleyi Sterki. Valles river; Valles and drift of Panuco river, Tampico.

Eupera singleyi Pils. Valles river, Valles; and Tamesi river, Tampico.

MACTRIDÆ.

Mulinia lateralis Say. Panuco river.

PELSENEER'S TREATISE ON MOLLUSCA.

A TREATISE ON ZOOLOGY, edited by E. Ray Lankester, PART V, MOLLUSCA, by Paul Pelseneer, London, 1906. This admirable book, of 355 pages, should be studied by every conchologist, although it is not quite elementary, and some fundamental knowledge of zoölogy is required to fully understand it. The text is well illustrated by 301 figures, partly diagrammatic, many of them from Prof. Lankester's article "Mollusca" in the ninth edition of the Encyclopedia Britannica, 1883. It is interesting to note the considerable changes of classification from Lankester's article to the present book. The editor of the NAUTILUS may permit to cite the main groups here, side by side:

LANKESTER, 1883.	PELSENEER, 1906.
Branch A. Glossophora.	Grade A. Isopleura.
Class 1. Gastropoda.	Class I. Amphineura.
Br. *a.* Isopleura.	Grade B. Prorhipidoglossomorpha.
Br. *b.* Anisopleura.	Class I. Gastropoda.
Class 2. Scaphopoda.	Class II. Scaphopoda.
Class 3. Cephalopoda.	Class III. Lamellibranchia.
Br. *a.* Pteropoda.	Grade C. Siphonopoda.
Br. *b.* Siphonopoda.	Class I. Cephalopoda.
Branch B. Lipocephala.	
Class 1. Lamellibranchia.	

It is seen that the PTEROPODA have disappeared as a division of higher order; they are ranged under two tribes of the sub-order *Tectibranchia*, order *Opisthobranchia*, of Gastropoda (pp. 170 and 173).

Many conchologists and zoölogists may be surprised to find the class Lamellibranchia[1] ranged under the same group with the Gastropoda and Scaphopoda, as in contrast to the *Isopleura* and the *Siphonopoda*. It still appears that the arrangement as adopted by Lankester and other zoölogists, is more natural: Lipocephala or Acephala, and Cephalophora. Not alone is the presence or absence of a head a distinguishing feature. On pp. 6–7 the author says: "the radula is characteristic of the phylum mollusca. It exists throughout the series . . . and is only absent in the most specialized types, in which it has evidently been lost, such as . . . the Lamellibranchs . . ." If it was lost in the latter there should be traces of it in the embryo, the more so since the embryonal and larval stages of at least many Lamellibranchia are of very well marked forms and existing as such through a long time and under various conditions. Also for other reasons it might appear that the Lamellibranchia are not a specialized or retrograde group, *e. g.*, from the Gastropoda or some primitive form near them, as must be inferred from Pelseneer's arrangement, but one primitively different. At any rate, I believe that they represent a group of decidedly inferior organization, and that their proper place is not in the same group with the Gastropoda, and between the latter and the Cephalopoda. The formation, and especially the functions of the ctenidia (branchiæ), are certainly significant;[2] and although the Lamellibranchiata have been decidedly, and as it seems, definitely separated from the Bryozoa, etc., the fact should not be overlooked that the branchiæ of the former have not only the same functions—principally nutritive—as the tentacles of the latter, but that, in many instances at least, the filaments are of similar formation, even to minute details. Something else might be said in this connection: it is the tendency of our day to found classification on a single organ, or organ system—rather than on the ensemble of the whole organization.

[1] On p. 197 the author says that the name *Scaphopoda* has been more generally used than *Solenoconcha*, for the sake of uniformity; for that same reason he might have adopted the name *Pelecypoda* in place of *Lamellibranchia* (better: *Lamellibranchiata*).

[2] Confer also Lankester l. c., pp. 684 and 685.

While studying the book I made some notes on minor items, and a few of them may be mentioned here.

A somewhat strange incongruity is shown in the synoptic tables at the head of each class, that of the Isopleura is carried down to families, those of Gastropoda and Lamellibranchia to sub-orders (the tribes of the former are omitted), that of Cephalopoda to tribes. In a general way, the grouping is carried down to genera, giving shorter or longer diagnoses of the latter where it seemed desirable.

Pp. 7 and 89–91. Radula. It should have been stated that the radula with its teeth is constantly formed anew, and advancing; while the teeth at the anterior end are becoming blunt and useless, and dropping off, new teeth at the posterior end are formed. The whole radula is renewed several and probably many times during the life of a snail. Also it should have been said that at least in some Gastropods and probably in many of them, the first teeth on the radula of the embryo are of a shape entirely different from those of the post-embryonal animal.

P. 18. "The otocysts . . . contain auditory granules or otolithes." But in closing the paragraph, the author says: "through them the creeping molluscs preserve their orientation and swimming molluscs their equilibrium." I would emphatically endorse the latter view, as against the otocysts being auditory organs, their structure as well as location, in most mollusca, seems to point in that direction.

P. 186. *Physidæ* . . . "with a narrow aperture." How does that agree with forms like our *Ph. ancillaria*, etc.? Nothing is said about the radula so very different from those of other Basommatophora.

P. 186. *Zonites* evidently comprises[1] *Zonites* s. str., *Zonitoides*+ *Gastrodonta*, *Hyalina*, etc., (conf. p. 129, l. 4, *Zon. cellarius*); no mention is made of the differences of the genitalia, the foot, the radula, etc.

P. 187. *Helix* also is understood in the ancient, Pfeifferian sense, with "more than 4,000 species, a large number of sub-genera have been established," and some of them are cited. *Macroön* with its immense (probably meroblastic) ova might have been mentioned.

P. 188. *Pupa*, "shell cylindrical, dextral with obtuse summit . . . ." This will fit most of the *Pupilla*, *Orcula*, etc.; but how about most of the *Torquilla*, *Bifidaria*, *Pupoides*, etc., which are evidently included?

[1] According to English-French conchological—not political—coalition.

P. 253. "There are 1,000 *Unionidæ*," pp. 267–268, "*Unio*, Retzius, shell thick, hinge toothed [sic!]. This genus includes more than a thousand species." Seven other genera are cited, *e. g.*, *Anodonta*, *Quadrula*, but *Lampsilis* is not, although mentioned on p. 240. (A few points on the morphology and anatomy of *Unionidæ* will be reviewed elsewhere). That the larval embryo of the *Mutelidæ* is a lasidium, might have been added.

P. 251. In fig. 228 A it is surprising to find the brush- or candle-like processes of the soft parts of a glochidium designated as "teeth of the shell" (S); the figure and explanation are taken over from Lankester's article (fig. 149 A), after Balfour.

These few criticisms on details do not mean to detract from the merits of the book in a general way. It cannot reasonably be expected that a man writing a book on a certain large group of animals be familiar with every detail. V. STERKI.

FREDERICK STEARNS.

Frederick Stearns was born in 1832, and died in January of the present year. He was the founder of one of the greatest pharmaceutic establishments in this country. In 1887 Mr. Stearns retired from active business partly for the purpose of recuperating his health, which too strenuous devotion to business had somewhat impaired. The following years were devoted to travel abroad. Always observant and critical, he began as an amateur collector, and among his earliest achievements in this line is a magnificent collection of Japanese and Korean art objects, some 16,000 of which he donated to the Detroit Museum of Art—having a few years previously by his money and influence assisted in building the fine museum itself. Various smaller collections, such as coins, precious stones, etc., claimed his attention for a time. Then he took up conchology and devoted his time and money for several years to what was to him an absorbing diversion, and to science a work of great value. Over 10,000 species of shells classified and arranged in systematic order and catalogued are in the Detroit Museum as a monument to his activity in this line of human endeavor—almost a life-work in itself. His book, "Marine Mollusks of Japan," on which Dr. H. A. Pilsbry of Philadelphia collaborated, is a standard work based on his collection.

A considerable number of Japanese shells named after Mr. Stearns remind students of his labors on that fauna. Among invertebrates of other groups, he discovered *Scalpellum stearnsi*, a very large and handsome pedunculate barnacle.

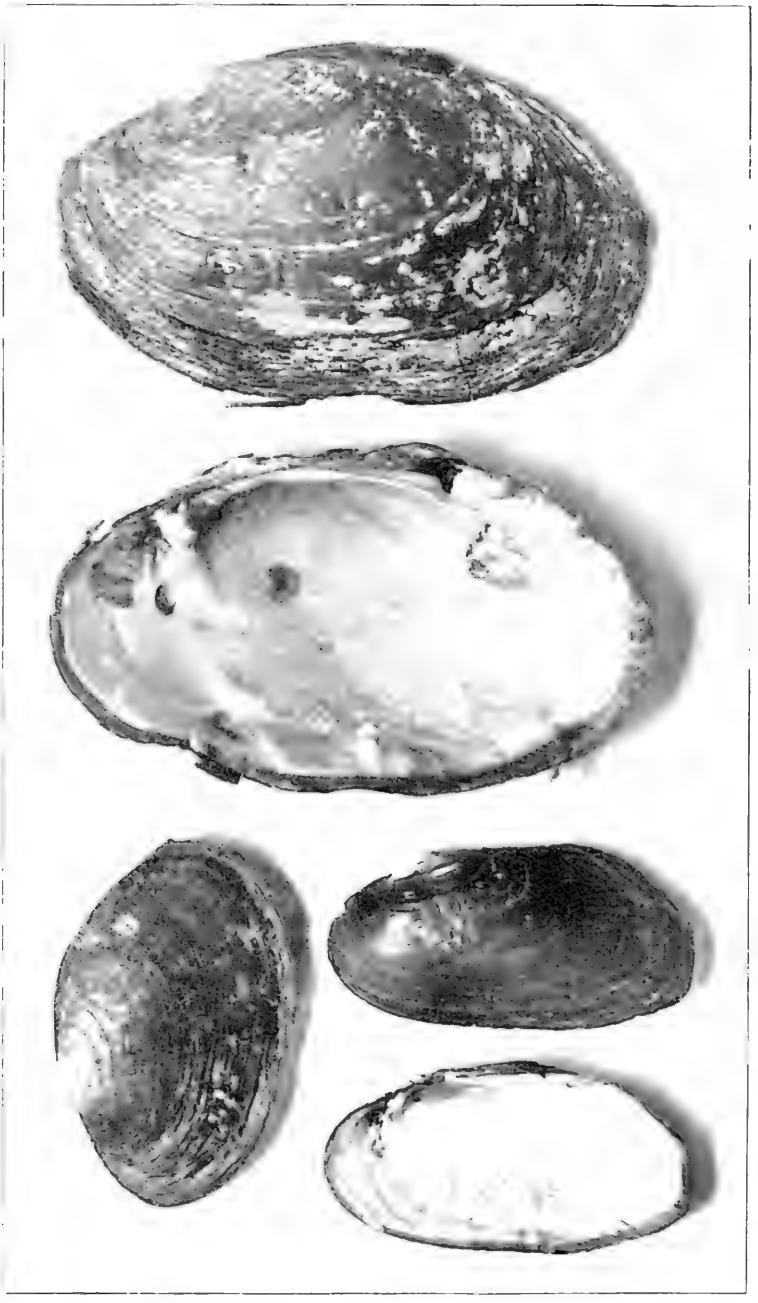
SLOMAN ROUS.

Sloman Rous died at sea July 8, 1907. Mr. Rous had been ill for several months, and upon the advice of physicians resolved to return to his old home in South Africa at Port Elizabeth. He arrived at Southampton, and died when two days out from England on his way to Africa. He became very ill in the morning of July 8th, and expired in less than two hours.

Mr. Rous was born August 3, 1838, in England. He had lived the greater part of his active life in South Africa, where previous to the Boer war he accumulated a small fortune. The embargo, or what practically amounted to that, imposed by the Boers on imported articles ruined his business. He then came to the United States, which he had previously visited and, bringing with him a valuable collection of shells, opened a store in Jersey City, afterwards transferred to Brooklyn. He became well-known among collectors. His shells were desirable species, and the accuracy of his identifications was unquestioned. In South Africa he had devoted his leisure time to the gratification of his love of natural history. He made very important collections of South African insects, a large part of which were unfortunately destroyed, and he also contributed to a knowledge of the molluscan life of the Cape and the neighboring coasts. Many species of shells bear his name, and he almost or quite alone among dealers possessed specimens of the rare *Achatina* (*Cochlitoma*) *linteræ*, the locality of which is now deserted.

During the last five years of his life he was attached to the Department of Conchology in the American Museum of Natural History, New York. He was painstaking to the last degree, enthusiastic and discriminating. When disabled by his sickness—an asthmatic affection—he was engaged in studying the revision of the Amphibolidae, and was also at work revising the nomenclature of the collection of land shells.

Mr. Rous was a man distinctively strong and independent in thought, agreeable in address, and unfailingly courteous and considerate.—L. P. Gratacap.



LAMPSILIS FIBRIATA.

L. FIMBRIATA. L. IRIDELLA.

THE NAUTILUS.

VOL. XXII. DECEMBER, 1907. No. 8.

ON A CYMATIUM NEW TO THE CALIFORNIAN FAUNA.

BY WM. H. DALL.

Having heard from Dr. R. H. Tremper that he had recently obtained from the fishermen of San Pedro, a species of *Cymatium* which could not be referred to any of the forms heretofore known from that region, he was requested to send the specimens for examination.

A careful study of it shows that it is different from any member of the group previously known from either coast of America, but so close to the Mediterranean "*Triton*" *corrugatus* Lamarck, that it seems impossible to separate it more than varietally.

Cymatium corrugatum var. Tremperi nov. Shell agreeing closely with *C. corrugatum* except in the following particulars: the periostracum in the latter is light colored, velvety, with the processes or hairs of a uniformly even length; in *Tremperi* it is blackish-brown, coarse, lamellose with, on the varices, strong, sparse, projecting hairs reaching 6 mm. in length. In all the specimens I have examined of the Mediterranean shell, there are, between the revolving primary ribs, numerous small subequal minor threads; while in *Tremperi* there are in the channels only one or two coarse, irregular, markedly larger riblets. The other differences are all apparently of an individual character. The shell measures: length 85; aperture, including the canal, 36; max. diam. 38 mm. There are five rather prominent axial ribs on the last whorl between the last pair of varices. The operculum is exactly like that of the Mediterranean form.

The animal was alive when captured, and was brought up from a depth of about 42 fathoms, bottom temperature about 51° Fahr. I have not been able to compare it with the *C. Krebsi* Mörch of the Antilles, which is said to have a short spire.

The discovery of this species adds another to the list of Mediterranean forms which reappear either directly or by closely related varieties or species, on the Pacific coast, attention to which had been called already by the late Dr. Philip Carpenter. Among them are:

California.	Mediterranean.
Cymatium var. tremperi,	C. corrugatum,
Leptothyra carpenteri,	L. sanguinea,
Gibbula canfieldi,	G. adriatica,
Williamia peltoides,	W. gussoni,
Arctonchis borealis,	A. celtica,
Leda cuneata,	L. cuneata,
Crenella decussata,	C. decussata,
Verticordia novemcostata,	V. novemcostata,
Lima orientalis,	L. tenera,
Zirphæa crispata,	Z. crispata,
Platidia anomioides,	P. anomioides.

To these many more might be added without stretching the comparisons unduly.

A NEW MEXICAN MUSSEL, LAMPSILIS FIMBRIATA.

BY L. S. FRIERSON.

LAMPSILIS FIMBRIATA, n. sp.

