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THE
NAUTILUS

A MONTHLY JOURNAL
DEVOTED TO THE INTERESTS OF
CONCHOLOGISTS.



VOL. V.
MAY 1891 to APRIL 1892.



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THE NAUTILUS.

VOL. V.

MAY, 1891.

No. 1.

DESCRIPTION OF TWO NEW SPECIES OF UNIO, FROM ARKANSAS.

BY WM. A. MARSH.

Unio Pilsbryi.

Shell quadrate, somewhat oblique, plicate, striate, slightly inflated before, compressed behind, very inequilateral, obtusely angular before, sub-biangular posteriorly, valves thick before, thin behind, beaks small and flat. Epidermis dark reddish-brown, without rays. Cardinal teeth compressed, oblique, grooved, double in both valves, lateral teeth long, slightly curved, solid, anterior cicatrices deep, pit-like, granular, posterior cicatrices not very distinct, confluent, nacre dull white.

Habitat. Little Red River, Arkansas.

Remarks. This species bears some resemblance to *U. perplicatus* Con., which is abundant in the same stream, but differs in being much flatter, beaks very much smaller, the growth lines much closer; it also differs in being coarsely striate over the entire surface of the shell; in its undulations it is very different, the plications being very small, and much broken up; in fact, semi-nodulous; from *U. undulatus* Barnes, which is also abundant in the same stream, it differs entirely in outlines, in the manner and disposition of its folds, color of epidermis, nacre, teeth, etc., etc.

I name this shell in honor of Mr. H. A. Pilsbry, Conservator Conchological Section, Academy of Natural Sciences, Phila., who first called my attention to its specific value. Specimens may be

seen in the United States Collection of the American Association of Conchologists, in the Academy of Natural Sciences of Philadelphia.

Unio Pleasii.

Shell smooth, oval, slightly elliptical, very inequilateral, valves rather thin, somewhat compressed, regularly rounded before, obtusely angular behind, beaks very small and flat, undulations very minute. Epidermis greenish-olive, usually covered with green capillary rays posteriorly, sometimes rayless. Cardinal teeth small, erect, crenulate, single in the right, and double in the left valve, sometimes tripartite in left valve; lateral teeth short and slightly curved, anterior cicatrices deeply impressed, posterior cicatrices very slightly impressed, confluent; nacre varying from pale rose to pale salmon, often silvery white and iridescent.

Habitat. Little Red River, Arkansas.

Remarks. In general form this shell bears some resemblance to *Unio spatulatus* Lea, but differs from that shell in being a much smaller and thinner shell, very much more compressed; its cardinal teeth are entirely different; it is not spatulate in form, and is very much more inequilateral; the nacre differs entirely; the very peculiar character of the females of this species must distinguish it from all others; they are deeply emarginate, very oblique, and sharp pointed posteriorly, bearing some resemblance to the females of *Unio conradianus* Lea.

I name this shell after my friend, Mr. Ellwood Pleas, of Indiana, who collected this species, with many other rare shells, in the interior of Arkansas. Typical specimens of both male and female are in the American Association Collection in Philadelphia.

EDIBLE MOLLUSKS, ETC., HERE AND THERE.

Mr. Carpenter's article in the last number of THE NAUTILUS, is fully as entertaining and profitable as his previous communications. It may be his last is a trifle more thrilling, and when this is supplemented by the usual spice of discrepancy, the picturesqueness is enhanced and the thoughtful reader is for awhile diverted from the plodding habit of careful definition and rational interpretation, and led unconsciously to soar far and wide on the reckless wings of fancy, and revel free and easy, in the salubrious atmosphere of fiction. The author's loyalty to Rhode Island is certainly commend-

able, and his belief that that illustrious commonwealth is the Banner State of the Union, in the matter of Oysters, Clams, Scallops and earless Cats, and such creature comforts, is heartily appreciated. I am prepared to wager—in vulgar parlance to bet—a bowl of “clam-chowder” against a “pan-roast,” with Mr. Carpenter or any other conchologist brother, that the mollusks referred to *are abundant and nowhere of better quality* than in Rhode Island, and whether I lose the bet or not, in the spirit of fraternal sympathy, to pay the bill; but here, let us “drop a stitch,” as the old ladies do sometimes in their knitting, and pick it up further on; let us leave the realms of romance and come down to the simple facts of *terra firma*.

If Mr. Carpenter will kindly turn to Mr. Keep’s article in the January NAUTILUS, he will perceive *two* facts. *First*, the title is “Mollusks of the San Francisco Markets.” *Not the Edible Mollusks of California*. *Second fact*; nowhere in Mr. Keep’s paper does the word California occur.

Yet Mr. Carpenter, in the last three lines of his article, on page 137 (of the April NAUTILUS), says: “As we have seen, California has but five species and Maine only four regulars and two occasional, while Rhode Island can show eight every day and five irregular as below.” The careful reader will look in vain to see any such statement in Mr. Keep’s paper, and the species enumerated named therein, are such as are *usually* on the stalls in the San Francisco markets.

In addition to those named by Mr. Keep I have occasionally seen, and have purchased, *Macoma nasuta*, *Saxidomus aratus*, *Acmæa patina*, *Platyodon cancellatus* and *Haliotis rufescens*. The big Cephalopod *Octopus punctatus* is frequently met with, especially in the Clay Street market, and is a common article of food among the Italians and Portuguese. Another cephalopod, a small ten footed species or squid, is frequently, if not usually, purchasable in the Chinese markets, and dried *Abalones* or *Haliotis* meats, are a regular article of food in Chinatown. I have supplemented Mr. Keep’s five species with others that pertain to the San Francisco markets, and do not propose to extend the list by going outside of the territory of that city, and up and down the *seven hundred* and more miles of the sea board of California, to name the *twenty-five or thirty* other species, that may fairly be regarded as “edible clams” and sufficiently abundant as to warrant their inclusion in a list of

species available for food supply, and therefore of commercial importance. Nor have I mentioned species that are "occasionally thrown into clam-bakes," or others that "were formerly eaten by the * * * Indians." A comparison in harmony with Mr. Keep's paper requires a list of those species of mollusks that are ordinarily on sale in the markets of Providence and Newport, and this is what Mr. Carpenter should have given.

The space occupied by this criticism, etc., is perhaps out of proportion to the importance of the matter criticised; so I will only take up the stitch previously dropped and in closing express my surprise and astonishment at the effect of Rhode Island "scallop-rims," on Pawtuxet and East Greenwich cats, tabbies or tomnies, not specified, and marvel greatly over the possibility of turning mules into horses by the same kind of fodder.

Another and more serious matter is hinted at, for the mollusks of California, Maine and Rhode Island are referred to as "regulars" and "irregulars." This has the flavor of war. I have never seen any military clams on the West Coast. I presume the "regulars" belong to the standing army, and the "irregulars," are to be regarded as militia only.

R. E. C. S.

April 7th, 1891.

ON THE GENUS *TEBENNOPHORUS* BINNEY, OR *PHILOMYCUS*, RAF.

BY H. A. PILSBRY.

A recent discussion of this genus in the pages of the valuable English magazine, *Annals and Magazine of Natural History*, is probably of sufficient interest to American conchologists to justify us in reprinting the several articles.

Article I. (*Ann. Mag. N. H.*, Nov., 1890.)

Notes on Slugs chiefly in the Collection at the British Museum. By T. D. A. COCKERELL.

THE GENUS *Limacella*, BLAINVILLE.

While working on the slugs at the British Museum I came across the type specimens of *Limacella lactiformis*, Blainville. The two examples are in a bottle with the label "*Limacella lactescens*," and another label, apparently written by Dr. Heynemann, "Original zu Fig. 1, Taf. 7. Fér. Hist. Nat." They are true

Philomycus, presenting no generic difference from the well-known species of that genus. Heynemann (1884) has referred them to *Arion*, but he could not have examined them sufficiently, and was no doubt misled by the figure in Man. de Mal. (1827), pl. xli. That they are really Blainville's types need not be doubted, as they agree with his figures in outline, and his original description, notwithstanding that he misunderstood the characters of the slug, is sufficient to show that he had not an *Arion* before him. He refers to the absence of a shell and the genital orifice at the base of the right tentacle. The outline of the figure, and especially the anterior portion of the mantle, suggests at once a *Philomycus*. The supposed *Arion*-like mantle indicated in the figures is really due to an outline of some of the internal organs, visible on account of the transparency of the slug. The figures in Journ. de Phys., November, 1817, show how the mistake began, fig. 4 having even a sort of spiral coil in the middle of the anterior part of the mantle. The figure of *L. elfortiana* in Man. Mal. is the same outline, but apparently patched up from an *Arion ater*, with altogether fictitious rugæ on the back. Férussac's figure is after one of those in Journ. de Phys., and is fairly recognizable.

Altogether I think it must be held that Blainville described and figured his genus *Limacella* sufficiently for recognition, and as it antedates *Philomycus* by three years, the name must be used. *Limacella*, Brard, 1815, need not be considered, as it is identical with *Limax*, Linné, 1767. The synonymy of *Limacella*, Bl., will accordingly stand:—

LIMACELLA, Blainville.

1817. *Limacella*, Blainville, "Mém. sur quelq. Moll. Pulm." Journ. de Phys.

Dec. 1817, p. 443 (text), and Nov. 1817, figs. 4, 5.

1820. *Philomycus*, Rafinesque, Ann. of Nat. p. 10.

1820. *Eumelus*, Rafinesque, Ann. of Nat. p. 10.

1824. *Meghimatium*, v. Hass. Bull. Univ. Sci. iii. p. 82.

1842. *Incilaria*, Bens. Ann. & Mag. Nat. Hist. ix. p. 486.

1842. *Tebennophorus*, Binney, Bost. Journ. Nat. Hist. iv. p. 171.

1864. *Pallifera*, Morse, Journ. Portl. Soc. i. 8, fig. 5, pl. iii. fig. 6.

It does not seem necessary to recognize more than one genus here, though v. Ihering (Nachr. d. m. Ges. 1889) recognizes three—*Philomycus*, *Pallifera*, and *Meghimatium*. *Pallifera* may be conveniently retained as a subgenus.

The species of *Limacella* are as follows:—

Limacella lactiformis, Blainv.

1817. *Limacella lactiformis*, Blainv. Journ. de Phys. Dec. p. 444.

1821. *Limacellus lactescens*, Férussac, Hist. Nat. Moll. pl. vii. fig. 1.

1825. *Limacella elfortiana*, Blainv. Man. de Mal. et de Conch. p. 464.

This appears to be distinct from any species since recognized. The British Museum types may be briefly described as follows:—42 millim. long; respiratory orifice 7 millim. from anterior border of mantle. Sole, lat. 7 millim. Entirely greyish-white; mantle pellucid, semitransparent, finely granulose. Sole slightly ochreous, unicolorous. A distinct groove round the edge of the foot. Liver pale chocolate.

Gray in 1855 (Cat. Pulm. p. 158) has referred this species to *Philomycus*.

Limacella carolinensis (Bosc).

Limax carolinensis, Fér. Hist. 77, pl. vi. fig. 3.

There are two specimens of this species in the British Museum from Virginia (*Dr. J. Wyman*), agreeing excellently with Férussac's figure. This slug is cylindrical, curved, and narrow (in alcohol); sole narrow; ground-colour and colour of sole pale yellow, back thickly marbled with brown-grey, and with two longitudinal series of dark egg-shaped spots. Jaw bright-coloured, not ribbed. (Description from Brit. Mus. specimens.)

Dr. Gray (Brit. Mus. Cat.) also describes *L. carolinensis*.

Limacella nebulosa.

? *Eumelus nebulosus*, Raf. Ann. of Nat. 1820.

Tebennophorus carolinensis, Binney, Terr. Moll. U. S. vol. ii. p. 20.

This and the last have hitherto been included together under the one name *carolinensis*, and it is not without misgivings that I venture to separate them here.* Yet, from the specimens which I have examined, there would certainly seem to be a specific distinction between the northern and southern forms referred to *carolinensis* in the Eastern United States and Canada. The British Museum contains specimens of *nebulosa* as follows:—

- (1) From Mr. W. G. Binney, labelled *T. carolinensis*.—Ochreous, marbled with black above, the marblings rather inclined to be in three longitudinal series. Sole unicolorous.
- (2) W. Canada (*Dr. MacLagan*).—Pale yellow, marbled above with brownish-grey, the markings being a broadish dorsal and narrower lateral brownish-grey bands, with irregular spots over the rest, except sides near foot. Sole unicolorous.
- (3) Amhurstburgh, Canada West (*Dr. O. W. MacLagan*).—Like the last, but mottling grey and more diffuse; two narrow dorsal and narrowish lateral bands, rather obscurely indicated in grey. Grey mottling thicker. Ground-colour pale yellowish.

Comparing *carolinensis* with *nebulosa*, we note:—

- (a) The Virginia *carolinensis*.—Sole narrow, yellowish, pale, without transverse striæ; body smoothish.
- (b) *nebulosa*, no. 1 above.—Sole broad, brown, with strong transverse striæ; body rugose.

Or, taking measurements:—

- (a) The Virginia *carolinensis*.—Long. 35 millim., sole, lat. 3 millim.
- (b) *nebulosa*, no. 1 above.—Long. 35 millim., sole, lat. 7½ millim.
- (c) *nebulosa*, no. 2 above.—Long. 36 millim., sole, lat. 8 millim.

Rafinesque described five supposed species belonging to *Philomycus* and *Eumelus* in 1820 as *quadrilus*, *oxurus*, *flexuolaris*, *fuscus*, and *lividus*. They

* Mr. W. Binney writes (*in litt.* Sept. 9, 1890):—"I am rather sceptical about there being two species . . . as you say . . . —there is a big species of *Tebennophorus* confounded with *carolinensis*, but having a ribbed jaw."

will probably prove to be varieties of *nebulosa* or *carolinensis*, but they have not yet been identified.

* * * * *

Limacella dorsalis (Binney).

Philomycus dorsalis, Binney, Bost. Journ. Nat. Hist. 1842, iv. 174.

Pallifera dorsalis, Morse, Journ. Portl. Soc. 1864.

N. E. United States. Jaw ribbed.

Limacella Wetherbyi (W. G. Binney).

Pallifera Wetherbyi, W. G. Binney, Ann. Lyc. of Nat. Hist. of New York, 1874, xi. 31, pl. ii. figs. 1, 2.

Kentucky. Jaw ribbed.

Limacella Hemphilli (W. G. Binney).

Tebennophorus Hemphilli, W. G. Binney, Man. Amer. Land-Shell, 1885, p. 247; Third Suppl. Terr. Moll. U. S. 1890, pl. vi. fig. H.

Georgia and North Carolina. Jaw ribbed.

Article II. (*Ann. and Mag. N. H., Feb., 1891.*)

Critical Notes on the Genus Tebennophorus and the recent literature relating to it. By HENRY A. PILSBRY, Conservator of the Conchological Section, Academy of Natural Sciences of Philadelphia.

The slugs of this genus have been commented upon lately by a number of English and continental authors, who have arrived at very different results, it has occurred to the writer that a presentation of the subject by one who has studied the species in their native forests would not be without interest.

Firstly, regarding the proper name for the genus. We will consider the several designations in the order of their publication.

In 1817 Blainville proposed a genus *Limacella* with the following characters:

"Body limaciform, entirely naked, provided with a foot as wide as itself, but separated by a groove.

"Orifices of the organs of generation widely separated and communicating between each other by a furrow which occupies the entire right margin of the body."

Blainville refers to his plate ii. fig. v, illustrating the type species, *L. lactiformis*.

A moment's reflection will convince any competent malacologist that the above description does not indicate *Tebennophorus*, a slug in which the genital organs have a common outlet. It cannot be supposed that Blainville has made a mistake in observation, because in the same paper he describes at length the external anatomy of *Veronicella*, and correctly locates the orifices. The figure given is equally non-committal; so much so that Mr. Cockerell (who supposes *Limacella* to equal *Tebennophorus*) really cites "figures 4, 5" instead of 5 only*—his inability to tell Blainville's figure of *Limacella* (fig. 5) from that of *Veronicella* (fig. 4)

* That this is not mere inadvertence on Mr. Cockerell's part is demonstrated by his remarks on Blainville's fig. 4 on p. 380 of the 'Annals' for November, 1890.

being evidence enough that the former is not generically recognizable. As to the fact that Mr. Cockerell has found a couple of slugs under the name "*Limacella lactescens*" in the British Museum, which he *supposes* are the types of *L. lactiformis*, it is absolutely irrelevant to the subject. What evidence is there beyond the merest guess-work that they are Blainville's types? And even if they were (a most improbable hypothesis!), their mere existence does not constitute *publication*. We have nothing whereby to judge *Limacella* save the original figures and description, and these certainly indicate a type of slug different from *Tebennophorus*.

It may also be noted that the name *Limacella* is preoccupied, having been used by Brard in 1815. If we care to be really consistent we must use *Limacella* in place of *Agriolimax*!

The second name for the genus is *Philomycus*, Rafinesque. This genus, says its author, "differs from *Limax* by no visible mantle, the longer pair of tentacula terminal and club-shaped, the shorter tentacula lateral and oblong." Rafinesque describes four species and says there are many more in the United States. Not one of those he described has been identified with any certainty, and only *two* species of *Tebennophorus* occur in the regions visited by him. Rafinesque also describes the genus *Eumeles*—"differs from *Limax* by no visible mantle, the four tentacula almost in one row in front and cylindrical, nearly equal, the smallest pair between the larger ones." Of this genus he describes two species, one of which, *E. nebulosus*, has been recognized by Mr. Cockerell, whose penetration and facilities have enabled him to identify new or old species which have escaped the observation of specialists on the American fauna.

We will not comment on these Rafinesquian genera; those who find slugs corresponding to them should of course use the names. *Eumeles* is especially remarkable, and we would invite the attention of conchologists who hunt slugs (in old collections of museums and elsewhere) to the unusual arrangement of the tentacles in this genus, and to the fact that a number of Rafinesque's species are still at large.

The genus *Meghimatium*, v. Hasselt, 1824, was founded on a species of this genus from Java, and was quite recognizably described. The names *Tebennophorus*, Binn., and *Incilaria*, Benson, were both proposed in 1842, the probable priority being in favour of the first.

Morse in 1864 established the genus *Pallifera* for a species with ribbed jaw.