Shell large, elliptical, thin, and compressed. Dorsal line incurved in front of the beaks. Anterior margin somewhat obtruded, and obtusely pointed or sharply elliptically curved. Basal margin nearly straight, occasionally slightly arcuated. Posterior margin broadly roundly biangular. Beaks low, and without sculpture. Posterior ridge elevated, rounded and obsolete. The greatest diameter of the shell being about the center of the ridge. Sides flattened, and generally somewhat constricted in the middle. Behind the posterior ridge, down the siphonal area extends a raised line, enclosing a triangular area (having its apex at the beak) which is sculptured

with small pustules arranged in upcurved lines. Epidermis yellow, horn color, sometimes obsoletely rayed, on the posterior slope. The shell would seem to be nearly smooth, but in all the specimens seen there are numerous irregular, radial, pit-like impressions and concentric striae, and shallow sulci. The radial impressions or pits, extend through the shell, and are visible inside and out. Hinge ligament, stout and rather long. Muscle scars well marked, separate in front, confluent behind. Teeth stout, double in the left, and single in the right valve. Beak cavities shallow, with a row of muscle scars running downward, forward and onto the base of the cardinal tooth. Nacre white, flesh color or dark purple, very irregularly laid on, and very thin. Except in old shells, the prismatic structure extends far beyond the nacre, and the epidermal layer, in turn, extends still further.

Length 80, height 47, diameter 25 mm.

Habitat: Valles River.—Collected by Mr. A. A. Hinkley.

A cotype in coll. A. N. S. Phila., measures, length 81, height 51, diam. 22 mm.

The shell is not related very closely to any species that I know of. In fact I am undetermined whether to place it in *Lampsilis* or in *Nephronaias*. In the absence of any data regarding the animal, it is provisionally placed in *Lampsilis*. Mr. Hinkley informs me that it is near to, if not identical with an undescribed species labeled by Mr. Chas. F. Simpson as *Lampsilis salinasensis*, which however Mr. Simpson has not described, and which he informed me, he does not intend doing.

The prismatic layer is $\frac{3}{16}$ inch wide at the edge in some cases. This peculiarity accounts for the *pitting*, and numerous irregular sulcations being, it is evident not normal, but the result of numerous accidents which befall the extremely delicate edge of the shell.

Plate 12, two upper figures represent the type specimen; lower left-hand figure is a young shell.

THE GRAVID PERIODS OF UNIOS.

BY CHARLES H. CONNER.

About four years ago, I began to collect systematically data relative to the gravid periods of Unios. Some of the results are presented herewith, in the hope that they will be of interest.

The scene of most of my observations has been along the Delaware river and Big Timber creek, in the vicinity of Newbold and Washington Park, New Jersey.

All along the extensive flats there mussels abound, and their empty shells lie scattered along the banks in thousands.

For the purpose of these observations I have made it a point to patrol that section at low tide some time during every month of the year.

The work has been attended by many disadvantages, otherwise I should have been able to present a complete record of the matter.

The varying periods during which the glochidia are extruded by the various species, tends (so it appears to me) to effect their distribution; those spawning when fish are migrating, for instance, would have their distribution extended farther, or more rapidly than other species. Of the species hereabouts, *Unio complanatus* (Sol.), has given me the best results for the labor expended. My records show that they are gravid but once annually, from April–May to July–August, or, approximately, during four months of the year.

I have found *Lampsilis radiatus* (Gmelin), and *Unio nasutus* (Say) gravid all the year around. Both appear to spawn in June and November, if not also at other times. All the individuals do not spawn at the same time. On June 22, 1907, I found some *U. nasutus* with the gills half empty, and some still full.

Anodonta cataracta (Say) is gravid about eight months in the year, the interim occurring during the warm period (May–October). I have found them gravid as late as May 27, and as early as October 13. I have found them spawning the latter part of December, to the early part of January * which indicates approximately, as is the case with *U. complanatus*, a gravid period of about four months.

I have had the good fortune to discover the use of the byssus also. I isolated a gravid specimen in an aquarium, and when the glochidia were extruded, using a magnifying glass, I discovered several of them, with the valve opened wide, hanging suspended by the byssus, from the *Anacharis canadensis* plants with which the aquarium was stocked.†

From further observations it appears that they hang thus sus-

* NAUTILUS, Vol. XIII, pp. 142.

† April 19, 1905, *Anodonta cataracta*, Say.

pended, and when a passing fish touches them they fasten upon it by means of the hooks, and the glochidium is wrenched from its mooring. I observed frequently the sudden jump which my goldfish made, and I afterwards found glochidia attached to them.

A NEW ZONITOID SHELL FROM THE MIOCENE, FLORISSANT COLORADO.

BY T. D. A. COCKERELL.

Although fresh-water shells (*Lymnea*, *Planorbis* and *Sphærium*) are abundant in the Florissant shales, terrestrial species are extremely rare. In 1906 we found a species of *Omphalina*, in a fragmentary condition. The 1907 expedition has yielded a better-preserved specimen which is referred to *Vitrea*.

VITREA FAGALIS n. sp.

Diameter 7 mm.; with seven and a half closely coiled whorls, the first three not increasing at all, but having a uniform diameter of about 340 micromillimeters; the fourth barely larger, diam. about 357 m.; the fifth with diam. about 391 m.; the sixth twice as broad as the inner ones; the seventh much larger, diam. 1 ¾ mm. Last whorl very smooth and shining, not or hardly striate, but inner whorls delicately striate, with the exception of the apical whorl and a half, which are quite smooth. Spire gently convex, the sides regularly ascending to the apex. No internal lamellæ, so far as can be seen. One example, with reverse; on a slab with a leaf of *Fagus*, showing that it probably lived in the proximity of that tree.

This shell appears to be a *Paravitrea*, very close in all respects to *Vitrea andrewsæ*. In the number of whorls and absence of internal lamellæ, it is like *V. placentula;* but the whorls appear to be more closely coiled than in that species, and the radial sculpture is much closer and less regular.

The resemblance of the Florissant flora to that of the uplands of the southeastern states has already been noted; the discovery of *Vitrea fagalis*, and the previous finding of *Omphalina*, point in a similar direction.

A NEW CALIFORNIAN VERTIGO.

BY V. STERKI.

VERTIGO OCCIDENTALIS, n. sp. Plate XI, fig. 2.

Shell of the shape, size and appearance of a smaller *Vert. ovata* Say, but perforated; short ovate, chestnut colored, transparent; slight impressions over the palatal folds, no crest, no callus inside; lamellæ and folds: parietal and angular close together, coherent, short, low, somewhat massive; columellar only indicated by a slight, angular projection; the two palatals quite small, short, the upper closer to the margin. Alt. 2 mill. Soft parts not seen.

Habitat: San Bernardino Mts., California, at alt. 7600 feet, collected in the summer of 1907, by Mr. S. S. Berry, one specimen.

It is rather inopportune to establish a species on a single specimen. But the one seen is mature, with no trace of a deformity, and with all its external resemblance to *V. ovata*, is evidently distinct. It has been carefully compared with many *ovata* from New Mexico, Arizona, California e. g., the Cuyamaca Mts. near San Diego, to Montana and Washington, etc. None of them was perforated, and the lamellæ and folds of *occidentalis* are different as to size, shape and location from those of *ovata*, even in immature specimens. It has been pointed out, years ago, that their location and shape are of more consequence than their mere presence or absence, at least in some forms.

NOTES.

Specimens of *Planorbis magnificus* Pilsbry have been kept alive in small aquaria at the National Museum for more than a year. Those which were adult when collected in 1906 (October) are all dead, apparently from old age, but before dying they left progeny now about six months old and one-third grown. It is therefore probable that the life of the species is about two years in length. The young have well-pigmented eyes, in the usual situation, but in the adult these have so degenerated that no trace of pigment or lens is visible in the living animal by transmitted light. Their favorite food is lily-pads, which they devour with great rapidity and on the lower surface of which they are most likely to be found.—W. H. DALL.

Among common "beach-stuff" from the Florida Keys the writer recently found a well-preserved sinistral specimen of *Marginella apicina* Menke, in excellent condition.—W. H. Dall.

Mr. E. W. Gifford of Alameda, California, while collecting on the "planted" oyster beds of San Francisco Bay last July, found *Ilyanassa obsoleta* Say living in abundance. This is the first time it has been reported from the coast. The drills, *Urosalpinx cinereus*, which had previously been numerous, seemed to have all died, at least none living were found.—W. H. Dall.

Messrs. Ferriss and Daniels have just returned from a collecting trip in Arizona. Several new and interesting species of *Sonorella* and *Ashmunella* are among the spoils. Some account of the expedition will be given next month.

Helix hortensis on Bass Island, Me.—While at Kennebunkport, Me., this summer, Mr. John B. Henderson discovered that Bass Island at Cape Porpoise was well stocked with *H. hortensis*, so I made a trip over there, and in about an hour collected seventy-five specimens. The ground and weeds were covered with young shells, but the adults were not so plentiful, as the field mice (?) are good collectors and make a specialty of fine large shells, and when they get through with them the shells are of very little use to the two-legged collector. Also saw a good many *Polygyra albolabris*, which had been eaten, but only found one alive. The specimens of *Helix hortensis* show the following variations:

Bands.		*No. Specimens.*
12345		19
12345	Transparent bands, Var. *arenicola* MacGill.	4
12300	Transparent bands, faint.	1
00345	Transparent bands, faint.	1
12345	(Two broken, almost gone).	1
00300	Band distinct.	3
00300	Band faint and broken, but in most of them the band is more or less transparent, some also show traces of other transparent bands.	35
00000	Yellow.	9
00000	Whitish.	2
Total		75

Band 3 is the one most persistent, and even in the shells which I have put down as 00000 yellow there is a very faint indication of it. In many of the 35 this band shows as a distinct patch back of the lip, with fragments at other places, while the balance of the band is more or less transparent as in Var. *arenicola.*

At Bar Harbor and on Bar Island, Frenchman's Bay, Mr. Henderson and I collected a number of *hortensis* all of which are 00000, and of a bright canary yellow.—Geo. H. Clapp.

Shells of La Jolla, California.—Having read an article in the Nautilus by my friend Mr. Maxwell Smith about the conchology of La Jolla, Cal., I send a list of a few species which were not mentioned in Mr. Smith's article, but which I think are of interest in this connection, as one species has not been found in California before to my knowledge.

Zirphaea crispata.
Nettastomella darwinii.
Macoma secta.
Modiola recta.
Bryophila setosa. One collected by Mr E. P. Rawle of Philadelphia.
Leda hamata.
Yoldia cooperi.
Dentalium pretiosum.
Chromodoris porterae.
Hopkinsia rosacea.
Diaulula sandiegensis.
Triopha maculata.
Aplysia californica.
Circinaria transfuga.
Marginella regularis.
Eulima bistorta.
Eulima compacta.
Odostomia terricula.
Crucibulum imbricatum.
Crepidula excavata.
Acmaea pelta var. nacelloides.
Acmaea pelta.

Neritina sp. indet. (perhaps picta?) One specimen found by Mrs. Frank Pierce of Madison, Wis.

Leptothyra bacula.

Calliostoma gloriosum.

Ethalia invallata.

Haliotis cracherodii.

Nuttallina californica.

Octopus punctatus.

These species have all been collected by me except where otherwise noted. I was unable to compare the *Neritina* with any authentic specimens, but Mr. Kelsey, of San Diego, to whom I mentioned it, said that he had not heard of any Neritina found so far north, but thought it might be *N. picta.* The specimen of *Nuttallina californica* Reeve was a seven-valved individual.

JOSHUA L. BAILY, JR.

CHARLES AUSTIN DAYTON.—We regret to announce the death of Mr. C. A. Dayton who died at his residence in Brooklyn, N. Y., Nov. 7, 1907.

Mr. Dayton was a lifelong admirer and collector of shells, and was widely known through his correspondence with collectors. He was the first president of the Brooklyn Conchological Club and a regular attendant at its meetings until his recent illness confined him to his home. He possessed in high degree all those qualities which make the honored citizen and the esteemed friend.—SILAS C. WHEAT.

A CONTRIBUTION TO THE FAUNA OF THE COAST OF LOUISIANA. —By L. R. Cary (Gulf Biologic Station Bull. No. 6, Cameron, La.). A considerable list of mollusks is given, pp. 54–58.

BULLETIN OF THE BUFFALO SOCIETY OF NATURAL SCIENCES, Vol. VIII, No. 6 (1907) contains an interesting historical sketch of the Society, illustrated with portraits of the presidents and other men of science prominent in its annals.

PROPOSALS FOR AN AMERICAN CONCHOLOGICAL SOCIETY.

The Brooklyn Conchological Club, which has maintained a successful organization for several years, proposed last May the formation of a society of national scope, appointing a committee to form a preliminary organization. This committee elected the following officers: President, Dr. H. A. Pilsbry, Philadelphia; Vice-President, Louis A. Gratacap, New York; Treasurer, Silas C. Wheat, Brooklyn; Secretary, Maxwell Smith, New York. These officers to serve until a permanent national organization can be formed.

At the International Zoölogical Congress held in Boston in August, those interested in mollusks held an impromptu meeting, and appointed the following committee to consider the question of organizing a society: Dr. W. H. Dall, Dr. H. A. Pilsbry, Elizabeth J. Letson, Silas C. Wheat, John Ritchie, Jr.

If sufficient interest in the proposed society is manifested a permanent organization will be effected. A general expression of the feeling among conchologists towards the project is desired.

Suggestions may be sent by those interested to Mr. Maxwell Smith, Secretary, 265 West 72d street, New York City, or to the Editors of THE NAUTILUS. It is hoped that some abstract of the responses may be received in time for publication in the issue of January 1st next.

Dr. Dall, Chairman of the Boston Committee, has drafted the following:

MEMORANDUM OF SUGGESTIONS FOR THE ORGANIZATION OF AN AMERICAN CONCHOLOGICAL ASSOCIATION OR SOCIETY.

NAME.—The AMERICAN Conchological Society would be better than "NATIONAL," as Mexican, Cuban, or Canadian members, whom it would be desirable to include, might object to the term "National" as excluding them.

OFFICE.—To promote intercourse between the students of Mollusca, recent or fossil, in North America, the Antilles and Hawaii; to encourage the study of Mollusks by meetings and publications, or other means suitable for the purpose, and to interest the general public in the study of shells.

OFFICERS.—The officers shall comprise a president, a vice-president for each section, a general secretary and a treasurer, and an executive council consisting of nine members.

MEMBERS.—The membership of the Society shall be divided into the follow-

ing classes: Patrons, life members, active annual members, associates, and corresponding members. A limited number of honorary corresponding members may be authorized by the council if deemed desirable.

Qualifications.—A patron shall be a donor to the Society of any sum exceeding the total of two life-membership fees, and shall be entitled to all publications of the Society and to receive gratis any periodical which may be distributed, as its organ, to the members by the Society. A life membership may be secured by the payment to the Society's treasurer of the sum of one hundred dollars; active membership by the annual payment in advance of the sum of five dollars;[1] associate membership by the annual payment in advance of one dollar and a half by American associates and two dollars by foreign associates or corresponding members. Honorary members may be relieved of payment at the time of election by the vote of the executive council.

All members shall be nominated to the council by the application of any three members or associates in good standing through the secretary, and shall be elected by a majority vote of the council, but no election shall be deemed effective until the treasurer has received the first annual subscription from the nominee, and the publications of the Society shall not be sent to any member subsequently, more than two months in arrears. All membership fees shall be due and payable at the beginning of the year, and no subscription for the benefit of any member or associate to the organ of the society shall be made by the treasurer until this annual fee shall have been paid.

Sections.—To facilitate local intercourse by meetings or otherwise, the Society may establish sections for the members of the Atlantic coast, Pacific coast and Mississippi valley (or other) regions. Meetings within each sectional area may be arranged by the local sectional vice-president, and the members of the section may elect temporary officers, except the vice-president when present, and by a majority vote assess such local subscriptions as may be needed to carry on local work in addition to the regular annual fees.