This review shows that several names for the genus, more or less certainly applying to it, were proposed anterior to 1842, the date of *Tebennophorus*. Of these names *Philomycus* and *Meghimatium* are the only ones available, *Eumeles* and *Limacella* being clearly inapplicable. Since continental authors generally have adopted the name *Philomycus*, it seems advisable to retain that designation for the genus if *Tebennophorus* must be rejected.

(To be continued.)

PRELIMINARY NOTICES OF NEW MEXICAN SHELLS.

BY H. A. PILSBRY.

The shells here described were collected by the expedition from the Academy of Natural Sciences of Philadelphia, and will be fully described and illustrated in the Proceedings of the Academy.

Orizosoma, new subgenus of **Streptostyla**.

Shell *perforated*, the columella thickened, *simply concave*, almost imperceptibly sinuous above.

Streptostyla (**Orizosoma**) **tabiensis**, n. sp.

Shell ovate-turreted, rather thin, smooth, the base deeply indented and minutely umbilicated; whorls 6, the three earlier distorted; aperture narrow, $\frac{1}{2}$ the length of the shell, outer lip sinuous; columella thickened, concave. Alt. 9·8, diam. 4·8 mill.

Cave at Tabi, Yucatan.

Carychium exiguum mexicanum, n. var.

Shell cylindrical; whorls $4\frac{1}{2}$; aperture equalling or a trifle exceeding $\frac{1}{3}$ of the total length. *Outer lip thickened at and below the middle by a very heavy deposit of callus upon its face*; columellar fold subobsolete. Surface delicately striated. Alt. 1·8, diam. ·3 mill.

Orizaba, Mexico.

Physa osculans var. **Patzcuarensis**, n. var.

Shell thin, obconic, broad above, narrow below; spire small, acute, whorls 4, rapidly enlarging; columella long, vertical, slightly sinuous; color light brown or whitish. No internal lip-rib; surface smooth. Alt. 15, diam. 11 mill.

Lake Patzcuaro, Mexico.

Holds the same relation to *Ph. osculans* Hald. that *ancillaria* + *Parkeri* hold toward *Ph. heterostropha*. The rationale of these bulging, broad-topped forms of *Physa* is discussed in my paper in Proc. A. N. S. Phila.

Potamopyrgus ? **Bakeri**, n. sp.

Shell slender, elongated, composed of $5\frac{1}{2}$ very convex whorls; aperture ovate, its length contained more than three times in the length of the shell. Surface marked by delicate growth-lines, having low, inconspicuous longitudinal folds, sometimes quite regular and well marked on the upper whorls, and encircled by numerous fine, subobsolete spiral striae. Alt. 4, diam. 1·9 mill.

Yautepec, Mexico.

Has much the general aspect of *Tryonia protea* Gld. It is named in honor of Mr. FRANK C. BAKER who collected the specimens.

Pyrgulopsis ? **Patzcuarensis**, n. sp.

In general form like *P. nevadensis* Stearns. Whorls acutely keeled in the middle, convex above the keel, the last whorl obtusely

shouldered above the median keel. Covered with an olive epidermis. Surface marked by delicate growth-lines and excessively fine, close spiral striæ. Alt. 5·2, diam. 3 mill; alt. of apert., 2, width 1·3 mill.

Lake Patzcuaro, West Mexico.

This species is very different from other American Amnicoloids.
(*To be continued.*)

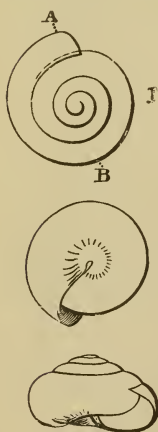
DESCRIPTION OF A NEW SPECIES OF HYALINA.

BY WM. H. DALL.¹

Dr. V. Sterki, of New Philadelphia, Ohio, has of late years been giving special attention to the minute forms of Pulmonata, *Vertigo*, *Pupilla*, *Hyalina*, etc. In 1886 he collected a small *Zonites*, of the section *Hyalina* or *Conulus*, which, being submitted to several naturalists, appeared to be a new species, although of remarkably small size. In 1887 a few more specimens were obtained, which he has submitted to me with the request that I describe them.

Shell minute, thin, yellowish translucent, brilliant, lines of growth hardly noticeable, spire depressed, four-whorled; whorls rounded, base flattened, somewhat excavated about the center, which is imperforate; aperture wide, hardly oblique, not very high, semilunate, sharp edged, the upper part of the columella slightly reflected; upper surface of the whorls roundish, though the spire as a whole is depressed. Max. diameter 0.044 inch (line A—B, Fig. 1); alt. 0.026 inch.

This little shell is clearly not the young of a *Pupilla* or of any of our other small *Zonites*. It is certainly the smallest American species. *H. parvula* Rang, from Cape Verde Islands, has a little less diameter, but is higher in the spire. *H. pygmaea* and *H. minutissima* Lea are decidedly larger, besides belonging to a different group. It is probably one of the smallest species known, and remarkable for its imperforate umbilicus.



¹ From Proceedings U. S. National Museum, vol. xi, 1888, p. 214.

It was collected on a grassy slope, inclining to the northward, and covered with grass, moss, and small bushes, and so far has not been found anywhere else. Its permanent place in the system will, of course, be determined by an examination of the soft parts, which remains to be made.

GENERAL NOTES.

Owing to continued illness in his family, Mr. CAMPBELL, President of the American Association of Conchologists, has been unable to contribute the monthly reports on Association affairs. He hopes to resume them in the June issue.

Mr. C. W. JOHNSON, Junior Editor of the NAUTILUS, and Mr. WM. FOX, of the Academy of Natural Sciences, have spent the month of April in that paradise of land snails, Jamaica. They will return about the middle of May, and doubtless bring with them hosts of shells and insects.

The personal interest felt by younger students in their predecessors in science, is our excuse for clipping the following from a recent letter:

“In the March number of the NAUTILUS, Mr. Roper said that Mr. Mayo was probably the oldest student of conchology in America. Mrs. MARY B. ALLEN KING, of Rochester, N. Y., is 92 years old, having been born in January, 1799. She has studied and collected shells before Mr. Mayo (whom she met at one time) did; and has corresponded with most of the U. S. Conchologists. She was elected a member of the American Association for the Advancement of Science in 1886, at the Buffalo meeting.”—A. M. K.

AUSTRALIAN SLUGS.—Mr. Charles Hedley exhibited and offered some remarks on specimens of *Vaginula leydigi*, Simroth, and *V. hedleyi*, Simr., two interesting slugs from Brisbane, recently added to the molluscan fauna of Australia (*vide* Zoologischer Anzeiger, 1889, p. 551; and Abstr. in Journ. Roy. Micros. Soc., 1890, p. 21). These slugs are very abundant in the Brisbane botanical gardens, occurring also in lawns and gardens in that part of the city which was formerly scrub land. After a shower they may be collected in abundance, crawling rapidly over the asphalt paths and the grass. *V. leydigi* is much commoner than *V. hedleyi*, which it resembles in shape, size and habits, but from which its coloration distinguishes it in all stages of its growth, the former being a blackish-brown with

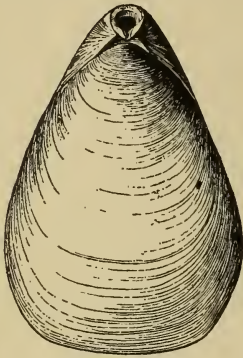
a tawny yellow dorsal stripe, the latter a dark form without any stripe. These molluscs are the first real representatives of their genus found in Australia, the only *Vaginula* previously known here, *V. australis*, Heyneman, belonging to that trigonal group which embraces *V. prismatica*, Tapparone-Canefri, from Dutch New Guinea, *V. tourannensis*, Souleyet, from Cochin-China, and *V. trigona*, Semper, from the Philippines, constituting a natural but as yet unnamed genus. He also took the opportunity of pointing out that he had submitted specimens of *Limax queenslandicus*, Hedley (P. R. S. Q., Vol. V, p. 150, pl. 5), to Dr. Simroth, who had determined them to be *Agriolimax lævis*, Müller. This species is probably the slug (Journ. des Mus. Godeff., XII, p. 159) mentioned under the name of *L. rarotonganus*, Heyn., as occurring in Australia. Few if any land molluscs range so widely, since, under different names by various authors, this form has been recorded from Europe, North and South America, the West Indies, Madagascar, and many islands of the Pacific.—*From advance proof sheet Proc. Linn. Soc. N. S. Wales, Australia, Dec., 1890.*

DR. JOSEPH LEIDY.