Nominations and Elections.—Owing to the scattered distribution of the membership, voting may be by ballot mailed to the secretary, who shall announce the result through the organ of the Society, in the number next following the limit fixed for counting the vote, but no votes by proxy shall be accepted.

Nominations for officers may be made by any three members or associates, so as to be announced at least one month before the annual election in the Society's organ. Nominations for membership may be made at any time, but at least one month before they are to be acted upon.

The secretary, treasurer and members of the executive council shall be active or life members, and serve until the election of their successors. Elections shall be annual. The president, vice-presidents, secretary and treasurer shall

[1] Members of the Brooklyn Club and some others think the annual dues would better be fixed at two or three dollars.

be ex-officio members of the Council. The term of office for the members of the Council (not ex-officio) shall be three years, but three members shall retire each year, and of the nine members elected to the Council at the first election three shall serve one year, three two years, and three the full term, the individuals to be determined by lot; after which three members shall be elected annually.

The Council.—The Council shall conduct the business of the Society, elect members, control expenditures, audit the treasurer's accounts, prescribe the duties of Secretary and Treasurer, make rules or by-laws to carry out the details of the organization of the Society, and shall annually report to the Society at least one month before the annual election. All new members or associates shall be elected by a majority vote of the Council, not less than five members constituting a quorum.

Active Members.—Active members shall be elected from those persons actively engaged in research, the collection, or the study of the Mollusca, and their qualifications shall be stated in the nomination papers. Associates may be any one of good character interested in the general subject or the study of natural history. Corresponding members shall be residents of foreign countries.

Official Organ.—The Council may select a periodical, not issued by the Society, as its official organ, and may from the annual fees pay such subscription for the several members and associates as may be arranged for with the proprietors of such periodical.

Amendments to the Constitution and By-Laws.—The constitution may be amended by a majority vote of the life and active members at any annual meeting, provided notice of the proposed amemdment shall have been given in the official organ at least three months previously. Amendments to the by-laws may be made at any meeting of the Council called for the purpose, at least one month's notice having been given to the members of the Council.

Permanent Funds and Expenditures.—The sums paid in by patrons and life members shall be invested and constitute a permanent fund, of which the interest only shall be available for expenses as directed by the Council. All expenditures must be authorized and all investments approved by a vote of the Council, which shall have the Treasurer's accounts annually audited, the result to be included in the annual report to the Society.

Loss of Membership.—Any member or associate two months in default in his annual subscription shall be notified by the Secretary, and any member or associate who shall be over one year in arrears shall, *ipso facto*, lose membership; provided that, on a majority vote of the Council and payment of all arrearages, such member or associate may be reinstated without a formal re-election.

THE NAUTILUS.

VOL. XXII. JANUARY, 1908. No. 9.

POMATIOPSIS ROBUSTA N. SP.

BY BRYANT WALKER.

Shell ovate-conic, perforate, smooth and shining, lines of growth subobsolete; light greenish-yellow becoming lighter towards the apex; spire elevated, apex blunt, the initial whorl being perceptibly flattened. Whorls $5\frac{1}{2}$, convex, with a well impressed suture, body whorl large and inflated. Aperture ovate, narrow above and well rounded below, between one-third and one-half of the length of the shell; peritreme continuous and adnate to the parietal wall above the perforation; lip sharp.

Alt. 6, diam. $3\frac{1}{2}$ mm.

Jackson Lake, Wyoming.

Type in the collection of A. A. Hinkley, Du Bois, Ill.

Although only a single specimen of this species was found, it is so obviously distinct from any of the known species of the genus, that I do not hesitate to describe it.

It is a much stouter shell than *P. hinkleyi* and differs from both that and *californica* in the less convex whorls and less impressed suture. In these particulars it resembles more *P. lapidaria*, but differs from that entirely in shape. The narrow perforation and sharp lip as well as the general contour easily separate it from *P. cincinnatiensis*.

A COLLECTING TRIP AT NORTHPORT, N. Y.

BY WM. H. WEEKS, JR.

It was my good fortune to have a vacation during the month of October, and I decided to go to Northport, in search of shells. Northport is situated on a fine harbor on the north shore of Long Island, some forty miles from New York City. The conchologist here has a fine field before him for work, and if not easily discouraged, shore-collecting will yield good results. It usually means however long tramps each day of some five to ten miles. I expected to use the dredge but could not make satisfactory arrangements. It is here that the scallop (Pecten borealis) abounds, but this year only small quantities have been brought in by fishermen, and the much-prized red variety is decidedly scarce.

Where I had found some five years ago countless numbers of *Crepidula convexa* on the beach not a specimen was to be seen, but a few were gathered at low tide from dead specimens of *Litorina littorea* and *Nassa obsoleta*. *Mya arenaria* were everywhere on the beach in fine order, and also many *Ensis directus*. Usually one has to dig for them. *Lævicardium mortoni* were found in small colonies and seemed to be larger than usual. Numerous odd valves of *Astarte undulata* were taken at low tide. It is evidently a deep-water species. No search was made for land shells. The following is a list of species obtained:

Ostrea virginica Gmel., cultivated extensively.
Anomia simplex Orb., abundant.
Pecten gibbus var. borealis Say, fairly common.
Mytilus edulis Linn., abundant.
Modiolus modiolus Linr., scarce.
Modiolus demissa var. plicatula Lam., abundant.
Arca transversa Say, abundant.
Arca pexata Say, abundant.
Astarte undata Gld., odd valves.
Laevicardium mortoni Conr., fairly common.
Venus mercenaria L., abundant.
Petricola pholadiformis Lam., fairly common.
Tellina tenera Say, one specimen.
Macoma balthica Linn., scarce.

Ensis directus Conr., abundant.
Spisula solidissima Dillw., fairly common.
Mulinia lateralis Say, scarce.
Lyonsia hyalina Conr., scarce.
Mya arenaria Linn., common.
Busycon canaliculata Say, fairly common.
Busycon carica Gmel., fairly common.
Nassa trivittata Say, fairly common.
Nassa obsoleta Say, very abundant.
Nassa vibex Say, scarce.
Astyris lunata Say, scarce.
Eupleura caudata Say, scarce.
Urosalpinx cinereus Say, common.
Odostomia trifida Totten, scarce.
Bittium nigrum Stimp, common.
Litorina rudis Donov., common.
Litorina littorea Linn., very common.
Crepedula fornicata Linn., common.
Crepedula plana Say, common.
Crepedula convexa Say, scarce.
Neverita duplicata Say, fairly common.
Chaetopleura apiculata Say, scarce (usually on oysters).

A LIST OF THE LAND SHELLS OF LEE COUNTY, FLORIDA.

BY E. G. VANATTA.

The following species were collected in Lee County, Florida, by Mr. Clarence B. Moore. The smaller forms were picked from leaf-mould sent in bags, each with the exact locality carefully marked on it.

Practically nothing has been known hitherto of the land-snail fauna between Key Marco and Cape Florida, the Ten Thousand Island region being accessible only to the collector cruising in his own boat.

It is interesting to note the occurrence of *Bifidaria rhoadsi* Pils. and *Vertigo variolosa* Gld. on the west coast of Florida; also that many of the shells of *Zonitoides minuscula* Binn. have internal

laminæ or teeth. The use of the name *Euglandina rosea* Fér. instead of *Glandina truncata* has been explained by Dr. Pilsbry in the last number of the Manual of Conchology, p. 191. All the specimens listed are in the collection of the Academy of Natural Sciences of Philadelphia.

Blue Hill Id., near Goodland Point, Marco Key.

Truncatella bilabiata Pfr.
Thysanophora selenina Gld.
Polygyra cereolus f. carpenteriana Bld.
Polygyra uvulifera Shutt.
Drymæus multilineatus Say.
Euglandina rosea Fer.
Euglandina rosea parallela Binn.

Buttonwood Key.

Polygyra cereolus f. carpenteriana Bld.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Zonitoides singleyana Pils.

Chokoloskee Key.

Pupoides modicus Gld.
Bifidaria rupicola Say.
Zonitoides minuscula Binn.

Dismal Key.

Truncatella bilabiata Pfr.
Helicina orbiculata Say.
Thysanophora plagioptycha Shutt.
Polygyra cereolus f. carpenteriana Bld.
Strobilops hubbardi A. D. Brown.
Pupoides modicus Gld.
Bifidaria rhoadsi Pils.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Microceramus floridanus Pils.
Euglandina rosea parallela Binn.
Vitrea dalliana ' Simpson ' Pilsbry.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.
Zonitoides singleyana Pils.

Fakahatchee Key.

Truncatella bilabiata Pfr.
Helicina orbiculata Say.
Thysanophora selenina Gld.
Polygyra cereolus f. carpenteriana Bld.
Pupoides modicus Gld.
Bifidaria rupicola Say.
Microceramus floridanus Pils? (young).
Drymæus (young multilineatus Say?)
Drymæus dominicus Rve.
Euglandina rosea Fer.
Euglandina rosea parallela Binn.
Vitrea dalliana 'Simp.' Pils.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.

Georgia Fruit Company's land, S. of Marco.

Praticolella jejuna Say.
Vitrea dalliana 'Simp.' Pils.
Guppya gundlachi Pfr.

Gilberts (near Matanzas Pass).

Polygyra cereolus f. carpenteriana Bld.
Pupoides modicus Gld.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Vitrea dalliana 'Simp.' Pils.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.
Zonitoides singleyana Pils.

Goodland Point, Marco Key.

Polygyra c. f. carpenteriana Bld.
Bifidaria p. hordeacella Pils.
Euglandina rosea Fer. (near parallela Binn.)
Zonitoides minuscula Binn.
Succinea floridana Pils.

Little Marco.

Truncatella caribæensis succinea C. B. Ad.
Truncatella bilabiata Pfr.

Helicina orbiculata Say.
Helicina orbiculata var. clappi Pils. Mss.
Thysanophora plagioptycha Shutt.
Polygyra cereolus f. carpenteriana Bld.
Polygyra uvulifera Shutt.
Bifidaria contracta Say.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Vertigo variolosa Gld.
Microceramus floridanus Pils.
Euglandina r. parallela Binn.
Vitrea indentata Say.
Vitrea dalliana ' Simp ' Pils.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.
Zonitoides singleyana Pils.

Marco, N. end of Marco Key

Polygyra cereolus f. carpenteriana Bld.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Euglandina rosea Fer.
Euglandina rosea parallela Binn.
Vitrea dalliana ' Simp.' Pils.
Guppya gundlachi Pfr.

Mound Key, Estero Bay.

Truncatella caribæensis succinea C. B. Ad.
Truncatella bilabiata Pfr.
Helicina orbiculata Say.
Thysanophora plagioptycha Shutt.
Polygyra cereolus f. carpenteriana Bld
Pupoides modicus Gld.
Bifidaria contracta Say.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Euglandina rosea parallela Binn.
Euglandina rosea minor Binn.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.
Succinea floridana Pils.

Nameless Key (Mr. Addison's) two miles east of Marco.

Helicina orbiculata Say.
Thysanophora selenina Gld.
Polygyra cereolus f. carpenteriana Bld.
Pupoides modicus Gld.
Bifidaria contracta Say.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Microceramus floridanus Pils.
Euglandina rosea parallela Binn.
Vitrea dalliana 'Simp' Pils.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.
Zonitoides singleyana Pils.

Near Punta Rassa.

Truncatella bilabiata Pfr.
Polygyra cereolus f. volvoxis Pfr.
Euglandina rosea parallela Binn.

Aboriginal shell-heap about one mile east of St. James, Pine Island.

Truncatella clathrus Lowe.
Truncatella caribæensis 'Sby.' Rve.
Truncatella caribæensis succinea C. B. Ad.
Truncatella bilabiata Pfr.
Praticolella jejuna Say.
Polygyra cereolus f. volvoxis Pfr.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.
Zonitoides singleyana Pils.

Pine land, N. W. end of Pine Island.

Helicina orbiculata Say.
Bifidaria contracta Say.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Euglandina rosea Fer. near var. parallela Binn.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.

N. E. end Pine Island, Lee Co., Florida.

Euglandina rosea parallela Binn.

Russell's Key.

Helicina orbiculata Say.
Helicina orbiculata var. clappi Pils. Mss.
Thysanophora selenina Gld.
Thysanophora plagioptycha Shutt.
Polygyra cereolus f. carpenteriana Bld.
Pupoides modicus Gld.
Bifidaria p. hordeacella Pils.
Bifidaria rupicola Say.
Microceramus floridanus Pils.
Euglandina rosea parallela Binn.
Guppya gundlachi Pfr.
Zonitoides arborea Say.
Zonitoides singleyana Pils.

Turner Place, Turner River (a key near Chokoloskee).

Truncatella bilabiata Pfr.
Polygyra cereolus f. carpenteriana Bld.
Polygyra uvulifera Shutt.
Bifidaria rupicola Say.
Microceramus floridanus Pils.
Euglandina rosea parallela Binn.
Vitrea indentata Say.
Zonitoides minuscula Binn.

About five miles up Whitney River (mainland).

Polygyra cereolus f. carpenteriana Bld.
Bifidaria rupicola Say.
Euglandina rosea parallela Binn.
Guppya gundlachi Pfr.

Wiggins' Key, Sandfly Pass.

Euglandina rosea parallela Binn.

Lossman's Key.

Euglandina rosea minor Binn.

CANCELLARIA OBTUSA DESH.

BY SLOMAN ROUS.

Among some shells handed to me by my friend Mr. D. W. Ferguson, of Brooklyn, is a specimen of *Cancellaria obtusa* Desh. Tryon writing in 1885 says (Man. of Conch., Vol. VII, p. 68): "The unique specimen formed part of the Cumingian collection. Hab. unknown." As far as I am aware no other specimen has since been recorded, and it seems worth while to note the appearance of another specimen and at the same time to amplify the somewhat meager description given in the Manual.

The specimen is unfortunately what is called a dead shell but it retains its color and is perfect, its principal imperfection being a worm groove in the aperture, but this in no way detracts from showing its characteristics and the species can be perfectly described from the specimen.

Spire much depressed, regularly spirally costate, the ridges flattened, the intervening grooves about half the width of the ridges, growth lines somewhat obsolete, but deeply pitted where they cross the spiral grooves; light yellowish-brown; whorls three; rather narrowly umbilicate, columellar plications three, the inferior somewhat obsolete, upper part of aperture very heavily calloused, aperture white. Lon. 24, lat. 18 mm. Hab. Panama.

Mr. Ferguson received this specimen with a number of other species from Mr. McNeill, well known as a collector of shells of Central America, Panama, etc. All were labeled Panama, and all the other species were undoubtedly Panama shells. I think there is but little doubt but that this habitat will prove correct.

NOTES.

MUREX CARPENTERI, FORM ALBA.—During the past year the fishermen of Newport, Orange County, California, have brought up a number of specimens of *Murex carpenteri* Dall, in their nets. Most of them are the ordinary form, but among them are two or three specimens of a pure white color, showing little or none of the usual brownish coloration so characteristic of the species. This is a really beautiful variation, but as yet it seems to be very rare. Ac-

cording to the usual custom, this form may be referred to as the form or variety *alba*.—S. S. Berry.

Triton gibbosus Brod., in California.—Ralph Arnold in The Paleontology and Stratigraphy of San Pedro, quotes the range of the living *T. gibbosus* as West Tropical America and Panama. At this time Dr. Dall supposed that a single example from San Pedro Bay had been washed from the fossil beds on the beach. Another writer reports the species from San Pedro Bay (see Nautilus, Vol. VII, p. 75). At the time I brought the La Jolla material together (Nautilus, September, 1907), three specimens were secured by Miss Mary A. Williams, Joshua L. Baily and myself. These were not included in the L. J. list, as at the time the identity was doubtful. The species can now safely rank in the fauna of the state.—Maxwell Smith.

Shells of the Lake Region of Maine.—The following mollusks were collected at Capens, Deer Island, Moosehead Lake, during July, 1907: *Polygyra fraterna* Say, *P. albolabris* Say, *P. sayana* Pils., *P. dentifera* Binn., *Vitrea hammonis* Ström., *Euconulus fulvus* Müll., *Zonitoides arborea* Say, *Pyramidula alternata* Say, *P. cronkhitei anthonyi* Pils., *Sphyradium edentulum* Drap., *Succinea ovalis totteniana* Lea, *Philomycus carolinensis* Bosc., and *Planorbis bicarinatus* Say.—C. W. Johnson.

Mollusca of La Jolla, California.—To the lists which have appeared in the Nautilus, the following nudibranchs may be added:

Chromodoris macfarlandi Ckll. Forms a distinct subgenus or genus.

Chromodoris californiensis Bergh (*universitatis* Ckll.).

Archidoris montereyensis Cooper (?). Specimens immature.

Cadlina flavomaculata McFarl.

Cadlina marginata McFarl. (?). Specimens small.

Doridopsis nigromaculata C. & E. (*vidua* Bergh, var. (?).

Thecacera velox Ckll.

Several others have been found at San Pedro and San Diego, and, therefore, may be expected at La Jolla.

In the Journal of Malacology, 1905, p. 42, is given a brief account of a new *Triopha* from San Pedro. No specific name was offered, because the notes on the external characters had been mislaid.

These have now been recovered, and the animal may take the name originally given in MS., *Triopha aurantiaca*. It is close to *T. carpenteri* Stearns, in external characters, but instead of being white it is orange, with the appendages tipped with vermilion.—T. D. A. COCKERELL.

HENRY VENDRYES.

Mr. Henry Vendryes, well known to students of the Jamaican fauna, died at Kingston, Jamaica, Nov. 20, 1907, in his 86th year.

Mr. Vendryes was of French extraction, his father having served with Napoleon, and was born on the island Oct. 30, 1822. He became a student of law with Donald Campbell, a noted solicitor of that day. After making a temporary experiment as a business man, he soon returned to his first choice. In 1879 he was appointed an advocate of the Supreme Court, and was offered but declined the position of resident magistrate on the island. He distinguished himself in private practice of the law, and was for a time the editor of a local paper now extinct, the "Colonial Standard." His accomplishments in music were exceptional, but it is as a conchologist and the friend of conchological students interested in the Jamaican fauna that the readers of the NAUTILUS will chiefly remember him. He contributed largely to the cabinets of Adams, Chitty, Bland, Guppy and others as their publications show, and was most courteous and generous in extending aid to all who were interested in his special science. He leaves a large family connection. He suffered serious financial losses by the Kingston earthquake, and his uniquely complete collection of Jamaican shells and fossils has been offered for sale, particulars of which can be learned from his late partner and son-in-law, Mr. R. W. Bryant, of Kingston. W. H. DALL.

SOME PERSONAL RECOLLECTIONS OF HENRY VENDRYES.

BY J. B. HENDERSON, JR.

The news of Henry Vendryes' death in Kingston, Jamaica, a few weeks ago has awakened many pleasant memories of his personality. On our collecting trips to Jamaica, Mr. Simpson and I always paid our respects to this veteran conchologist, and we passed many pleas-

ant hours in his "shell room" inspecting his large collections and enjoying his generous hospitality.

Mr. Vendryes was then—ten years ago—an old man carrying somewhat unsteadily the weight of seventy-five years, but he radiated about him the indefinable charm of the gentleman of the old school. He talked freely of days in the field with C. B. Adams, Chitty and Gloyne, those forefathers of Jamaican conchology, and the spirit of their work and methods remained with him, for he evolved with difficulty from that conchological era when every roundish land shell was a Helix, and every marine shell with a long canal stood firmly on the name of Fusus.

The large collections which he brought together were almost wholly made up of Jamaican and Haitan forms both marine and land. They were large and of undoubted scientific value, although their beauty was marred by the presence of too many dead and worn specimens of the commoner species which he seemingly lacked the courage to throw away. His shells were mounted upon glass slides the specimens fixed by cement and the names and localities painted upon the glass in white. What appeared to be a most unsatisfactory cabinet method he assured me was made necessary in that tropical climate by the swarms of insect pests which would relish paper trays and labels.

Owing to the lack of modern titles in his library Mr. Vendryes was much handicapped in his literary labors. He acknowledged the necessity of anatomical work and fully approved of the more modern methods of biological research, but before such a task as applied by himself to his collections he sank back exhausted.

Notwithstanding such discouragements Mr. Vendryes published an excellent list of Jamaica shells which is to-day the best we have, and he also had in preparation the great undertaking of a monograph of the most exhaustive kind, of the Jamaican fauna. He gave me a section of this MS of literally hundreds of pages of closely written (in his own hand) observations, critical notes, descriptions, synonomy, etc., and asked me to find a publisher for it in the United States. The preparation of this unpublished monograph involving as it must have done an enormous amount of physical as well as mental effort, was, after all, a labor of love, and from the way he handled the MS it was apparent how he loved the monument he was with such infinite pains building for himself.

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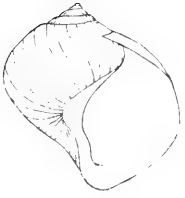

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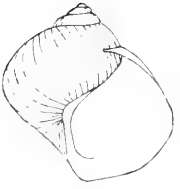

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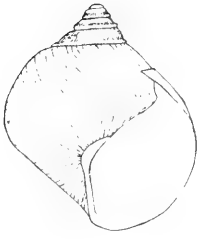

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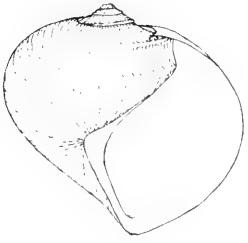

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WALKER· YOUNG STAGES OF ANCULOSA.

THE NAUTILUS.

VOL. XXII. FEBRUARY, 1908. No. 10.

HYGROMIA HISPIDA (LINNÆUS) IN MAINE.

BY N. W. LERMOND.

In 1904 I found a snail considerably smaller in size than *Polygyra fraterna* Say, and very numerous on walls of old lime quarries, on wooden sidewalks and on the under sides of rocks from the lime quarries at Rockland, Knox County, Maine. Specimens sent Dr. Pilsbry for identification were pronounced by him *Hygromia hispida* (Linn.), and the first record for this species for the state of Maine.

In his 1898 list of "Land Shells of America North of Mexico," on page 3, Prof. Pilsbry gives *Hygromia hispida* (Linn.) as found at Quebec and Levis, Quebec, Canada—"a species of northern Europe, imported." In 1905 I found them quite as plentiful in and about old lime quarries at Thomaston, and in 1906 collected them in a garden in the same town under cabbage plants. They literally "swarmed" on the ground and on the under side of the cabbage heads. This garden is on the banks of "Mill River," and near a lime kiln.

This season I found them just as numerous—and they are by far the most abundant species in this locality—in the Rockland and Thomaston localities, but have not as yet found them elsewhere in the county, although they quite likely are already established in the lime quarries of Camden and Rockport.

ON CERTAIN IMMATURE ANCULOSÆ.

BY BRYANT WALKER.

Anculosa prærosa was described by Say in 1824 from specimens collected at the falls of the Ohio. In the following year he described a second species from the north fork of the Holston River in Virginia as *A. subglobosa.*

In 1838 Dr. Lea described a very small bicarinate species from Cincinnati as *A. cincinnatiensis*, and, in 1845, another species from "Tennessee and Tuscaloosa, Ala.," as *A. tintinnabulum.*

Tryon in his preliminary "Synonymy of the Strepomatidae" (1865) stated that *cincinnatiensis* was "undoubtedly the quite young of *prærosa*," and placed *tintinnabulum* as a variety under *subglobosa.* He considered *A. virgata* Lea, a small, smooth, rounded form, to be the young of *tintinnabulum* and *A. globula* Lea, a very similar but more globose shell, the immature form of *subglobosa.*

In 1871, Dr. James Lewis published a paper in the American Journal of Conchology (VI, p. 216) on the shells of the Holston River, in which he identified a small bicarinate form from that river as *A. cincinnatiensis*, and, by a series of specimens graded in size, satisfied himself that this form was the young of Lea's *tintinnabulum.*

He further states that "some of the varieties (so-called) of *Anculosa prærosa* have bicarinate young, but their *forms* are such that when the dimensions of Mr. Lea's typical *cincinnatiensis* (diameter .16 inch) they *do not exactly*, but only *approximately*, correspond thereto, and therefore must yield to the claims of *titinnabulum.*" Dr. Lewis did not specify the peculiar characteristics of the young of *A. prærosa*, as distinguished from the young of *tintinnabulum*, beyond stating that the species is extremely variable and that "in one variety carinæ are scarcely discernible in the smallest specimens. In others there are traces of carinæ upon shells of nearly or quite $\frac{1}{4}$ inch in diameter."

In regard to *A. subglobosa* he described the young as "smooth, shining, depressed, subglobose, with a somewhat pointed, elevated apex," and states that in his numerous series of that species "none are carinate, nor can I find any evidence by which I might identify *subglobosa* with *tintinnabulum.*"

His conclusion therefore was that Lea's *cincinnatiensis* was the

very young of a valid species distinct from both *prærosa* and *subglobosa*, of which *A. tintinnabulum* was the adult form.

Subsequently Tryon reviewed Dr. Lewis' paper (Am. Jour. of Con., VII, p. 86) and, without discussing at all the facts on which the latter had based his conclusions, reiterated his former conclusions, stating that Mr. Anthony did not find *tintinnabulum* in the Ohio, but did find *cincinnatiensis*, and satisfied himself that it was the young of *prærosa* and that he, himself, had examined "thousands of specimens from many localities" and was "fully convinced that *subglobosa* and *tintinnabulum* are the same species." And this position was maintained in his elaborate monograph of the *Strepomatidæ* published by the Smithsonian Institution in 1873.

Since then, so far as I have been able to ascertain, nothing has been published on the subject.

It is obvious that, if these different forms of *Anculosa* exhibit as claimed by Lewis persistent and characteristic differences in the young shell, a valuable standard of comparison can be established, which will, when thoroughly worked out, enable us to definitely determine their relationships and their claims to specific or varietal recognition. And although, for a complete solution of the questions of synonymy involved, full suites of all ages of all the different forms would be necessary, any detailed information will be of value, both as leading the way towards the final settlement of the matter and as an incentive to further investigation and systematic work in the field for the acquisition of the material still necessary for successful results. For these reasons, the following notes have been compiled and, with full recognition of the fact that they are necessarily incomplete and quite insufficient for any broad generalizations and are of value only so far as they deal with material under observation, are published with the hope that they may lead others to review the material in their possession and incite additional effort toward securing the missing links.

I. Anculosa prærosa Say. Pl. X., figs. 1–6.

Unfortunately I have not been able to obtain any of the minute young of this species from the Ohio River, the smallest specimens seen having passed the carinate stage. But from a comparison of these with those of corresponding size and development from a very complete series of all sizes, ranging from .0125 mm. in diameter to

the fully matured shell, from the Tennessee river at Florence, Ala., collected by Mr. A. A. Hinkley, there seems to be no doubt but that the changes in growth of the two series have been identical.

The minute young in the Florence series have the apical whorls carinate and the body-whorl bicarinate. I have no difficulty in identifying this form with Lea's *cincinnatiensis*. The type had four whorls and measured 4 mm. in height by 3.5 in diameter. As a standard for comparison I have selected an individual of exactly these dimensions (Fig. 1); although most of the specimens of that diameter are more depressed, the altitude and width being substantially the same.

This specimen agrees with the original diagnosis in every particular with one exception. Lea states that the type had three bands and that the two carinæ were colored. Whether the three bands included the two carinal bands, he does not say. All of my specimens, with one exception, exhibit four bands within the aperture. Two are carinal, one is between the upper carina and the suture, and the fourth between the lower carina and the umbilical depression. These bands are continuous or broken into spots, and sometimes the upper and lower pairs are more or less confluent. The exception has only the upper pair of bands, the lower carina and basal area being uncolored. I do not regard the variation in banding of any material importance and, therefore, have no hesitation in proceeding on the assumption that these bicarinate individuals are the *cincinnatiensis* of Lea. As shown by Fig. 1, the typical form of *A. cincinnatiensis* has four whorls; the spire is acutely conical, its whorls flattened and bounded below by the projecting carina, the suture of the succeeding whorls being on the under side of the carina and slightly within the outer edge; the body whorl is strongly bicarinate, flattened above the superior carina, *concave* between the carinæ and with the basal arc area flattened and very oblique. The shell is rather translucent, light horn-color, more or less tinged with green; apex is red, lighter than the supracarinal band, and the bands dark reddish-brown; the superior band is broad and on the apical whorls fills nearly the entire space between the carina and the suture, so that the whorls appear wholly dark colored; the basal band is broad, the color extending to same degree over the entire umbilical area; the columella is more or less tinged with purple. The aperture is large "rounded,"

but slightly modified, however, by the carinæ. The nepionic whorl is smooth, or very slightly and irregularly roughened or pitted; this perhaps may be the result of incipient erosion. Below this, the lines of growth on the second and third whorls are strong, straight and quite regular, and intersecting these are numerous stronger, parallel, revolving striæ, which give a reticulated appearance to the surface; on the fourth whorl the revolving lines sensibly diminish in strength and towards the aperture become subobsolete. This sculpture is uniformly present and is apparently characteristic of the bicarinate form. The persistence of the revolving lines varies in different individuals. Usually they fade out as the shell assumes the globose form, but occasionally continue until the shell is nearly mature.

There is considerable variation in the height of the apical whorls. Most of the specimens in the bicarinate stage are more depressed than the type and the carina is less prominent on the superior whorls. Fig. 2 is the most depressed individual seen, and the spire is wholly flattened with no projection of the carina above the body whorl. As the shell increases in size, the superior carina becomes less prominent, the lip of the lower whorl rises and gradually passes over its edge, and, thenceforth, the shallow suture characteristic of the mature shell is maintained. Erosion begins, the acute spire and, generally, all the sculptured whorls disappear, and the shell assumes the characteristic globular shape of maturity.

During this stage, the carinæ progressively diminish in strength and become mere angles and finally disappear. The groove between them widens and becomes plane and persists in the half-grown and mature shells as the characteristic flattening of the body whorl. The superior carina is the less persistent and completely disappears in the regularly rounded curve of the upper part of the whorl. The lower carina and the resulting angle remain longer in evidence and cause in the mature shell the greater width of the lower part of the body whorl. The carinæ persist longer in the more conical specimens (Fig. 4) than in the depressed individuals (Fig. 3). For comparison with this stage in the Florence series, the smallest example seen from the Falls of Ohio is figured (Fig. 5). It measures 5.5x5.5 mm. The apical whorls are somewhat eroded, but enough is left to show that they were carinate and had the characteristic sculpture ascribed to *cincinnatiensis*. They are more depressed

than any of the Florence series, and the body whorl is much more gibbous. This feature is still more emphasized in a small series of *prærosa* from the Ohio at Golconda, Ills., also collected by Mr. Hinkley. In these (Fig. 6), as the shell advances beyond the bicarinate stage, the lip passes over the superior carina and overlaps the preceding whorl, forming a slight shoulder around it, so that upon the completion of an entire whorl, the spire appears, as it were, in a flattened depression with the short, apical elevation in the centre. Whether this is constant in the *prærosa* of the Ohio, the series under examination is too small to establish. But the similarity of the specimen from the Falls of the Ohio (the type locality) suggests that it may be. It is very desirable that a full series of all sizes from the Ohio should be examined, so that the manner of growth of the typical form may be definitely determined.