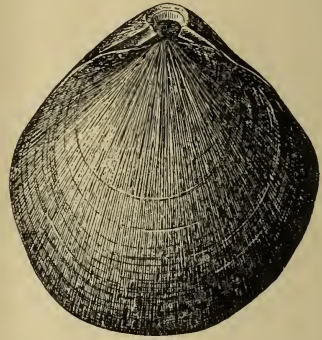
Professor JOSEPH LEIDY, M. D., LL. D., the eminent scientist, died at his home in Philadelphia on April 30th, 1891. Dr. Leidy was born in Philadelphia, Sept. 9, 1823. His ancestors on both sides were Germans, from the valley of the Rhine. His taste for natural history was exhibited at a very early age, and when a mere boy he collected and studied minerals and plants. His father proposed for him the career of an artist, but so absorbed was the boy in anatomical and natural history studies that, with the encouragement of his mother, at the age of seventeen he began the study of medicine, graduating in 1844. In 1845 he was appointed Prosector to the Chair of Anatomy in the University of Pennsylvania. Dr. Leidy's first scientific work was a paper on the anatomy of *Litorina*, published by the Boston Society of Natural History. In 1844 he began, at the instance of Dr. Amos Binney, to study the anatomy of land snails. The result is seen in his beautiful anatomical drawings in the first volume of Binney's "Terrestrial Mollusks," and in the chapter on special anatomy written by him. In 1845 Dr. Leidy was elected a member of the Academy of Natural Sciences of Philadelphia. He has been closely connected with this institution

in various official positions ever since, and has been its President since 1880. Dr. Leidy published very extensive memoirs on vertebrate palæontology, on Rhizopods (a truly magnificent quarto volume), on the anatomy of Insects, and especially on Entozoa and Vermes generally. Indeed, nearly every branch of zoological literature has received valuable additions at his hands. His work is so many-sided that in the broadest sense of the word, Dr. Leidy may be called a Zoologist. He was an honored member of many scientific societies in both hemispheres, and had received substantial tokens of the value of his work from the Boston Society (Walker Prize, \$1000), the Geological Society of London (Lyell Medal), and other learned bodies.

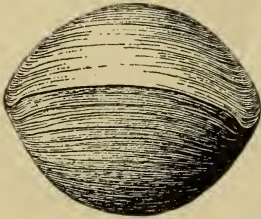
In his private relations Dr. Leidy was of a most kind and helpful disposition. He had an almost morbid dislike of contention of any kind. The loss to American zoology is irreparable.



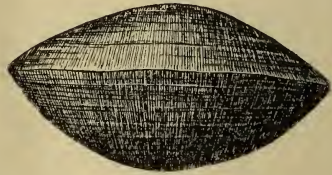
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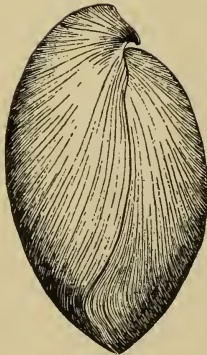
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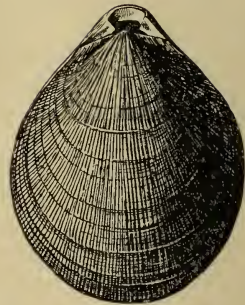
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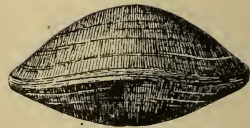
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THE NAUTILUS.

VOL. V.

JUNE, 1891.

No. 2.

ON THE MEANS OF DISTRIBUTION OF UNIONIDÆ IN THE SOUTHEASTERN UNITED STATES.

BY CHAS. T. SIMPSON, WASHINGTON, D. C.

In the March number of the NAUTILUS Mr. S. Hart Wright in some notes on the distribution of *Unionidæ* in the Southeastern United States thinks it remarkable that many of the species of Georgia and the Carolinas should be found in Southern Florida, and that they should pass from one stream to the other. I think when we fully consider all the conditions of environment of these mollusks it will be easy to understand how they have migrated.

The region is one of excessive rainfall. Over a wide area of territory bordering on the Gulf and the Atlantic it is nowhere less than 45 inches a year, ranging up to 75 inches in the vicinity of Cape Hatteras. North of latitude 30° the most of this moisture falls during the winter and early spring. South of somewhere near that line the regular dry and rainy seasons of the tropics set in, and nearly all the precipitation occurs in June, July and August. Of course these conditions vary somewhat with different seasons and under different circumstances, but as a rule in any part of this area the greater amount of the annual rainfall occurs within a limited period, producing extensive floods.

It is well known that all the region indicated, or at least a wide belt of it extending along the Atlantic and Gulf coasts, is exceedingly low and flat, consisting for the most part of level, sandy plains, rising as a rule but a few feet above, and alternating with swampy streams.

Having thus outlined the physical conditions of their environment, it may perhaps be well to speak of the manner in which the Unionidæ migrate from one locality to another.

The number of young produced by the species of this family is simply enormous. Lea counted some 600,000 perfectly formed embryos in the ovaries of an *Anodonta undulata*, and estimated that a female *Unio multiplicatus* contained no less than 3,000,000 shells.

It is believed that these young bivalves sometimes attach themselves to fishes and are thus carried from place to place; no doubt others are taken up in mud on the feet or feathers of aquatic birds, and may survive a short transit through the air, and certainly they might be swept from stream to stream across the country during the time of floods, when almost the entire surface of that level area is covered with water, in many places flowing with a rapid current. During the rainy seasons in South Florida I have repeatedly seen the whole country a sheet of water, with myriads of fish swimming in every direction among the palmettoes and over the fields. That the *Unionidæ* are carried out over the land is, I think, proved by the fact that I have found *Unio obesus* existing in great numbers in low places and drains in the piney woods of South Florida, at quite a distance from any stream, where there was not a drop of water outside of perhaps three months of the rainy season, and where during the remaining nine months of the year they must have lain dormant in slightly damp sand. I have dug these unios alive out of such sand banks in such places, and during the dry season, by the bushel.

It is a well-known fact and one which seems to me much more strange than the migration of unios across such a country, that artificial ponds and reservoirs often become densely peopled with the Naiades, even when their outlets are altogether too insignificant in size to be a residence for these molluscs. In such cases it would seem most probable that aquatic birds had been the means of such distribution, and possibly in rare instances they may have been lifted from their original homes and carried by cyclones.

But once having reached the lower part of the St. Johns River, I cannot conceive of any difficulty mollusks would encounter in spreading toward its sources. The stream is really little more than a freshwater estuary for a long distance from its mouth, and has but a few feet of fall throughout its entire length. Let any of the *Unionidæ* be placed in any part of a stream and if the conditions

are favorable they will migrate against the current as well as with it. Any one who has ever collected these mollusks at all extensively will notice their furrows on sandy or muddy bottom, often extending for forty or fifty feet, and made apparently without any regard to the direction of the stream. I am led from my observations to believe that most of the unios if placed in favorable conditions would migrate over considerable stretches of water in a comparatively short period.

PALUDOMUS PALAWANICUS, n. sp.

BY DR. AUG. BROT, GENEVA, SWITZERLAND.

T. imperforata, globoso-turbinata, solidula, fusco-olivacea nonnunquam obscure flammulata. Spira breviter exserta, subintegra, sed superficialiter erosa; anfract. $4\frac{1}{2}$ –5, rapide crescentes, valde convexi, vix infra suturam submarginatam paulo planulati, sub lente tenuissime spiraliter striati et striis incrementi subgranosa decussati, striis infra suturam et ad basin posterioribus, filiformibus. Anfractus ultimus magnus, basi striis elevatis filiformibus nonnulli distantibus, ornatus. Apertura ampla, late ovata, intus fusco-brunnea, margine dextro subserrato, vix incrassato, intus albo limbato; columella incrassata, alba, callo parietali albo crasso.

Operculum?

Alt. 19 mm., lat. 17 mm.; apert. alt. 13 mm., lat. 10 mm.

Habit. I. Palawan, Philippines (legit E. L. Moseley).

Shell globose with a short exserted spire, moderately thick, dusky-olivaceous, sometimes with irregular translucent interrupted flames. Spire short, almost entire, but superficially eroded. Volutions $4\frac{1}{2}$ –5, very convex, slightly flattened under the suture, which is finely marginated, covered with fine spiral unequal striæ, and decussated by the lines of growth; last whorl globose, with some distant filiform striæ at the base and along the suture. Aperture wide, ovoid, inside dusky-brown, sometimes with one or two narrow pale bands; columella thickened, white; outer lip obscurely serrated, slightly thickened inside, white at the margin.

This interesting new shell, although the operculum is unknown, belongs certainly to the genus *Paludomus* and is, I believe, the first species of the genus mentioned from the Philippines. It cannot be

confounded with any other; it might be compared only to *Paludomus lacunoides* Aldrich, from Borneo, but that species is larger, heavier, has a more elevated spire, less tumid volutions, and is entirely smooth, not to speak of the characteristic peculiar structure of its umbilical area.

The *Paludomus Palawanica* was collected by Mr. E. L. Moseley in a brook about ten miles from Puerto Princesa in the Island of Palawan, Philippine Archipelago.

**TEREBRATULINA (UNGUICULA CPR. VAR ?) KIIENSIS, DALL
AND PILSBRY.**

? *T. unguicula* Cpr. P. Z. S. 1865, p. 201, figs. 1-4.

? *T. caput serpentis*, var. *unguiculata* Dav. Trans. Lin. Soc. iv, p. 25, 1886.

Terebratulina sp. Dav. Challenger Brach. p. 36, pl. 1, fig. 10, 1880.

Habitat: Phillippines, in 82 fathoms N. E. from Mindanao, Chall. Exp.; Coast of Province Kii, Japan, Stearns; N. W. coast of America, various authorities including Carpenter, Dall, Whiteaves, etc.

Among the shells collected by Mr. Stearns in Japan, and sent to Mr. Pilsbry for identification, is a coarsely radiately striated *Terebratulina* which has been carefully studied, but in the absence of more material, cannot be finally pronounced upon. It appears to be the adult of a form of which a young specimen was submitted by Dr. Davidson in 1879 to Mr. Dall for examination and which had been collected by the Challenger Expedition. It was not named at that time in view of the fact that it was obviously young, and the number of nominal East Asian *Terebratulinas* obviously too great for the known species.