By a careful selection of the less eroded specimens, the whole process of growth can be traced from the typical bicarinate form of the young to the smooth rotundity of the adult shell and there is apparently no question but that the *cincinnatiensis* of Lea is the young of the *prærosa* of Say.

II. Anculosa subglobosa Say.

This species, in some localities at least, seems to be less subject to erosion than its associated species of the genus; and specimens nearly if not quite mature, with perfect apices, are not uncommon. The tracing of the growth of the shell from the early stages to maturity is, therefore, a matter of comparative ease.

The series of young shells in the Lewis collection, of which the smallest (Fig. 9) measures alt. 3.25, diam. 3.55 mm., with one exception, is very uniform, and there can be no doubt but that they are the young of the typical form as figured by Tryon (Mon. figs. 799 and 800). They are gibbous, translucent, light horn-color, unicolored or banded, smooth and shining, apex acutely conical, the tip tinged with dark brown, whorls rounded, suture well impressed, with no trace of any carina whatever. The shell increases very rapidly in size, but retains its peculiar form until nearly mature. For comparison with Figs. 3 and 8 a larger specimen (5x5 mm.) is also figured (Fig. 10).

The exception above noted (Fig. 11) is quite different in shape and would seem to be specifically distinct. It measures 5.5x5 mm.,

and is of a light greenish-yellow and much more globular than the others and barring the bands, which are three instead of two as called for by the original description, has great resemblance to *A. globula* of Lea. The aperture is almost exactly two-thirds of the length of the shell. Among a small set from the Holston at Knoxville, Tennessee, collected by Mr. A. C. Billups, are larger specimens (10x8.5 mm.) of the same form, but I have been unable to trace it with entire satisfaction to maturity. It is, however, apparently the immature form of the species that Dr. Lewis identified with the *A. virgata* of Lea. But whatever the relation of the form to *subglobosa* may be, it agrees with it in its smooth, shining, rounded whorls with no impressed spiral lines and no carinæ.

III. A. TINTINNABULUM Lea.

Dr. Lewis' series of this species is very complete and as he states, there can be no question but that the bicarinate form that he identified with Lea's *cincinnatiensis* is the young of *tintinnabulum*. But they are quite different from the true *cincinnatiensis* if I am right in my identification of that form, and seem to be specifically distinct. Compared with *cincinnatiensis* of the same size, these shells (Figs. 7 and 8) have a more elevated spire and are much thicker, being quite opaque and noticeably more heavily moulded; the surface of the whorls above the superior carina is decidedly convex above and excavated below as it approaches the carina, so that on the third and fourth whorls there is a well-developed groove immediately behind the carina; the carinæ are much stronger, the superior projects upwards rather than laterally, and is formed more by the excavation of the upper surface of the whorl behind the uplift of the intercarinal area, than by the lateral projection of the carina, as in *cincinnatiensis;* the lower carina is much stronger and projects laterally; the intercarinal area is relatively wider and very flat, being scarcely at all concave; the basal area is much more excavated immediately below the inferior carina. While color is, perhaps, the least reliable factor in specific distinction in *Anculosa*, in this series it is remarkably uniform and very striking. The shells are uniformly light greenish-yellow with two broad reddish-brown bands on the body whorl, one above the superior carina and the other on the basal area immediately below the inferior carina; the apical whorls are reddish-brown; the intercarinal area has no band, the carinæ are

noticeably lighter in color than the rest of the shell and stand out conspicuously against the dark bands above and below them. As the shell grows, the superior band widens and invades the region of the superior carina, sometimes before it has entirely disappeared, and occasionally divides into two narrow bands, the basal band persists and in the adult the space between them represents the intercarinal area of the young shell.

The spiral lines are uniformly present and rather stronger than in *cincinnatiensis* and apparently persist longer as the shell approaches maturity.

As the shell increases in size, the superior carina diminishes and finally disappears entirely; the lower carina persists much longer, descends somewhat in position and becomes a characteristic feature of the half-grown shell and, in the adult, causes the bell-shaped form which gives to the species its specific name.

IV. Conclusions.

From the examination of the material as above detailed, the following conclusions may be drawn.

1. That in these species of *Anculosa* at least, the very young shells have characteristics which are constant and available for specific distinction.

2. That the young shell of *A. prærosa* is bicarinate and spirally striate and was described by Lea as *A. cincinnatiensis*.

3. That the young shell of *A. subglobosa* is ecarinate and without spiral, impressed lines.

4. That the young shell of *A. tintinnabulum* is bicarinate and spirally striate, but specifically different from Lea's *cincinnatiensis*.

5. That *A. tintinnabulum* Lea is specifically distinct from both *A. prærosa* and *A. subglobosa*, and is a valid species.

6. That collectors and especially those in the field should give special attention to securing full *suites* of all the species of all ages, particularly the very young, so that the exact relations of all the described species may be definitely determined.

EXPLANATION OF PLATE X.

All the figures are on the same scale, × 48.

Fig. 1–4. *A. prærosa* Say—Tennessee River, Florence, Ala.

Fig. 5. *A. prærosa*—Falls of the Ohio.

Fig. 6. *A. prærosa*—Ohio River, Golconda, Ills.
Fig. 7–8. *A. tintinnabulum* Lea—Holston River, Tenn.
Fig. 9–10. *A. subglobosa* Say—Holston River, Tenn.
Fig. 11. *A. globula* Lea?—Holston River, Tenn.

A NEW SPECIES OF PYRGULOPSIS.

BY A. A. HINKLEY.

The finding of a new species of *Pyrgulopsis* is a surprise, coming as it does from such a well-known stream as the Wabash, a river which has furnished many forms of shells found nowhere else north of the Ohio river, though common in southern streams. There was found associated with the new species *Somatogyrus strengi* Pilsbry and Walker, a recently described southern species, which adds another to that list of, shall we call it freak geographical distribution? or is there some known cause for the occurence of southern forms in the Wabash? It seems a little strange that no species of shells bears the name of the Wabash river. The writer thinks now a good time to use the name.

PYRGULOPSIS WABASHENSIS, n. sp.

The shell is imperforate, pupiform, smooth, horn-colored; growth lines faint; composed of five convex whorls separated by an impressed suture. The periphery is rounded or slightly angular. The aperture oblique, ovate, angular above, rounded below. The columella a little reflected. Columellar callus thickened; on the parietal wall the outside edge straight and raised.

Length .12, diam. .06 of an inch.

Found in shallow water of the Wabash river, at the Chains in Posey county, Indiana, by the writer's son, George Hinkley. Compared with *P. mississippiensis* this species is smaller, has not the angular or carinate body whorl, the spire is not so acutely conical, and the aperture is not as wide. The *mississipiensis* is conical with flat whorls; this species is pupiform with rounded whorls. Some examples of *wabashensis* have a slight shoulder on the penultimate whorl just above the suture, others have an impressed line on the body whorl a little distance below the suture.

Examples are in the collections of the Academy of Natural Science, Philadelphia; The National Museum; The Chicago Academy of Science, Mr. Bryant Walker, and the writer.

NOTES ON SOME AUSTRALIAN UNIONIDÆ.

BY L. S. FRIERSON.

A series of shells covering nearly the whole range of species credited to Australia having been received from the well-known conchologist, Mr. Wm. T. Bednall of Adelaide, reveals several interesting points, which may constitute as many "addenda and corrigenda" to Mr. C. T. Simpson's "Synopsis of the Naiades."

Page 891. *Unio bednalli* Tate was described in 1882, Proceedings Royal Society of South Australia, page 56. The shell, as evidenced by notes, and a fine series of specimens from Mr. Bednall, is not a form of *Diplodon australis* (Lam.) Hanley, but is much nearer to *D. wilsonii* Lea (= *stuarti* Adams and Angas). A specimen of *bednalli* is over $3\frac{1}{2}$ inches long by $1\frac{3}{4}$ high, whereas a specimen of *D. australis* var. *legrandi* (an elongated variety) is 3 inches long and 2 inches high). *D. bednalli* Tate therefore should be removed as a synonym of *australis*, and restored to specific rank, from whence, should it ever be degraded, it must fall under *D. wilsonii* Lea, as a variety.

A series of shells labeled *U. angasii* Lea revealed the following facts: *U. angasii*, credited to MSS. of Lea, was described by Sowerby in Conchologia Iconica, and placed by Mr. Simpson as a synonym of *D. shuttleworthii* Lea. A casual observation of the lot seemed to indicate two species. A critical study of both the actual specimens with the original descriptions of both species confirmed this impression. *Diplodon shuttleworthii* Lea (besides being apparently larger) has a deeply and coarsely sulcated disc, and is covered with a heavy, thick, scaly epidermis resembling that of *D. cucumoides*.

On the other hand the *D. angasii* Sowerby is apparently a smaller species, is much *thinner*, with a smooth surface and covered with a *thin* epidermis, with nothing more than *fine* sulcations, scarcely noticeable. But as a final clincher, a young specimen of *D. angasii* (having beaks so perfect as to show the glochidial shell) shows a

beak having not a trace of radial sculpture, but only a *fine*, concentric sulcation. Hence the shell not only is not *D. shuttleworthii*, but strictly speaking is not even a *Diplodon*. The beaks of *D. shuttleworthii* have "strongly, irregularly radiate, curved bars."

Mr. Bednall was unable to procure for me a single example of *D. vittatus* Lea, or *D. evansii* A. & A., or of *D. wilsonii*, having uneroded beaks. But from the general similarity of the shells, it is, I believe, more than probable that a subgenus composed of these and possibly other Australian shells, having concentric beak sculpture or none, should be made and the definition of *Diplodon* be correspondingly broadened.

NOTES.

NOTICE TO SUBSCRIBERS.—Among the amendments to the Postal Laws and Regulations, to take effect Jan. 1, 1908, is the following —"a reasonable time will be allowed publishers to secure renewal of subscriptions, but unless subscriptions are expressly renewed after the term for "which they are paid within the following periods: [monthlies within four months] they shall not be counted in the legitimate list of subscribers." Subscribers will confer a great favor by paying promptly. A bill is sent when subscription is due.

H. A. P., C. W. J.

PUBLICATIONS RECEIVED.

A NEW PTEROPOD FROM NEW ENGLAND.—By C. H. Danforth, (Proc. Boston Soc. Nat. Hist., vol. xxxiv, pp. 1–19, pl. 1–4).

This new pteropod, *Pædoclione doliiformis*, which also proves to be a new genus, was taken in the plankton of Casco Bay, Me., on the nights of Aug. 28 and Sept. 5, 6, 7 and 8, 1902. On a hasty examination it was referred to a larva of some gymnosomatous pteropod. Later, in making some sections, they were found to be sexually matured adults. "This genus does not properly fall under any established family although perhaps it approaches most nearly the *Clionidæ*, from which it differs in having an odd number of cephalocones and in having the entire posterior part of the body filled by the viscera." The species is described as: "Transparent;

barrel-shaped; small, about 1.5 mm. in length; head when expanded elliptical in outline; anterior ciliated band broken up into segments; expanded parapodia (wings) flat, long-ovate; middle lobe of foot rather large." The author gives a very exhaustive account of its general features, musculature, digestive and nervous systems, heart and nephridium, and the reproductive system. The paper is illustrated by four plates and two figures in the text.—C. W. J.

The Haliotis or Abalone Industry of the Californian Coast.—By Mrs. M. Burton Williamson (Am. Hist. Soc. S. Cal., vol. vii, pp. 22–30, 1907). An exceedingly interesting account of this important industry. The law protecting these shells is like the law protecting the lobster on the Atlantic. The young are protected but those which produce young are not. The author asks the pertinent question—"If these mollusks are destroyed as soon as old enough to propagate, of what use to the State is the preservation of the young?" The present method in time can only lead to their extermination. The shells should be protected at least during their breeding period.—C. W. J.

The Mollusca of Mast Head Reef, Capricorn Group, Queensland, Pt. II.—By C. Hedley (Proc. Linn. Soc. N. S. Wales, vol. 32, pp. 476–513, pls. 16–21, 1907). In this paper 37 new species are described and beautifully figured. A list containing some 447 species from this reef, procured within a week, in a six-mile radius from one spot, shows the richness of the fauna.

The Pyramidellid Mollusks of the Oregonian Faunal Area—By William H. Dall and Paul Bartsch (Proc. U. S. Nat. Mus., XXXIII, pp. 491–534, pls. 44–48, 1907). The species described in this paper have been selected from a monograph of West American *Pyramidellidæ* upon which the authors have been at work for some time, but which has been unavoidably delayed. The Oregonian Faunal Area includes the region extending from the northern limit of the Alexander Archipelago southward along the coast to Pt. Conception, Cal. Thirty-eight new forms are described and beautifully figured together with many others already known imperfectly from this region.—C. W. J.

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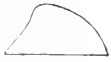

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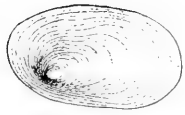

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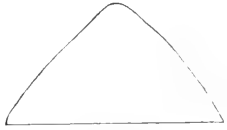

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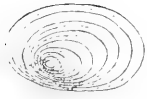

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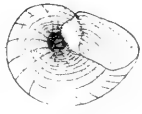

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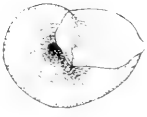

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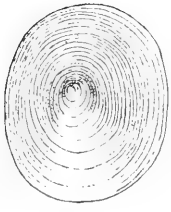

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THE NAUTILUS.

VOL. XXI. MARCH, 1908. No. 11.

MOLLUSCAN FAUNA OF THE SAN BERNARDINO MOUNTAINS, CALIFORNIA.

BY S. S. BERRY.

In view of the extraordinary researches carried on in the neighboring regions of Arizona and New Mexico by Messrs. Ashmun, Ferriss, Pilsbry, and other recent collectors, the writer has often wondered what might be the result of an equally diligent effort in the mountain ranges of Southern California. But little work seems to have been done in the region, and reports on that little are scattered and fragmentary.

During the month of August, 1907, the writer spent two weeks camping in the San Bernardino Mountains, California, and although he had other business on hand than the advancement of a hobby, he kept his eyes open for mollusks, and is thus enabled to add another fragment to the records.

The San Bernardino Mountains range in height from about five thousand to nearly twelve thousand feet above sea-level, and abound in grand and beautiful scenery. Extending, as they do in an easterly-westerly direction, the northern slope of the mountains drains into the Mojave Desert, the southern into the Pacific. No mollusks whatever were found in the desert drainage, but the writer was able to give only a superficial examination to all but one or two spots, and has no doubt but that his collections represent a far from complete index to the life of the region.

The cañons and higher regions are well wooded, but the soil is

generally dry at this time of the year, although there are numerous brooks and rills, with here and there an open swampy meadow or cienaga.

Bear Lake is a partly natural, partly artificial reservoir, some five or six miles long by perhaps a half a mile wide, and about sixty-five hundred feet above sea-level. It is the home of multitudes of small forms, most of them being species of wide distribution. High up on the mountain to the south of the lake is Bluff Lake, a small summer resort, at an altitude of 7,550 feet. In this case the "Lake" is only a large cienaga with a swamp at its lower end. This swamp, with the creek which flows from it, proved a very interesting locality, while all the land mollusks seen on the trip were found either under sticks and logs at the edge of the meadow or nearby in the woods.

It is notable that none of the larger *Helices* were found, although *Glyptostoma newberryanum* should occur here just as it does in the neighboring San Gabriel Range, and I have seen living specimens of *Epiphragmophora tudiculata* W. G. B. from the base of these mountains.

A list of the species obtained is herewith appended:

Pisidium californicum Newcomb (?). Two "somewhat different forms" were thus determined by Dr. Sterki, who says that *P. californicum* itself is somewhat in doubt. They occur together, and are rather common in the quieter pools of Bluff Lake Creek, in ditches in the meadow, and in the swamp.