This shell is sculptured like *T. unguicula* Cpr. and the larger the specimen, the more *unguicula* seems to resemble the Japanese form. *T. unguicula* under the name of *caput-serpentis* has been recognized already in Japan, by Davidson.

The present form differs from the largest *unguicula* with which we have been able to compare it in the following particulars. It is larger and proportionately somewhat wider and the beak proportionately shorter, much such differences as would come about by increased size in such a species as *unguicula*. If more material should prove that the supposed variety cannot be connected with *unguicula*, the varietal name can be taken as specific. The specimen

noted measures 44 mm. in total length; 38·5 mm. in the length of the hæmal valve; 40 mm. in maximum width and 21·5 mm. in maximum diameter. It is waxen white with extraneous brown stains and has no anterior flexure. Davidson's figure of *Tr. Crossei* (Trans. Lin. Soc. IV, pl. 3, fig. 6) resembles it, but is more faintly sculptured and less transverse.—*W. H. D. and H. A. P.*

EXPLANATION OF PLATE I.

Figs. 1, 2, 3. *Terebratulula Stearnsii* Dall & Pilsbry.

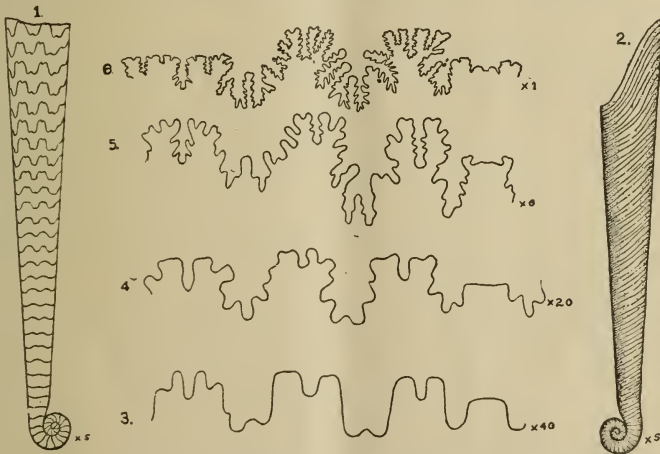
“ 4, 5. *Terebratulina* var. *Kiimensis* Dall & Pilsbry.

“ 6, 7. “ *unguicula* Cpr., typical, a large specimen.

ON THE YOUNG OF *BACULITES COMPRESSUS* SAY.

BY AMOS P. BROWN, PHILADELPHIA.

The young of *Baculites compressus* Say has been recently discovered by me in some cretaceous marl from the vicinity of Deadwood, South Dakota. Associated with them in the same material were several species of *Baculites*, *Scaphites* and *Inoceramus*. The



young *Baculites* were of the form shown in figures 1 and 2 and varied in length from 1 to 3 cm., with a diameter of 0·4 to 2 mm. Other larger fragments with the spiral end broken off were found from

1.5 to 6 cm. in diameter. An examination of the form of the septa and suture lines showed the forms to belong to the Ammonitidæ, and by the examination of an extensive series it was possible to determine the genus and species.

The shell originates in a spiral of two to two and one-half turns, ranging in breadth from 0.8 to 1 mm. thence it extends in a straight line, tangent to the spiral (figure 1) or sometimes slightly reflexed (figure 2). The straight portion of the shell rapidly increases in diameter from 0.38 to 0.40 mm. at the spiral, to about 1.5 to 2 mm. at 2 cm. length. Many shells were covered by the nacreous shell substance, some being preserved entire, figure 2, while in others the shell had been dissolved away leaving the suture lines exposed as in figure 1. On breaking away the pearly exterior of forms like figure 2 it was found that the last chamber occupied about one-half the length of the shell. The shell of the outer whorls somewhat envelops the inner so that from the outside view the exact form of the spiral cannot be measured; it was found, however, to closely approximate the mathematical curve known as the hyperbolic spiral. That the spiral origin of this shell was not smaller than that of allied genera was demonstrated by grinding cross sections of the shell of *Scaphites Conradi* Morton; the first two turns of its spiral being 1 mm. in breadth. The siphon in *Baculites* is excentric and was found to lie near the outer margin of the spiral, being easily seen in the fractured spirals.

The species was determined from an examination of the form of the sutures which may be traced from the simple form of that of figure 1, through forms of gradually increasing complexity shown in figures 3, 4, 5, and 6, the latter being the typical sutures of the adult of *Baculites compressus* Say. In figure 5, an individual of 6 mm. diameter, the suture of the adult form is already well outlined, the specific distinction, the two deep sinuses on the right hand, being well marked.

I have been unable in the literature of the subject to find any reference to this spiral termination of *Baculites*, and believe the observation to be new. That this spiral termination has not been formerly observed is not strange in view of its small size and fragile character, it being probably broken off long before the shell had attained adult size; and it would only be preserved when as in the present instance the shells were preserved in their immature condition. This observation tends to prove that *Baculites* origi-

nated from a coiled form, and is not as supposed by some palæontologists the original form of the *Ammonitidæ*, but is rather to be looked upon as an uncoiled form developed from originally coiled parents.

ON THE GENUS *TEBENNOPHORUS* BINNEY, OR *PHILOMYCUS*, RAF.

(CONTINUED.)

BY H. A. PILSBRY.

Article III. (*Ann. Mag. N. H., March, 1891.*)

Letter from Mr. T. D. A. Cockerell to Eds. *Ann. Mag. N. H.*

The Genus Limacella.

On pp. 184-186 of the February number Mr. Pilsbry has some remarks on the genus *Tebennophorus* or *Limacella*, to which I may perhaps be permitted to reply, taking his several points in order.

- (1) That plate of Blainville's has certainly received bad treatment. The figures have been inaccurately copied; Férussac quoted it wrongly; and now, as Mr. Pilsbry has shown, I also have erred with regard to it! There are two figures iv., labelled respectively 1 and 2. Fig. 2 is obviously *Veronicella*, but fig. 1, for which alone my reference was intended, looks like *Limacella*, though from Blainville's text it is clearly intended for *Veronicella* also. I quite agree with Mr. Pilsbry that fig. iv. no. 1 might or might not from its appearance be of the genus under discussion; and as it is stated to be *Veronicella*, there apparently remains no doubt that my reference of it to *Limacella* was erroneous. I am still of the opinion, however, that fig. v. represents the genus Americans writers call *Tebennophorus*.
- (2) There is, I think, no doubt about the slugs I described being Blainville's types; nor are these the only British-Museum slugs described by Blainville. The Museum is mentioned in the original paper.
- (3) It is very difficult to say whether inaccuracy of description, when there is no doubt what was intended, ought to condemn a name. If so, there will have to be considerable slaughter of the genera described by early authors, or, for that matter, by some recent ones. *Philomycus*, which Mr. Pilsbry thinks might be adopted, was also inaccurately defined. So far as is known there is no slug in existence really agreeing with the original descriptions of *Limacella* or *Philomycus* taken literally.
- (4) *Limacella*, Brard, if it is anything, is *Limax* of modern authors, not *Agriolimax*. But a genus founded for the shells only of species of the Linnæan *Limax* cannot be recognized as valid, and the only authors who have adopted it are Dr. Jousseau (1876) and Dr. Turton. The former writes *Limacella* for *Limax* auct., and *Limax* for *Arion*; while Dr. Tur-

ton (1831) kept the name for the shells of *Limax* and allied genera, though spelling it *Limacellus*. We are told, for instance, that *Limacellus parma*, Brard, is "found in the *Limax maximus*," as though it were a sort of parasite!

- (5) I think it nearly certain that my *Limacella nebulosa* is Rafinesque's species *E. nebulosus*; but if so, of course that author described it incorrectly. Mr. Pilsbry will observe that I have given the reference with a query.

While on the subject, it may be well to mention that there is a figure and description of *Limacella lactiformis* (as *Elfortiana*) in Knight's 'Pictorial Museum of Animated Nature,' vol. ii. and fig. 2598. The figure is very bad, being a rough copy of that in Man. de Mal.; but the generic description, so far as it goes, is accurate.

T. D. A. COCKERELL.

3 Fairfax Road, Bedford Park, Chiswick, W.,
February 3, 1891.

Article IV. BY H. A. PILSBRY.

In concluding I wish simply to emphasize a few points upon which both Mr. Cockerell and myself have already touched.

(1) That Blainville's figures are so poor that Mr. Cockerell could not tell his *Veronicella* from his *Limacella*, but repeatedly confused them in his first article. Blainville's description most certainly indicates *Vaginulus* rather than *Tebennophorus*, as anyone can see by reading the translation of it given in my article. We can allow for some inaccuracy in descriptions by early authors, but we cannot suppose that when they say "black" they mean "white."

(2) As to *Limacella*, Brard. The name as used by Brard covers species of both *Limax* and *Agriolimax*. Since the Limaces are already provided with a name, why should we not adopt "*Limacella*" for the other species, namely the *Agriolimax*, as has been done in scores of similar cases? Still I do not care to advocate the use of "*Limacella*" for any group, as no definition worthy of acceptance has been given of it.

(3) As to the *Limacella nebulosa* (Raf.?) Ckll., I do not see how it is to be separated from *carolinensis* as that species is figured by Férussac. The characters given by Mr. Cockerell are wholly insufficient. Why does he not tell whether the jaw is ribbed or smooth? We would then have some clue of value. Measurements taken from variously and generally badly contracted museum specimens of slugs are practically of but little use.

(4) Mr. Cockerell truly says that *Philomyces* like *Limacella* was inaccurately defined by Rafinesque. It would be well for us to adopt Fischer's course, and write "*Philomyces* Férussac, 1821." Férussac fixes the identity of the genus with certainty by including the species *carolinensis*, which he describes and figures very well.

NOTE. The writer desires to make a more careful study of the species of *Philomyces* (*Tebennophorus*), and will be glad to receive specimens. They are best if prepared by drowning in a vessel of water from which air has been excluded. Transfer to alcohol (or whiskey) and water, the former slightly in excess. They may then be sent safely by mail in an ordinary box, if removed from the spirit and wrapped in paper or muslin wet with spirit.—*H. A. P.*

GENERAL NOTES.

MR. HENRY HEMPHILL has left San Diego for a summer in the north.

SHELLS OF ERIE CANAL.—Taking advantage of the annual spring cleaning of the Erie canal, I spent one day in April of the present year collecting mollusks between Ilion and Utica with the following results :

<i>Unio Tappanianus</i> Lea,	350 specimens.
<i>Unio rubiginosus</i> Lea,	15 "
<i>Unio luteolus</i> Lam.,	27 "
<i>Unio complanatus</i> Sol.,	38 "
<i>Margaritana marginata</i> Say,	1 "
<i>Margaritana undulata</i> Say,	18 "
<i>Margaritana rugosa</i> Barnes,	28 "
<i>Anodonta edentula</i> Say,	24 "
<i>Anodonta subcylindracea</i> Lea,	6 "
<i>Anodonta Lewisii</i> Lea,	91 "
<i>Physa heterostrophu</i> Say,	150 "
<i>Campelema decisum</i> Say,	46 "
<i>Goniobasis Virginica</i> Gmelin,	379 "
<i>Vivipara contectoides</i> W. G. Binney,	5 "
<i>Planorbis trivolvis</i> Say,	8 "
<i>Sphærium striatinum</i> Lam.,	12 "
<i>Limnæa catascopium</i> Say,	2 "

All were collected without a dredge.—*Albert Bailey, Chepachet New York.*

The late EDWARD R. MAYO of Boston left no will, but his children have generously donated his valuable conchological collection to the Boston Society of Natural History.—*E. W. R.*

COLLECTION FOR SALE.—We learn that the Collection of Dr. Hartman is for sale, together with his Conchological Library and other works on Natural History. The Collection embraces about 8000 species of Marine, Terrestrial and fresh-water shells of the best quality, many of which are rare and difficult to obtain. All parts of the world are represented in this Collection, which has taken a period of forty years to accumulate. They are all correctly named and many are mounted. Inquiries should be addressed to Dr. W. D. Hartman, West Chester, Penna.

PUBLICATIONS RECEIVED.

MOLLUSCA OF SANTA BARBARA CO., CAL., etc., by Dr. Lorenzo G. Yates. A useful contribution to our knowledge of the distribution of West Coast shells, is this extensive local catalogue. We note a number of errors in nomenclature, such as the retention of the name "*sanguineus*" for the common *Leptothyra*, etc., but such defects do not really diminish the usefulness of the list. The following are described and figured as new: *Venus Fordii* Yates, *Vertagus Lordi* Yates, *Vermiculus Fewkesi* Yates.

BEAKS OF UNIONIDÆ * * OF ALBANY, N. Y., by Wm. B. Marshall (Bull. N. Y. State Mus. II, p. 170). A careful and well illustrated study of the undulations of the beaks in Unionidæ, with especial reference to the distinguishing marks of the various species. This excellent work should be studied by all interested in Unionidæ, and extended by observers in various parts of the country. We have elsewhere expressed the opinion that excellent group characters, as well as specific characters are furnished by the beaks.—*H. P.*

THE NAUTILUS.

VOL. V.

JULY, 1891.

No. 3.

EDIBLE SHELL NOTES, FOR THE NAUTILUS.

BY ROBT. E. C. STEARNS.

In addition to the species of edible mollusks in the San Francisco markets heretofore noted by Professor Keep and myself, a recent letter from Mr. W. M. Wood of San Francisco informs me that "*Tivela crassatelloides* is very often sold in the San Francisco markets especially the 'California Market' so-called. I bought quite a lot of them a couple of weeks ago. They were of huge size about six inches in length. I observed they had some *five hundred*, or so behind the counter, for sale. The proprietor of the fish stall told me they were brought up from the vicinity (shore) of San Luis Obispo county. Near Fort Point (on the entrance to San Francisco Bay) known as 'Fort Winfield Scott' the soldier's boys at the Presidio go out near the fort and dig *Schizothærus Nuttalli*, with which their mothers make clam-chowder or clam-pies. In fact I have collected them myself." What good mothers!

Schizothærus Nuttalli beats any clam yet discovered for chowder, soup or pies. It is nearly like an oyster in consistency, has a very small foot, the proportion of hard or tough muscle being much less than in *Mya arenaria*; the mere memory of the soups and chowders I have eaten at various times, where *Schizothærus* was the grand staple, is like a gleam of sunshine through a London fog, and worth having; it is a noble and estimable clam. The California Indians, as well as those further north around Puget Sound, know them well and like 'em. In this conchological respect, I appreciate the red man's malacological taste and judgment. *Schizothærus* burrows

pretty deep, and sometimes weighs over a pound, which considering that the shells are usually rather thin and consequently light in weight, shows that the soft parts or edible portion is a jolly good junk of nutritious aliment, fit for the best conchologists on earth, and their friends also, without regard to age, sex or condition. Unlike *Mya arenaria* and *Panopæa generosa*, the end of the double siphon tube or sleeve is protected by two hard, valvular pieces. The siphons are not as long in proportion as in *Mya arenaria* nor does it ever reach the dimensions of *Panopæa*; the latter sometimes attains the weight of *fifteen or sixteen pounds*, and from tip of *extended* siphons to the opposite end, measures three feet. It will easily be seen, that it is no small job to dig out one of these deep burrowing fellows. The "meat," is very nice when parboiled and fried in batter, and as tender as a humbird's eye. Bathymetrically their station is so low or deep, that is to say usually that they are not to be procured except at very low tides. Around Puget Sound they are called "Geoducks," and they are really a delicious article of food, and a truly noble bivalve.

Tivela crassatelloides makes a good chowder or soup and is justly held in high esteem, being highly estimable and of good character among its fellows of the edible mollusca, but it is more of a "muscular Christian" than the others, and not so well adapted for frying or for pies. It is abundant at many places along the southerly coast of California, and at low tide can be plowed up in great numbers.

Washington, June 9, 1891.

ON A NEW SUBGENUS OF MERETRIX, WITH DESCRIPTIONS OF TWO
NEW SPECIES FROM BRAZIL.

BY W. H. DALL.


The shells which have passed under the name of *Sunetta* Link (1807, type *Donax scripta* L.) and *Tivela* Link (type *Venus corbicula* L.),—otherwise *Meroë* of Schumacher (1817) and *Trigona* Megerle (or *Pachydesma* Conrad), so far as the hinge is concerned occupy in the *Meretricinæ* much such a place as *Venus* (*mercenaria* and its allies) occupies in the sub-family *Venerinæ* of the *Veneridæ*. In both the subligamentary area is elevated and corrugated or transversely striated so that in some cases it is hardly to be termed a tooth. In both *Sunetta* and *Tivela* the shell is nearly equilateral as

regards the beaks, sub-trigonal and with a small rather rounded pallial sinus indicating short siphons. Both have compressed and inflated species; in both the epidermis in fresh specimens is conspicuous.

Sunetta differs from such species of *Meretrix* (or *Cytherea*) as *M. ovum* Hanley chiefly by the impressed lunule, excavated escutcheon, and crenulated margin of the valves. In both the subligamentary ridge is transversely striated. Allowing for the mechanical differences due to the differences in form of the cardinal margin, the hinge is essentially the same, and both have the shallow pallial sinus.

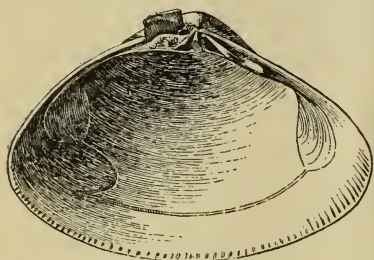
On the other hand in *Tivela* we have the cardinal margin and also the entire basal margin of the valves of *Meretrix*, while the hinge differs in that the subligamentary ridge or furrow is radiately coarsely rugose, instead of transversely regularly striate. There are flat species and inflated species as in *Sunetta*.

On the southeastern coast of South America there seems to be a group hitherto unrecognized which to the general characters of *Tivela* in regard to form, pallial sinus and hinge, unites the crenulated margin of *Sunetta*. To this section the name of *Eutivela* may be applied.