A number of minute *Pisidia* found in a spring on a nearby hillside are probably young of the same.

Pisidium (sp. ?). Two specimens from the swamp are of "different shape from the remainder," according to Dr. Sterki, but whether or not distinct he was unable to say.

Musculium raymondi J. G. Cooper. Found commonly in the swamp, and rather rarely in the creek at Bluff Lake.

Valvata (*sincera*, Say?) var. Bluff Lake Swamp (two specimens) and in Bear Lake, where it seems fairly common on and under stones.

Lymnæa palustris Müll. A small variety of this species occurs commonly in Bear Lake. It is extremely variable, generally tending toward the form called *nuttalliana* by Lea. The maximum longitude of the numerous specimens collected in Bear Lake is but about ten millimeters.

Lymnæa palustris nuttalliana Lea. Occurring with the preceding in Bear Lake and intergrading with it, this form is also abundant in Bluff Lake Creek and the swamp at its head. The specimens from these localities are very distinct and uniform, and several hundred examples showed no tendency to grade into typical *palustris*. All the specimens found here are very much larger and less fragile than those from Bear Lake.

Physa cooperi Tryon. Common in Bear Lake, and a smaller form was found in myriads in a watering trough on the City Creek Cañon Road. (Alt. about 2000 ft.)

Physa sp. May be a variety of the preceding with which it occurs in Bear Lake, but it has a much more ventricose body-whorl.

Physa politissima Tryon. Bear Lake—common. A fine, large species.

Planorbis trivolvis Say. Bear Lake; Bluff Lake Creek; swamp at Bluff Lake. Very common, but specimens generally much eroded.

Planorbis parvus Say. Swamp at Bluff Lake. Specimens identified by Dr. Pilsbry.

Planorbis vermicularis Gould. Not uncommon in Bear Lake. Specimens identified by Dr. Dall. It seems to me that this species is hardly more than a mere form of the preceding, although the specimens from Bear Lake have a more rounded and less flattened body-whorl, and are quite readily separated from those found in the swamp.

Vitrina alaskana Dall. Two specimens under sticks in the meadow at Bluff Lake.

Zonitoides arborea Say. About a dozen specimens found about an old stump in the border of the woods at Bluff Lake.

Euconulus fulvus Draparnaud. Bluff Lake; two specimens under logs at the edge of the meadow. This species has already been reported from "San Bernardino County" by Binney.

Vertigo occidentalis Sterki. One specimen (the type, No. 1860 of my collection) was found near a spring in the cañon side below Bluff Lake Swamp. Diligent search on two occasions produced not another specimen, but this was enough for Dr. Sterki to pronounce as "evidently of an unknown species." It is described in NAUTILUS XXI, p. 90, q. v.

Epiphragmophora tudiculata W. G. Binney. At the base of the mountains near Highland (1904); near Mentone (1906); also reported from above San Bernardino.

SUBDIVISIONS OF THE TEREBRIDÆ.

BY WILLIAM H. DALL.

Having recently had occasion to review the genera of *Terebridæ*, it seemed that the synoptical table might have some interest for students.

Genus TEREBRA Bruguière, 1789.

A. Presutural sulcus present.

Sculpture uniform at all ages, persistent, suture appressed. Subgenus STRIOTEREBRUM.

Shell short, small.

1. Sculpture reticulate. Section *Strioterebrum* s. s.
2. Axial sculpture emphatic, spiral obsolete. *Fusoterebra.*
3. Axial sculpture obsolete, spiral emphatic. *Perirhoë.*

Shell elongate, whorls mesially constricted.

4. Whorls nodulous at both margins. *Triplostephanus.*

B. Sculpture in youth and age discrepant. Subgenus TEREBRA.

5. Young nodulous, sulcus persistent. Section *Myurella.*
6. Young nodulous, sulcus present in youth. *Terebra* s. s.

Young axially ribbed, sulcus persistent.

7. Adult slender, smooth. *Subula.*
8. Adult small, obsoletely ribbed. *Abretia.*

Sulcus obsolete in the adult.

9. Whorls rapidly enlarging. *Oxymeris.*

C. Sulcus wholly absent. Subgenus ACUMINIA.

10. Adult slender, smooth. Section *Acuminia.*

Genus HASTULA Adams, 1853.

Presutural sulcus absent, suture appressed.

A. Sculpture uniform, persistent.

a. Shells small, slender. *Hastula* s. s.

B. Sculpture discrepant.

b. Whorls rapidly enlarging. *Impages.*

Genus DUPLICARIA Dall, 1908.

A. Sculpture persistent, suture channeled.

a. Shell axially ribbed, sulcate. *Duplicaria.*

Genus SPINEOTEREBRA Sacco, 1891.

A. Sulcus absent, suture appressed.

a. Columellar border callous, axis impervious. *Spineoterebra.*

b. Columellar border bare, axis pervious.[1] *Mazatlania.*

This table is not intended to exhibit all, or even the more important characters upon which the main subdivisions (which will be treated elsewhere) are based, but is rather a key by which the shells may be conveniently assorted. The sections are typified as follows:

Strioterebrum Sacco, 1891. *T. basteroti* Nyst.

A recent example is *T. dislocata* Say.

Fusoterebra Sacco, 1891. *Fusus terebrina* Bonelli.

A recent example is *T. benthalis* Dall.

Perirhoë Dall, 1908 (*nov.*). *T. circumcincta* Deshayes.

An American example is *Acus rushii* Dall.

Triplostephanus Dall, 1908 (*nov.*). *Terebra triseriata* Gray.

This is *Myurella* Hinds, in part.

Terebra s. s. Lamarck, 1799. *T. subulata* (Linné).

Myurella Hinds, s. s. 1844. *Terebra myuros* Lam.

Subula s. s. (Schumacher, 1817) Gray, 1847. *T. dimidiata* (Linné).

Abretia H. and A. Adams, 1853. *T. cerithina* Lam.

Oxymeris Dall, 1900. *Terebra maculata* Lam.

This is *Acus* Gray, 1847, not Edwards, 1771.

Acuminia Dall, 1908 (*nov.*). *T. lanceata* (Linné).

Hastula H. and A. Adams, 1853. *T. strigillata* Lam.

Impages E. A. Smith, 1873. *T. cœrulescens* Lam.

Duplicaria Dall, 1908 (*nov*). *T. duplicata* Lam.

This is *Myurella* Troschel, not of Hinds.

Mazatlania Dall, 1903. *T. aciculata* Lam.

Spineoterebra Sacco, 1891. *T. spinulosa* Doderlein. Miocene.

Mazatlania is *Euryta* Adams, 1853, not of Gistel, 1848.

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[1] I use the term "pervious" technically, to denote an axis gyrate about an empty space which penetrates the center of the shell internally, in contradistinction to "umbilicate" or "perforate," which would imply a space external to the inner wall of the whorls and circumscribed by them.

NEW SPECIES OF ANCYLIDÆ.

BY BRYANT WALKER.

NEOPLANORBIS SMITHII n. sp. Pl. IX, figs. 1 and 2.

Shell minute, planorboid, perforate, slightly convex above and below; periphery obtusely angulate; thin, translucent, whitish, shining with a silky luster from the fine, closely set, regular lines of growth. No trace of spiral sculpture. Whorls 2, rapidly enlarging; apex sunken; the last half of the first whorl elevated above the outline of the body whorl; apical whorl convex, the convexity rapidly diminishing towards the aperture; suture well impressed, rising somewhat at the aperture; aperture large, oblique, slightly expanded, equally curved above and below; columellar margin dilated, straight and vertical, callously thickened below, smooth; umbilicus a mere perforation.

Alt. 1, diam. 2 mm.

Types (No. 27149, Coll. Walker) from the Coosa river at Higgin's Ferry, Chilton Co., Ala. Co-types in the collection of T. H. Aldrich, Geo. H. Clapp, John B. Henderson, Jr., and the Philadelphia Academy.

This little species differs from *tantillus* and all the other known forms of the genus by the entire absence of spiral sculpture and the elevation of the spire above the level of the body whorl. The animal is black and the shell consequently appears of that color until cleaned.

NEOPLANORBIS UMBILICATUS n. sp. Pl. IX, figs. 3 and 4.

Shell minute, planorboid, umbilicate, convex above and below, but flattened above as it approaches the aperture and obliquely flattened below the periphery; periphery obtusely carinate; brownish horn-color; lines of growth fine and regular; surface sculptured by raised spiral lines, which are heavier below than above the periphery. Whorls 2, rapidly enlarging, apex sunken; apical whorl very convex; body whorl nearly flat in the sutural region, but curving down rapidly toward the peripheral carination; suture well impressed and depressed below the periphery at the aperture; aperture large, wider than high, flattened above and below, the upper and lower margins being nearly parallel, obliquely flattened below the periphery; columellar margin broadly dilated, curved and partially

covering the umbilicus; columella curved, with a heavy callus and obtuse tubercle in the center; umbilicus round and deep. The animal is yellowish.

Alt. 1, diam. 2 mm.

Types (No. 27150 Coll. Walker) from the Coosa River at "The Bar" 2½ miles above Yellowleaf Creek, Chilton Co., Ala. Cotypes in the collection of T. H. Aldrich, Geo. H. Clapp, John B. Henderson, Jr., and the Philadelphia Academy.

This species resembles *tantillus* in being spirally striate but differs in being umbilicate and in having a tooth on the columella, as well as in the general shape. It does not resemble *smithii* in any of its special features, and differs from *carinatus* in being more obtusely carinate and in the wider umbilicus and stronger spiral striation.

NEOPLANORBIS CARINATUS n. sp. Pl. IX, figs. 17 and 18.

Shell minute, planorboid, narrowly umbilicate, nearly flat above, convex below, but obliquely flattened below the peripheral carina, which is strong, but rather blunt; pale horn-color; lines of growth fine, closely set and regular, sculptured above by a few fine subobsolete spiral lines, stronger towards the periphery; under surface with numerous fine spiral lines heavier than on the upper. Whorls 2, rapidly enlarging; apex sunken; apical whorl somewhat flattened above, convexly rounded at the periphery which, at about the beginning of the body whorl, becomes angulate and then carinate; the body whorl above is slightly convex in the center, but flattened toward the suture, and "pinched out" at the periphery to form the carina; suture well impressed, descending toward the aperture below the periphery; aperture large, much wider than high and auriculated at the periphery by the carina; upper and lower margins flattened and nearly parallel; columellar margin dilated, free, slightly curved back over the small, round umbilicus, and obtusely angled where it joins the basal margin; columella somewhat thickened, with a small obtuse tubercle at about the center.

Alt. 1, diam. 2 mm.

Types (No. 27151, Coll. Walker) from the Coosa river at Duncan's Riffle, Coosa Co., Ala. Cotypes in the collections of T. H. Aldrich, Geo. H. Clapp, John B. Henderson, Jr., and the Philadelphia Academy.

In form the species reminds one of a minute *Planorbis oper-*

cularis Gld., its most prominent characteristic being the nearly plane upper surface with a strong peripheral carina. It resembles *umbilicatus* in being spirally striate and having a columellar tooth, but differs in the greater development of the carina, narrower umbilicus and in having the spiral lines much weaker. It differs from *tantillus* in the greater development of the carina, in the small but round umbilicus, dentate columella and weaker spiral striation. The animal is black.

All these species of *Neoplanorbis* were discovered by Mr. Herbert H. Smith in the fall of 1907. They live on the under sides of stones in the more or less rapid current and in suitable localities are very abundant. Mr. Smith took 50 from one small stone. *Neoplanorbis* seems very local in its distribution. It may be abundant on one shoal and not found at all on another. And on the same shoal, it is frequently restricted to one side of the river or the other.

In his progress down the river in 1907, Mr. Smith did not find *Neoplanorbis* at all, until he reached Cedar Island, Chilton Co., three miles above the mouth of the Yellowleaf Creek, where a single specimen of *umbilicatus* was found.

At "The Bar" two miles further down *umbilicatus* was found in some abundance on stones in a strong current, while at the same place *carinatus* was found in a moderate current. There was no intermingling of the species in these two situations. *Umbilicatus* was not met with below this point.

At Butting Ram Shoals, five miles below, in a moderate current, the catch was almost entirely *carinatus*, the exception being three specimens of *smithii*.

At Higgins' Ferry, seven miles further down stream, in a moderate current, with the exception of a single example of *carinatus*, the several hundred specimens were all *smithii*.

While at Duncan's Riffle seven miles below, the catch contained two specimens of *smithii*, the balance being *carinatus*.

Duncan's Riffle is twenty-four miles by river above Wetumpka, so that, in view of these facts, it is not surprising that *N. tantillus* was not met with at all.

The following key may be of assistance in differentiating the four species of *Neoplanorbis* now known:

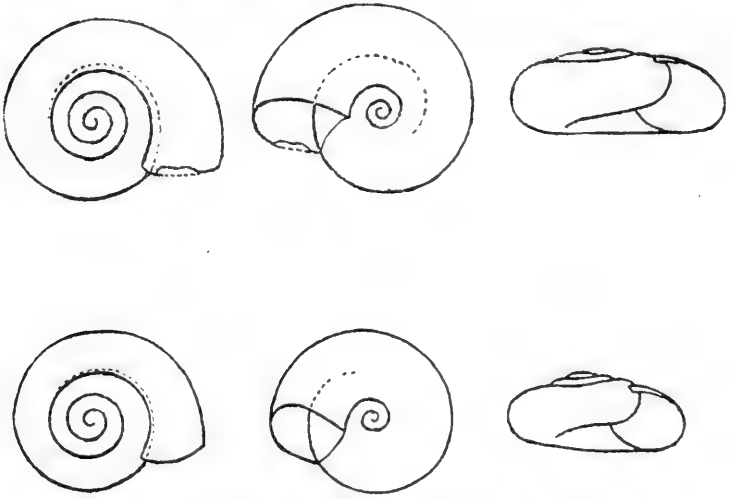
1. Umbilicate, columella dentate . . . . . 3.
2. Perforate, columella smooth . . . . . 4.

3. { Periphery carinate, umbilicus narrow . . . . . *carinatus.*
   { Periphery obtusely angled, umbilicus wider. . . . *umbilicatus.*
4. { Spirally striate, periphery carinate . . . . . *tantillus.*
   { No spiral striæ, periphery rounded . . . . . *smithii.*

VITREA LEWISIANA N. SP.

BY GEO. H. CLAPP.

Shell small, depressed widely, perspectively umbilicate, all whorls showing to the apex, umbilicus contained about five times in the diameter of the shell; yellowish-white, translucent, the inner whorls



Upper figures, *Vitrea lewisiana* Clapp. Type, x8.
Lower figures, " *dalliana* 'Simpson' Pils. x8. Miami, Fla.

showing through the body of the shell, highly polished; the delicate growth lines are very regularly spaced and close together, smooth below. Spire much flattened; sutures well impressed, margined; whorls $3\frac{1}{2}$, slightly convex, the last wide. Aperture oblong-lunate, depressed above, lower margin parallel with the base, lip simple.

Gr. diam. $3\frac{1}{2}$, lesser 2.8, alt. $1\frac{1}{2}$ mm.

Type from Monte Sano, near Huntsville, Ala., also found at Wetumpka and Gurley, Ala., so probably extends over the whole eastern part of the state. *Rare.* Collected by Herbert H. Smith.

I name this species in honor of the late Dr. Jas. Lewis, whose work on the southern mollusca is well known.

The color, and particularly the *very regular, close* lines of growth at once distinguish this shell from all other species. It is perhaps nearest to *V. dalliana*, but differs in color, shape and sculpture. In *dalliana* there is a very minute spiral sculpture, not mentioned in the original description, and only visible under a magnification of about 60 diameters.

NOTES.

NOTE ON HELIX HORTENSIS.—In my article on the distribution of *Helix hortensis* (THE NAUTILUS, XX, p. 73, 1906). I overlooked a very interesting article by Robert Bell, Jr., "On the Natural History of the Gulf of St. Lawrence, and the distribution of the mollusca of Eastern Canada." (The Canadian Naturalist and Geologist, IV p. 215, 1859). As the note on *H. hortensis* has an important bearing on its distribution and is probably inaccessible to many, I quote it in full: "It seems scarcely credible that this species has been imported from Europe, considering how widely diffused and vastly numerous it has become along the Lower St. Lawrence. On the mainland it was first observed on Mount Commis, about nine miles south of St. Luce and on the coast at Metir, where it was abundant and below which it seems to occupy the place of *H. albolabris*, but is generally much more numerous. In 1857, I found vast numbers of them on the Brandy Pots and Hare Island in the middle of the St. Lawrence opposite Rivière du Loup. The climate of Gaspé seems to be very favorable to their propagation, as they appear to have spread over the country for a considerable distance in land. The yellow and banded varieties seem to be about equally numerous. Where land has been recently cleared and burnt over, their withered shells may be seen strewed in thousands over the surface of the soil. In the valley of the Marcouin they were observed to extend 12 miles inland, which was farther than at any other place. The height at which the last specimen was found was about 1500 feet above the sea, as indicated by the barometer which we had with us. The young from the size of a grain of duck shot to half that of the adult shell were met with in our journey up this valley in the end of July." With this record as a basis it would be

interesting to know to what extent the species has spread during the past fifty years, or whether with advancing civilization and the clearing and burning of the woods it has diminished. We have no recent records outside of the Gaspé region.—C. W. JOHNSON.

WE regret to announce the death of Charles Abbott Davis, Curator of the Roger Williams Park Museum, Providence, R. I. He died January 29, at the age of thirty-nine years.

NOTE ON TURBONILLA CASTANEA AND ODOSTOMIA MONTEREYENSIS.—In the hurry of departure for the Philippine Islands, Dr. Bartsch applied to two new Pyramidellids in our recent paper (No. 1574) in the U. S. Nat. Museum Proceedings, the names *Turbonilla* (*Pyrgiscus*) *castanea* (p. 509) and *Odostomia* (*Amaura*) *montereyensis* D. and B., (p. 531). These names being preoccupied, I propose to substitute *T.* (*P.*) *castanella* and *O.* (*A.*) *canfieldi*.—WM. H. DALL.

MILAX GAGATES AND VITREA CELLARIA IN COLORADO.—Four of my students, Messrs. Walter Groom, Floyd House, Merrit Hunt and William Winner, recently examined the greenhouses of Boulder for Mollusca, to be used for class purposes. Quite to my surprise, they obtained five species, two of which had not previously been found in Colorado. *V. alliaria* was first found in Colorado last year, also in a Boulder greenhouse. The species obtained were:

(1) *Milax gagates* (Drap.). Many, of various ages, all of the variety *plumbea*, and with the keel rather inconspicuous in life. They probably came from the Pacific coast, and represent the *hewstoni* form, which I have never been able to separate from *gagates*.

(2) *Agriolimax agrestis* (L.). Several, from light reddish to almost wholly black.

(3) *Agriolimax campestris* (Binney). One.

(4) *Vitrea cellaria* (Müller). Many specimens, some of good size.

(5) *Vitrea alliaria* (Miller). Several, with the garlic odor very strong.

P. S., Feb. 6.—The examination of the Boulder greenhouses has been continued, and to-day Mr. Ivan Beck brought in a number of *Vitrea lucida* (Drap.), also new to Colorado. One specimen has a diameter of almost 15 mm. There was also secured an example of *Vitrea cellaria*, var. *margaritacea* Schmidt, the white variation. As the introduced species of *Vitrea* are not very generally known, a brief table may be of service.

Shell small, about 6 mm. diameter; shell and animal both quite dark; in life nearly always with a strong garlic odor.

V. alliaria (Miller).

Shell much larger when mature, and not smelling of garlic.

Shell about 10 mm. diameter, compact, nearly circular in outline, pale brownish or (var. *margaritacea*) white; animal pale, darker dorsally. *V. cellaria* (Müller).

Shell larger when mature, broader, with the last whorl broader and flatter, dark-colored; animal very dark bluish or bluish slate, the basis of the upper tentacles swollen.

V. lucida (Draparnaud).

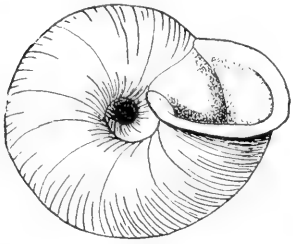
T. D. A. Cockerell.

PUBLICATIONS RECEIVED.

Bermuda in Periodical Literature, with occasional references to other works: A Bibliography, by George Watson Cole 1907. Pp. xii+275. "By far the greater part of what has been written concerning Bermuda has appeared in various periodicals and the publications of learned societies. These writings may roughly be divided into historical and descriptive, and those relating to natural history. Of history, properly speaking, little has appeared; but many descriptive articles have been written by tourists and others who have visited those beautiful islands. Their geographical situation and subtropical fauna and flora early attracted the attention of those interested in scientific phenomena. Soon after beginning this work it became apparent to the compiler that the Bermudas have for the past half-century been a favorite field of the zoölogist, botanist and geologist. Bearing this in mind, a special effort has been made to render the record of their labors as complete as possible. In order to do this, references are made to some works which are not periodicals, mostly, however, by authors who have also made contributions to periodical literature concerning the flora and fauna of those islands."

The scope of this work is sufficiently indicated in the above quotation from the author's preface. Mr. Cole has made the bibliography of Bermuda a labor of love for many years, and the number of titles brought together here will surprise even those who have been interested in things Bermudian. The notes given under all important titles amount to a digest of the papers. Thus in dealing with biological articles, all species described from Bermuda are cited, and extracts are given to show what of interest any paper contains. To the naturalist interested in Bermuda the work will take its place as an indispensable reference book; but Mr. Cole's delightful notes give the opus a merit all its own; it is really a *readable* bibliography.

H. A. P.



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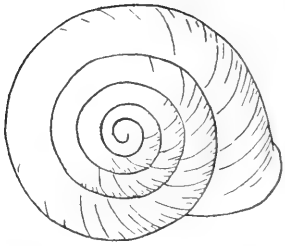

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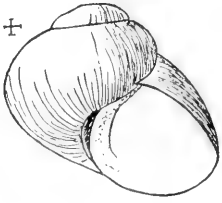

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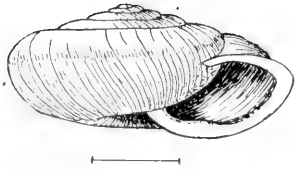

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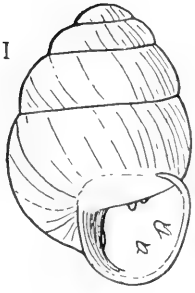

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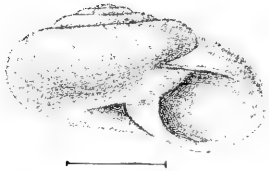

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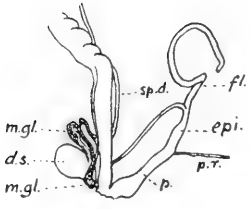

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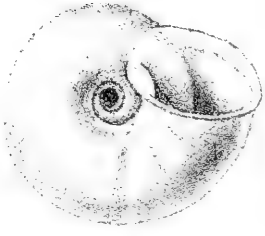

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THE NAUTILUS.

VOL. XXI. APRIL, 1908. No. 12.

NOTES ON PLATE XI.

Several references to the figures grouped on this plate were published before the plate was made up, and require correction in the text.

Figs. 1, 2, 3, *Polygyra martensiana* Pils., Tampico, Mexico. Described in the July number, p. 26. The dimensions are wrongly given in the text. The type measures, alt. 5.5, diam. 11 mm., another specimen, alt. 4.8, diam. 8.8 mm.

Fig. 4, *Fluminicola minutissima* Pils. Idaho. Description in November number, p. 76. Alt. 1.5 mm.

Fig. 5, *Vertigo occidentalis* Sterki. Bluff Lake, San Bernardino Co., California. Described on p. 90. In our opinion this form should be ranked as a subspecies under *V. modesta* nearest to *V. modesta castanea* St., from which it differs in the shorter, wider, less cylindric shape, and the slightly larger teeth. If this view is correct it will stand, as *V. modesta occidentalis*, among several other slightly differentiated races of *modesta*, all variable, and especially developed in the Canadian zone of the Rocky Mountains.[1] *V. m. occidentalis* is illustrated from the unique type, by courtesy of Mr. S. S. Berry. It is No. 1860 of his collection. See also p. 123.

Figs. 6–10, *Micrarionta desertorum* Pils. & Ferr. Described on p. 134. H. A. P.

[1] See in this connection the figures in Pilsbry and Vanatta. Partial Revision of the American Pupæ, 1900, p. 600, pl. 23.

A NEW MICRARIONTA FROM ARIZONA.

BY H. A. PILSBRY AND J. H. FERRISS.

When at the Grand Canyon of the Colorado in the autumn of 1906 the writers met Mr. W. J. Gilchrist, who at that time was about to leave the Canyon for the mining region of the lower Colorado. Besides various friendly and helpful services in connection with our work at the Canyon, Mr. Gilchrist volunteered to look out for snails in the region he was about to visit. It was with a great deal of pleasure that one of us received a letter and package of snails, making good his offer of assistance.

In that desert country snails are not common, and for a long time none were found. Finally, Mr. Gilchrist writes, "I was building a stone monument on a mining claim just after a heavy rain and found three live snails on a rock. These and four dead ones were all I have been able to find. They came from a small range of mountains 12 miles south from Parker, Yuma Co., Arizona."

The snails prove to be of a new species, which may be described as follows.

MICRARIONTA DESERTORUM n. sp. Plate xi, figs. 6–10.

The shell is small, depressed, openly umbilicate, the width of umbilicus contained nearly 5 times in that of the shell, glossy, opaque, pinkish-white with some oblique streaks of flesh-color, and sometimes a few corneous dots; the inner $2\frac{1}{2}$ whorls fleshy-corneous. The spire is convex but very low, whorls about $4\frac{1}{3}$, the inner ones rather slowly increasing, the last much wider, about double the width of the preceding. The embryonic shell consists of $1\frac{1}{2}$ whorls, the first fourth of a whorl smooth, the rest with close, even sculpture of minute papillæ, which are lengthened in a direction parallel to the sutures, and form a regular pattern of oblique, forwardly descending and ascending rows. The post-embryonic whorls have fine, irregular, somewhat wavy striæ in the direction of growth-lines, and papillæ like those of the embryonic whorls but much more sparsely placed, and disappearing near the end of the penultimate whorl. The last whorl has weak growth-lines only. It is rounded periferally and descends slowly to the aperture. The suture is deeply impressed, especially at the last whorl. The aperture is oblique, rounded-oval.

Peristome slightly expanded, with a narrow, rusty edge ; upper and outer margins very slightly expanded ; basal margin more expanded ; columellar margin rather broadly dilated. The ends converge and are joined by a short glossy callus.

Alt 7.5, diam. 12.9, aperture alt. 5.8, width 6.7 mm.

Alt. 6.8, diam. 11.6 mm.

Alt. 6.7, diam. 11.1 mm.

The whole upper surface, head and tentacles, are blackish-slate color, finely irregularly granulose. There are no distinct dorsal or genital furrows. The sole is tripartite, the areas separated by indistinct longitudinal impressed lines, in drowned alcoholic examples. The middle area is twice as wide as the others, slaty-white ; side areas darker slate color. The mantle is whitish, the venation of the lung outlined delicately with gray.

The genital system (pl. XI, fig. 9) resembles that of *M. hutsoni*. The penis (*p.*) is swollen near the base, and has a slender retractor muscle (*p. r.*), and a moderately long flagellum. The vagina is very short, the spermatheca globular, its duct very long, and inserted unusually low, much farther down than in *M. hutsoni*. The dart sack (*d. s.*) is large, and near its base, on the side facing the vagina, the two mucus glands (*m. gl.*) are inserted close together (as shown in fig. 10, a diagrammatic view of these organs). The mucus glands descend and their enlarged ends lie near the base of the dart sack. The measurements are : length of penis (to insertion of retractor), 3 mm. ; length of epiphallus, 1.8 mm. ; length of flagellum, 4 mm. ; length of vagina, 1.8 mm. The jaw has about 6 unequal ribs, grouped in its median part.

This species is doubtless related to both *Sonorella baileyi* and *S. fisheri* Bartsch, both of which differ in various details of sculpture. It stands nearest to *Micrarionta hutsoni* Clapp, having the same type of embryonic sculpture ; but that species has a dark band above the perifery, bordered with white above, and a much larger aperture.

Cotypes are in the collections of Ferriss and the Academy of Natural Sciences (No. 94783).

The anatomical data obtained from living examples of the species *hutsoni* and *desertorum* by the junior author, indicate that we went too far in referring species from the lower Colorado basin to the genus *Sonorella*. It now seems likely that the species *wolcottiana*, *indioensis*, *baileyi*, *fisheri*, *lohrii*, and perhaps some others, belong to

Micrarionta; a group which should apparently be given generic rank. Anatomically, *Sonorella* is not closely related to the *Micrarionta* series, which has its center in southern and Lower California, and the adjacent border of Arizona. Data to be presented in our forthcoming report on southwestern snails collected in 1906 and 1907 indicate that *Sonorella*, while remarkably varied in anatomy specifically, yet shows no forms in any way connecting with the Californian types of Helices.

EXPLANATION OF FIGURES.

Plate XI, figs. 6, 7, 8. *M. desertorum.*

Fig. 9, genitalia of the same specimen; *d. s.*, dart sack; *epi.*, epiphallus; *fl.*, flagellum; *m. gl.*, mucus glands; *p.*, penis; *sp. d.*, lower portion of the duct of the spermatheca. The mucous glands and their ducts are shaded.

Fig. 10. Diagram of dart sack and mucous glands viewed from the side towards the vagina, showing the contiguous insertions of the mucous ducts.

SOME NEW CALIFORNIAN SHELLS.

BY WILLIAM HEALEY DALL.

RISSOA (ALVANIA) GRIPPIANA Dall, n. sp.

Shell small, brownish, solid, cancellate, with one and a half smooth nuclear and five and a half sculptured whorls, nucleus flattish, blunt, remaining whorls rotund, evenly enlarging; last whorl with 13–14 axial ribs crossed by somewhat more slender, equal, equidistant, spiral threads not tuberculate at the intersections, with three somewhat stouter spirals on the base; earlier whorls with two and then three spiral threads between the sutures; suture indistinct, aperture obovate, rounded in front, slightly angular behind, with a much thickened lip which in senile specimens is duplex at the margin. There is a very minute chink but no umbilicus. Length 3, max. diam. 1.5 mm.

Type specimens from Todos Santos Bay, Lower California, between tides, Hemphill, U. S. Nat. Mus. 46171; others from 12 fathoms sand, off the entrance to San Diego harbor, C. W. Gripp;

others at various localities north to San Pedro and Catalina Island, California, mostly beach specimens. The species recalls *R. tumida* Carpenter, but is much more elevated, though less so than *R. incurvata* Cpr., which is also a thinner shell. All three have very nearly identical sculpture.

BELA GRIPPI Dall, n. sp.