Tivela (or *Pachydesma*) *crassatelloides* Conrad, of California, has the gills small, double on each side (W-fashion) dark flesh-color; the heart is orange colored, pulsating once in ten seconds; the muscles are reddish, the mantle dark flesh-color with the edge waxen, wrinkled transversely; the foot is hatchet-shaped, livid, with a swollen, wrinkled flesh-colored basal edge, the sides below the body compressed, vertically wrinkled and granulose; the body is livid flesh-color, the liver brown, the organ of Bojanus yellow; the palpi are small, single and bifid on each side; both siphons are white with black dots at the end, the incurrent granulose and the excurrent shorter, plain-edged and smaller; they are joined together for nearly all their length. The intestine is white and there is at the entrance of the stomach a curious cartilaginous translucent hollow organ through which the food must pass, difficult to describe in words, the lid or upper part of which has the form () of a bracket, while the whole is somewhat T-shaped, or perhaps vasiform. The whole thing is about 6 mm. in longest diameter and resembles an internal mandibular apparatus more than a gizzard; at least its size would seem to be insufficient for an organ of the latter kind. I have not been able to examine specimens of the smaller *Tivelas* with the soft parts or to get any light on the features of the soft parts of *Sunetta*.

MERETRIX (EUTIVELA) PERPLEXA Stearns, n. s.

Shell waxen-white, porcellaneous, covered with a greenish-yellow epidermis recalling that of *Iphigenia brasiliensis* or *Maetra ponderosa* Jan. The surface under the epidermis is smooth or marked with lines of growth only. The figure sufficiently illustrates the other characters of the shell. The specimen figured measures 45 mm. long by 33 in height and 23 in diameter. There is an impressed



Eutivela perplexa Stearns.

lanceolate lunule 15 mm. long and about 4.5 mm. in greatest width. As in *Tivela* there is a prolongation forward, between the beaks, of the dark epidermal coating of the ligament; forming a blackish lanceolate area in front of the beaks about 5 mm. long, resembling the dark area in *Arca*. This and the rugose

subligamentary ridge are reminiscences of the period when the ancestors of *Tivela* had a more archaic type of hinge. There is no defined escutcheon.

The soft parts in alcohol present several differences when compared with *Tivela crassatelloides*.

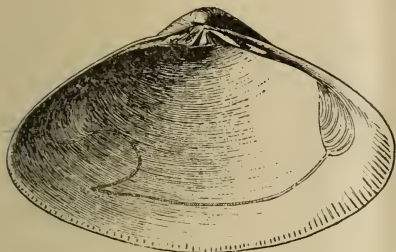
The gills are double, as in that species, but proportionately much larger and broader; the edges of the mantle are double with a groove between them; in both species they are open from the sinus to the anterior adductor; there are no papillæ or granulations in *E. Iheringi*; the foot is elongated, linguiform, and sharp-edged, without sulci or granulations; the palpi are large and distinctly paired on each side instead of being partially fused; the siphons are extremely short but rather large, the incurrent with several ranks of rather elongate tentacular processes, the excurrent with a single row of obvious papillæ; the siphons have blackish maculations toward their ends and are joined for most of their length on the adjacent sides. From the dark color of the tissues in alcohol, they were probably reddish or, at least, not white in life.

On a single shell of many, are two small brown maculæ, so that the species may sometimes be colored with brown markings. But the differences of proportion and of solidity which seem to be very constant, forbid us to unite the present species with *E. Iheringi*.

This species was dredged by the U. S. S. Albatross in several places off the mouth of the Rio La Plata in 10–15 fathoms, muddy bottom, associated with *Pectunculus* and sundry *Nuculidæ*.

MERETRIX (EUTIVELA) IHERINGI Dall, n. s.

Shell thinner, more equilateral and more elongate than *E. perplexa*, waxen-white with more or less interrupted rays of brown extending from the beaks toward the margin, modified by whitish zig-zags. The exterior is smooth, with a well marked epidermis and faint, obscure radiations corresponding to the interior marginal crenulations. The interior of the beaks and the cardinal region on both sides of them below the margin more or less marked with purplish brown. The lunule is narrow lanceolate and faintly impressed. The figure illustrates the characters of the single valve upon which the



Eutivela Iheringi Dall.

species is founded, which measures 41 mm. long, 27 high, while the double diameter would be about 18 mm.

It is named in honor of Dr. H. von Ihering, from whom it was received, and by whom it was collected on the beach near Santa Caterina in southeastern Brazil in about latitude 26° south.

 DESCRIPTIONS OF TWO NEW SPECIES OF UNIO FROM FLORIDA.

BY WILLIAM A. MARSH.

Unio Singleyanus.

Shell smooth, oval, slightly depressed, inequilateral; valves rather thick, squarish before, rounded behind; beaks small and flat; epidermis yellowish-brown, shining, with or without rays, usually rayless. Cardinal teeth crenulate, oblique, single in right valve, double in left. Lateral teeth short and straight; anterior cicatrices small, deep, not confluent, posterior cicatrices confluent, slightly impressed; nacre white, iridescent.

Habitat. A small creek near Pilatka, Florida.

Remarks. Seven shells of this species were sent to me by T. L. Cunningham a number of years ago. This species belongs to the *parvus* group, but differs very much from any other member of that group in the yellowish color of its epidermis, in its peculiar outline and much flattened form of the females. Some specimens are cov-

ered with rays, others without rays and having a bright yellow shining epidermis. In general outline it approaches *U. marginis* Lea, but is not pointed anteriorly like that species and differs altogether in the color and texture of the epidermis.

I name this shell after my friend Mr. J. A. Singley of Texas, a gentleman who has done very much towards collecting the mollusca of that state.

Unio Ferrissii

Shell oblong, inflated, smooth before, slightly plicate posteriorly, rather thick and solid, epidermis dark green or black and shining, with green capillary rays, sometimes rayless, squarish before, pointed behind, umbonial slope raised, obtusely rounded. Cardinal teeth compressed, thick and solid, oblique, single in right valve, double in left, striate. Lateral teeth short and slightly curved, anterior cicatrices not confluent, very deep, posterior cicatrices distinct, nacre pink and iridescent.

Habitat. A small creek near Pilatka, Florida.

Remarks. Several years ago I received two shells of this species from Mr. J. B. Upson, at the time I supposed them to be a variety of *U. Anthonyii* Lea, but having some doubts as to their belonging to that species, I sent them to Mr. Chas. T. Simpson of the Smithsonian Institution, who after a very careful examination, pronounced them distinct. They differ from *U. Anthonyii* Lea in being a much smaller species but more inflated and solid, less wide, more cylindrical; they are not angular over the posterior slope, with a very different epidermis and nacre and much heavier teeth.

I name this shell after my friend Mr. Jas. H. Ferriss of Joliet, a gentleman who has done much towards bringing to light many interesting species from our own state.

THE SLUGS OF BRITISH COLUMBIA.

BY T. D. A. COCKERELL.

Mr. H. F. Wickham sent me some slugs from Victoria, Vancouver Island, in November, 1889; and the Rev. J. H. Keen recently sent some slugs from British Columbia to the British Museum, so I have been able to examine sufficient material to offer a list of the slugs of that province, with notes:

(1) *Agriolimax campestris* subsp. *hyperboreus* (Westerlund). Mr. Binney sent me a specimen of this collected at Comor, 140

miles north of Victoria (Taylor). It is figured in 3rd suppl. Terr. Moll. U. S., Pl. viii, fig. f. On p. 205 of his 3rd suppl. Mr. Binney refers to a slug from British Columbia, apparently *L. hemphilli* W. G. Binney. *Limax hemphilli* is, I think without doubt, a variety of *Agriolimax Berendti* (Strebel), and was hardly to be expected so far north.

In my copy of Pl. viii of Mr. Binney's 3rd Suppl. Terr. Moll., figures of *Ag. hemphilli* and *Ag. montanus* have some appearance of dark lateral bands, owing to the ink having run in printing. All the four forms of *Agriolimax* figured on that plate resemble *Ag. levis* in general appearance, and of course, have no dark bands. I found them to differ slightly in the position of the longitudinal line or groove on the margin of the foot, and the figures given of the foot-margins were intended to show this difference. It will be seen that in *montanus* the line is near the upper edge of the margin, in *occidentalis* it is lower, in *hyperboreus* it is about median, and in *hemphilli* it is nearest the lower edge. I have not, however, examined this character in a sufficient number of specimens to say whether it is of really of classificatory value.

(2) *Prophysaon pacificum* Ckll.: Victoria, Vancouver Island (Wickham). Figured in Binney's 3rd Suppl. Terr. Moll. U. S., Pl. vii. In this work, Pl. vii, fig. e, is the jaw of *P. humile*, and fig. f that of *P. pacificum*: these names are unfortunately transposed in the plate, on p. 225. *P. pacificum* was described from two specimens, one of which is now in the British Museum, and the other in the U. S. National Museum.

(3) *Prophysaon andersoni* (Cooper) var. *hemphilli* (B. & B.): British Columbia, six specimens (*Rev. J. H. Keen*).

(3b) *Prophysaon andersonii* var. nov. *pallidum*. Paler, ochreous, the bands on mantle evanescent, reticulation on body not dark, back not darker than sides, neck pale. Two specimens from British Columbia (*Rev. J. H. Keen*), the largest 46 mill. long (in alcohol). One has the tail cut off, in the same way as has been described in other species of the genus. All the eight examples of *Prophysaon* sent by Mr. Keen have the sole strongly wrinkled.

(4) *Ariolimax columbianus* (Gould) forma *typicus*. Without black spots. British Columbia, two specimens (*Rev. J. H. Keen*).