Shell small, straw-color or pale brown with occasional spiral bands of darker brown, or all brown; six-whorled, of which the first whorl and a half are white, polished, smooth and turgid, the subsequent portion of the shell having a dull surface; earlier whorls with the periphery nearer the anterior suture, the whorl behind the periphery somewhat flattened and compressed, crossed by low obscure riblets, about a dozen on the fourth whorl, which become obsolete later; the whorl in front of the periphery shows no axial sculpture; the whole whorl is spirally sculptured with narrow sharp incised lines, one dividing the space behind the periphery, and about five in front of the periphery on the penultimate whorl; on the last whorl between the periphery and the siphonal fasciole there are about twelve of these lines, though they probably vary in number with the individual, while the incremental lines are moderately conspicuous; outer lips thin, simple; pillar lips with a small deposit of white callus; aperture narrow, lunate; canal very short, wide, with an inconspicuous fasciole. Length 9, of spire 5, of aperture 4; max. diam. 3.5 mm.

Dredged off San Diego Bay, about five miles south of the entrance in fifteen fathoms, by C. W. Gripp, on a bottom of broken shell. This is a very well marked species, hardly to be compared with any other known from the coast. Seven specimens were obtained of which two are in Mr. Gripp's collection.

The shell has much the aspect of an *Anachis* but one specimen retained the dried animal and by carefully soaking it out it proved to be a Pleurotomoid, with a short oval operculum with apical nucleus like that of *Bela*, though the shell from the absence of the strong axial ribs characteristic of most of the northern *Belas* has a very different aspect from the familiar forms of that genus. The animal is white, with short acute tentacles and very small black eyes.

NEW SPECIES OF ANCYLIDÆ.

BY BRYANT WALKER.

ANCYLUS (FERRISSIA) HENDERSONI n. sp. Pl. ix, figs. 8–10.

Shell small, thin, delicate, oval, slightly wider anteriorly, right side nearly straight, left side regularly curved; obtusely elevated; light horn-colored, apex very obtuse, depressed, not projecting above the normal outline of the shell, and only slightly deflected toward the right; apical pit in the centre and looking upwards; apical striæ strong and regular, originating from the circumference of the apical pit and projecting down towards the whole upper surface of the shell, becoming lighter and more irregular below, comparatively few reaching the edge of the shell; lines of growth irregular, but rather strong, giving a reticulated appearance to the surface where they cross the radial striæ; anterior slope, especially above, very convex, the highest point of the shell being in front of the apex; posterior slope slightly concave, nearly straight; left lateral slope convex, right slope nearly straight.

Length 2.5, width 1.5, alt. .75 mm.

Type (No. 25707 Coll. Walker) from Lake Waccamaw, N. C. Cotypes in the collections of Messrs. Jno. B. Henderson, Jr., and G. W. H. Soelner, of Washington, D. C. This small species was found by Messrs. Henderson and Soelner in the pools of the swampy woods around the shore of Lake Waccamaw in the fall of 1906.

It is well characterized by its obtusely elevated shape, blunt apex and radiating ribs or striæ. In sculpture it resembles *A. borealis* Mse., but differs from its thin, delicate shell, smaller size and different proportions, being relatively less elevated and with a longer and more sloping posterior outline.

ANCYLUS (FERRISSIA) NOVANGLIÆ n. sp. Pl. ix, figs. 5, 6 and 7.

Shell small, depressed, elongate oval, sides nearly parallel, the left being slightly more curved than the right; regularly rounded at the extremities; apex prominent, bluntly rounded, situated on the posterior third, very eccentric, turned decidedly to the right, apical striæ prominent; lines of growth fine and regular; anterior slope long, convex with numerous, fine, radiating ribs, which extend to the periphery; posterior slope oblique, nearly straight below the

swell of the apex; left slope very convex, more or less compressed toward the apex; right slope nearly straight below the protrusion of the apex.

Length 3.25, width 1.75, alt. 1 mm.

Types (No. 22502 Coll. Walker) from a small pond near Cambridge, Mass., collected by Owen Bryant. Cotypes in collections of Mr. Bryant and the Philadelphia Academy.

This little species is easily distinguished by its narrow, elongated, depressed form, very eccentric apex and the costulate anterior slope.

ANCYLUS (FERRISSIA) HINKLEYI, n. sp. Pl. ix, figs. 11–13.

Shell oval, slightly wider anteriorly, sides equally curved, elevated, conic; apex nearly central, being only slightly behind the longitudinal center and very slightly deflected toward the right, acute, erect, with strong radial striæ; light greenish horn color with the apex bright rose color; anterior slope slightly convex, posterior slope slightly concave, lateral slopes of about the same slight convexity; surface smooth, lines of growth fine, but irregular, no trace of ribs or radial striæ, except at the apex. Length 4.75, width 3.5, alt. 2.25 mm.

Type (25661 Coll. Walker) from the Ohio River at Golconda, Ill. Cotypes in the collection of A. A. Hinkley, DuBois, Ill. Also from the Ohio at Elizabethtown, Ill. (Coll. Hinkley), and from Kentucky. (Coll. Am. Mus. Nat. Hist.).

Four specimens were submitted for examination by Mr. Hinkley from the above localities. In two of the specimens, in which the apices are not at all eroded, the truncation is oblique, the apical pit opening towards the left. The right margin of the truncation is high and smooth, the apical striæ beginning just below the smooth border of the truncation. On the left and lower margin of the pit the apical striæ radiate from the center. *A. hinkleyi* by reason of its rosy apex groups, apparently, with *A. elatior*, *filosus* and *rhodacme*. Unfortunately the shells had been cleaned, so that at present it is impossible to say whether it shares the anatomical peculiarities common to those forms.[1]

It differs from *elatior* by its smaller size, acute, erect apex and

[1] These species and probably all the pink-tipped *Ancyli* have a very peculiar lingual dentition, quite different from any of the other *Ancyli* and form a group of probably generic rank, a full description of which will be published shortly.

concave posterior slope. It stands nearest to *A. filosus* from which it differs by the nearly central, acute apex, proportionately longer and concave posterior and less convex anterior slope and smooth surface. It is so entirely different in shape from *rhodacme* that there is no danger of confounding them.

The two specimens from Kentucky, received by the Am. Mus. of Nat. Hist. from Anthony as *A. elatior* are apparently identical with this species (see NAUT. XVIII, p. 79).

ANCYLUS (LÆVAPEX) HEMISPHÆRICUS n. sp. Pl. ix, figs. 14, 15 and 16.

Shell obtusely elevated, broadly oval or subcircular, sides almost equally rounded; apex subcentral, very obtuse and only slightly inclined toward the right; smooth, light yellowish horn color; anterior slope very convex, posterior somewhat less so; lateral slopes about equally convex, the left being as usual, somewhat the longer; lines of growth rather prominent and irregular, more or less rippled by subobsolete, irregular radial striæ.

Length (type) 3.5, width 3, alt. 1.5 mm.

Length (cotype) 3.8, width 3.1, alt. 1.8 mm.

Length (Decatur) 4.1, width 3.25, alt. 1.8 mm.

Types (No. 20785 Coll. Walker) from Georgia. Cotypes in the collections of the Kent Scientific Museum, Grand Rapids, Mich., and the Philadelphia Academy. Also from Decatur, Alabama.

The type lot formed part of the DeCamp collection now in the Kent Scientific Museum. Unfortunately no definite locality is given and no further information as to the history of the specimens is attainable.

This species is very distinct by its globose, almost hemispherical shape. None of the shells have a perfect apex.

The type is not quite full grown, but was selected as being less eroded and showing more exactly the contour of the shell. The other measurements given are from mature shells which show the length and width accurately, but owing to erosion are proportionately less elevated. With the erosion of the apex the anterior and posterior slopes have nearly the same convexity, and the specific name adopted becomes even more appropriate than in the type.

The specimens from Decatur, Ala., also collected by De Camp, are slightly larger and heavier than the types, but evidently the same species.

CLAMS AND THE EARTHQUAKE.

BY ROBERT E. C. STEARNS.

Under the head of "Abalones and the Earthquake," in the April, 1907, number of THE NAUTILUS, my brief article contained all that I had been able to learn up to the preceding February, of the effect of the earthquake of April 18th, 1906, upon the marine life of the coast. The Abalones (*Haliotis*) in the neighborhood of Morro Rock, about 190 miles south of the entrance to San Francisco Bay, were found in abundance, but all dead, and the earthquake it was presumed did the killing. Recently the Indians and the Spanish population about Marshall's and Tomales Bay, who for several years have been engaged in supplying the local "clam" *Paphia staminea* Conr. (= *Tapes staminea* auct.), for the San Francisco market, have been, it is so reported, thrown out of employment, the bay having become so shallow as to preclude the use of boats, and clam-diggers state that since the great earthquake no clams have been found there. In many instances these toilers of the clam banks have been reduced to poverty.

In and around Tomales Bay which is about fifty miles north of the entrance to the Bay of San Francisco, the quake was far more severe than at the southerly abalone locality mentioned, being in the direct northwesterly line of the main movement. Dr. Gilbert[1] remarks "the only notable water waves generated by the shock were in Tomales Bay where a group of waves estimated to be 6 or 8 feet high, came to the northeastern shore. The mud which forms the bed of the bay, was shifted and ridged and more or less horizontal displacement occurred as well as a marked shallowing of the waters." At Bolinas, which is north of the Golden Gate, and about thirty miles south of the Tomales locality, the shore of the lagoon or little inner bay, the home, when I was there in June, 1866, of *Tresus nuttalli* Conrad (*Schizothærus nuttalli* of Carpenter), was cracked, and the mud near the head of the lagoon was disturbed as well as the general region thereabout according to Mr. Gilbert. The "little round clam" as the Tomales form is called, is a favorite with many epicures,

[1] Bulletin No. 324. The San Francisco Earthquake, etc., etc., of April 18, 1906. Washington, 1907.

but its tough little foot is not conducive to the happiness of persons of feeble digestion. The fine clam *Tresus* is seldom, if ever, seen on the stalls in the San Francisco markets. It is noble in size and a patrician in quality, and makes a most delicious soup or chowder.

Los Angeles, Cal., March 8, 1908.

THE MOLLUSCA OF NORTH HAVEN, MAINE.

BY HENRY JACKSON, JR.

The Fox Islands constitute an archipelago in the mouth of Penobscot River. The largest of these islands is Vinal Haven, and next in size and position is North Haven. On either side are bays ranging from 4 to 8 fathoms in depth, with many varieties of bottom. The land is equally well adapted for shell collecting, except that there are practically no hard-wood trees. It is very peculiar that quite a number of species have one small place in which they are abundant, and they are not to be found elsewhere. The fresh-water shells have a very fair chance; there is a large pond about one mile long which promises large returns in time. There are also several semi-marshy tracts in which many smaller Limneas are found. Unfortunately I have not been able to dredge beyond 30 fathoms. So it is to be hoped that more species will soon be turned up.

My sincere thanks are due to Dr. Charles G. Weld, Prof. Edward S. Morse, Mr. Dwight Blaney and Mr. C. W. Johnson, for identification of various mollusks and other acts of kindness.

POLYPLACOPHORA.

Trachydermon ruber, Linné. Common.

Trachydermon albus, Linné. Rather common.

PELECYPODA.

Nucula proxima, Say. Very common. Large specimens were found in four fathoms mud.

Yoldia limatula, Say. Very common. Beautiful specimens over two inches long were obtained.

Yoldia myalis, Couthouy. Rare. A few specimen dredged in eight fathoms water.

Yoldia lucida, Lovén. Two specimens dredged in twenty fathoms mud. The eggs were in the shell.

Yoldia thraciæformis, Storer. Several old broken valves and an occasional young specimen.
Anodonta cataracta, Say.
Unio complanatus, Say.
Pecten magellanicus, Gmelin.
Pecten islandicus, Müller. Rare. Single valves occasionally.
Anomia simplex, d'Orbigny.
Anomia aculeata, Müller.
Mytilus edulis, Linné.
Modiolaria nigra, Gray. Rare. Several broken specimens.
Modiolaria discors, Linné.
Crenella glandula, Totten.
Crenella decussata, Montagu. Rare. Same locality as *C. glandula*.
Periploma fragilis, Totten.
Thracia conradi, Couthouy. Rare.
Thracia myopsis, Möller.
Pandora gouldiana, Dall.
Lyonsia hyalina, Conrad. Common. Sandy mud, ten fathoms.
Lyonsia arenosa, Möller. Extremely rare. Same localities as *L. hyalina*.
Cyclas islandica, Linné.
Astarte undata, Gould.
Astarte subaequilatera, Sowerby.
Pisidium abditum, Hald.
Sphærium partumeium, Say.
Venericardia novangliæ, Morse. Rare.
Venericardia borealis, Conrad.
Thyasira gouldii, Philippi.
Cardium pinnulatum, Conrad.
Cardium ciliatum, Fabricius. Rare.
Callocardia morrhuana, Linsley. Rare.
Macoma balthica, Linné.
Macoma calcarea, Gmelin.
Mya arenaria, Linn.
Saxicava arctica, Linn.
Lymnæa humilis, Say.
Lymnæa umbilicata, Adams.
Lymnæa desidiosa, Say.
Lymnæa columella, Say.

SCAPHOPODA.

Dentalium entalis, Linné. Common in deep water, mud.

GASTROPODA.

Acmæa alveus, Conrad. Very common on *Zostera marina*.
Acmæa testudinalis, Müller. Rarer than *alveus*.
Lepeta cæca, Müller.
Puncturella noachina, Linn.
Margarita helicina, Fabr.
Margarita groenlandica, Gmelin. Very rare.
Natica clausa, Broderip & Sowerby. Rather rare.
Lunatia heros, Say.
Lunatia heros, var. *triseriata*, Say. Very common. Found both in deep and shallow water, but never in company with *Lunatia heros*.
Velutina lævigata, Linn.

Velutina zonata, Gould. Rarer than *V. lævigata.*

Crucibulum striatum, Say. Rare alive. Common dead.

Littorina littorea, Linn.

Littorina rudis, Donovan.

Littorina palliata, Say.

Lacuna vincta, Montagu, on *Zostera marina.*

Lacuna vincta, var. *fusca.* On large *Laminaria.*

Cingula aculeus, Gould. Common at base of *fucus.*

Cingula carinata, Mighels & Adams. Rare. A few specimens in sandy mud, ten fathoms.

Skenea planorbis, Fabricius.

Amnicola limosa, Say.

Trichotropis borealis, Broderip & Sowerby.

Purpura lapillus, Linn. Very abundant; var. *imbricata* is also common.

Buccinum undatum, Linn.

Chrysodomus decemcostatus, Say. Rather uncommon.

Tritonofusus stimpsoni, Mörch. Rare.

Tritonofusus pygmæus, Stimpson.

Nassa trivittata, Say.

Nassa obsoleta, Say.

Columbella rosacea, Gould. Rare.

Bela incisula, Verrill.

Bela nobilis, Möller. One specimen.

Bela harpularia, Couthouy.

Bela decussata, Couthouy. Rare, in company with *B. incisula.*

Retusa gouldii, Couthouy. Rare.

Retusa pertenuis, Mighels.

Cylichna alba, Brown.

PULMONIFERA.

Zoögenites harpa, Morse. Very common.

Vallonia pulchella, Müller.

Polygyra fraterna, Say.

Strobilops labyrinthica, Say.

Bifidaria pentodon, Say.

Pupilla muscorum, Linné.

Vertigo gouldii, Binney.

Cochlicopa lubrica, Müller.

Vitrea indentata, Say. One immature specimen.

Vitrea hammonis, Ström.

Zonitoides arborea, Say.

Pyramidula alternata, Say.

Pyramidula cronkhitei anthonyi, Pilsbry.

Zonitoides exiguus, Stimpson.

Zonitoides minuscula, Binney. Extremely rare.

Carychium exiguum, Say.

Helicodiscus parellelus, Say.

Aplexa hypnorum, Linn.

Succinea retusa, Lea.

Succinea avara, Say.

Succinea ovalis var. *totteniana*, Lea.