(4b) *Ariolimax columbianus* forma *maculatus* Ckll. This spotted form seems to be rather more frequent than the type.¹ Mr. Keen's

¹ *Ariolimax* subsp. *californicus* forma nov. *maculatus* is a precisely similarly spotted form of the Californian subspecies. There is an example in the British Museum from Mr. W. G. Binney, 45 mm. long.

sending contains four specimens. Mr. Wickham sent me two from Victoria: one being immature, only 21 millim. long; in this small specimen the sole was not visibly divided into tracts. There is also a specimen of *f. maculatus* in the British Museum from Vancouver I. (*Lord I. Russell*; coll. by the Boundary Commission), which is 63 mill. long (in alcohol), tail well keeled for 18 millim.; a large spot on mantle; sole with median area smooth though wrinkled, lateral area rough; jaw dark, with 15 ribs.

(4c) *Ariolimax columbianus* forma nov. *niger*. Entirely black, except the sole, which is rather olivaceous. One specimen, 57 mill. long (in alch.), from British Columbia (*Keen*).

Mr. H. F. Wickham was so good as to send me some notes on the Victoria slugs, as follows: "The very large slugs [*A. columbianus f. maculatus*] from Victoria are found in the heavy woods on the island in rather damp situations, especially around and in the cracks of rotten logs. In damp weather I have seen them crawling around on logs and on the ground. The little ones [*P. pacificum*] from Victoria also occur under logs, but I got them in much damper places, especially under logs in ditches by the roadsides, and few or none in the woods" (*in litt.*, Dec. 12, 1889.)

LIST OF LAND AND FRESH-WATER MOLLUSCA COLLECTED
IN JAMAICA.

BY C. W. JOHNSON & WM. J. FOX.

The following is a list of the mollusca obtained on our recent trip to Jamaica, during a part of April and June. As the species are extremely local in their distribution, and our collecting confined to the eastern part of the Island, and time largely occupied in collecting insects, this list, represents but a small part of the Island fauna.

Collections were made near Kingston, Bogwalk in the Parish of St. Catherine, Morant Bay, Manchioneal, Port Antonio, Hope Bay and Swift River. At Kingston, *Orthalicus undatus* was abundant on the trees, ascending to the height of ten or twelve feet; as it was very dry weather, they were all tightly closed with an epiphragm, and so firmly attached to the bark that it required considerable force to remove them. *Helix invalida*, *Cylindrella brevis* and *Tudora armata* were also numerous. Though the shells were quite plentiful we did not succeed in finding a living *Sagda jayanus*. At Port Antonio, *Tudora augustæ*, *Cyclotus Portlandiensis* and *Hyalosagda*

similis, were the most abundant species, while near Hope Bay, *Helix acuta*, *Cylindrella alba* and *Lucidella aureola* predominated. We desire to express our thanks to Mr. Henry Vendryes of Kingston, for his kindness in directing us to collecting grounds, for valuable information regarding distribution, and for specimens.

LIST OF SPECIES.

Oleacina (Varicella) leucozonias Walch. Portland? This species was given to me by a gentleman in Port Antonio.

Oleacina procera C. B. Ads. Bogwalk. Two specimens.

Oleacina nemorensis C. B. Ads. Near Manchioneal.

Oleacina similis C. B. Ads. Bogwalk.

Oleacina (Melia) propinqua C. B. Ads. Near Hope Bay and Swift River.

Oleacina perplexa C. B. Ads. Near Hope Bay and Swift River.

Oleacina læviuscula. Near Hope Bay and Swift River.

Zonites (Proserpinula) discoidea C. B. Ads. Near Hope Bay.

Zonites opalina C. B. Ads. Bogwalk.

Helix (Sagda) Jayanus C. B. Ads. Long Mt. Kingston and Bogwalk.

Helix (Sagda) connectans C. B. Ads. Long Mt. Kingston.

Helix (Hyalosagda) similis C. B. Ads. Morant Bay, Port Antonio and Swift River.

Helix (Hyalosagda) Haldemania C. B. Ads. Morant Bay, Manchioneal.

Helix (Microphysa) turbiniformis Pfr. Bogwalk and Port Antonio.

Helix (Microphysa) peraffinis C. B. Ads. Port Antonio.

Helix (Microphysa) vortex Pfr. Port Antonio.

Helix (Microphysa) diminuta C. B. Ads. Port Antonio.

Helix (Microphysa) perdepressa C. B. Ads. Kingston.

Helix (Lucerna) acuta Lam. Near Hope Bay.

Helix (Lucerna) acuta var. *nobilis* C. B. Ads. Bogwalk.

Helix (Lucerna) acuta var. *ingens* C. B. Ads. Near Manchioneal.

Helix (Lucerna) valida C. B. Ads. Near Hope Bay.

Helix (Lucerna) invalida C. B. Ads. Near Long Mt., Kingston.

Helix (Lucerna) sinuosa Fér. Bogwalk.

Helix (Dialeuca) subconica C. B. Ads. Bogwalk, Port Antonio and Hope Bay.

Helix (Dialeuca) nemoraloides C. B. Ads. Bogwalk.

Helix (Dialeuca) nemoraloides var. *gossei* C. B. Ads. Bogwalk.

Helix (Cysticopsis) tumida Pfr. Bogwalk.

Helix (Cysticopsis) tenerrima C. B. Ads. Bogwalk.

- Orthalicus undatus* Brug. Kingston.
Stenogyra octona Linn. Common in all the localities.
Stenogyra octonoides C. B. Ads. Common in most of the localities.
Cylindrella elongata Chemn. Bogwalk.
Cylindrella alba C. B. Ads. Near Hope Bay and Swift River.
Cylindrella rubra C. B. Ads. Swift River.
Cylindrella Dunkeriana Pfr. Bogwalk.
Cylindrella brevis Fér. Near Rockfort and Kingston.
Cylindrella sanguinea Pfr. Bogwalk.
Cylindrella rosea Pfr. Near Manchioneal and Port Antonio.
Cylindrella lata C. B. Ads. Bogwalk.
Leia Maugeri Wood var. *striatula* C. B. Ads. Bogwalk.
Pupa fallax Say. Kingston.
Pupa contracta Say. Near Hope Bay.
Succinea latior C. B. Ads. Common in all the localities.
Succinea angustior C. B. Ads. Morant Bay.
Vaginulus sloanii Fér. Port Antonio.
Vaginulus occidentalis. Port. Antonio.
Planorbis affinis Ad. In a spring near Rockfort and Kingston.
Annicola? *sp.?* Brackish water near Kingston.
Hemisinus lineolatus Wood. Rio Cobre at Bogwalk.
Ampullaria fasciata Lam. Rio Cobre at Bogwalk.
Geomelania procera C. B. Ads. Near Hope Bay and Port Antonio.
Adamsiella Grayana C. B. Ads. Bogwalk.
Tudora armata C. B. Ads. Rockfort and Kingston.
Tudora fecunda C. B. Ads. Rockfort and Kingston.
Tudora maritima C. B. Ads. Near Manchioneal.
Tudora fascia Gray. Bogwalk.
Tudora Angustæ C. B. Ads. Port Antonio.
Tudora Angustæ var. *rufilabrum*. Swift River.
Cyclotus Portlandiensis Chitty. Port Antonio.
Helicina megastoma C. B. Ads. Port Antonio and Hope Bay.
Helicina neritella Lam. Port Antonio and Hope Bay.
Helicina depressa Gray. Bogwalk.
Alcadia solitaria C. B. Ads. Port Antonio.
Lucidella aureola Fér. Bogwalk, Port Antonio and Swift River.
Lucidella nana Pfr. Port Antonio and Hope Bay.
Stoastoma chittyana C. B. Ads. Port Antonio and Hope Bay.

[CONTRIBUTED.]

AMERICAN ASSOCIATION OF CONCHOLOGISTS.

JUNE 23, 1891.

Owing to long continued illness in the family of the President and absence of the Secretary in Jamaica, we have been unable to communicate our usual monthly notes to the NAUTILUS. For the same reason correspondence has been delayed and the affairs of the Association, so far as the President and Secretary are concerned have dragged somewhat. Members have been very indulgent and their kindness is appreciated.

The Association still grows. In fact, its rapid growth has astonished its projectors and has shown that such an organization was needed. American Conchologists were unacquainted with each other and in many instances had no one with whom to confer in their studies. Now they have at their command scores of willing associates, ready to extend them aid in solving disputed problems or in acquiring knowledge. Those members who have corresponded most perceive how valuable the Association has been. Before long we will not only have almost every American Conchologist enrolled, but many students and beginners will be induced to take up the study and collection of shells.

Next month we will resume the publication of the lists of new members, donations to the United States Collection etc.

Members desiring to donate shells to the United States Collection would do well first to send their *lists of species* to the President who would mark off the species already received and thus save duplication. Send all shells to the President, care of Academy of Natural Sciences, Philadelphia.

The annual election of officers of the Association took place, by correspondence, upon the 1st Wednesday of June, and the officers assumed their duties upon June 15th. Except a few scattering votes, by the officers and others, the present officers received all the votes polled, and were therefore re-elected for another year. They wish to return their thanks for the many kind words of approval of their conduct and for the great interest taken by the members in the election. The positions involve much hard work and the giving of much time to the affairs of the Association but the work is lightened by the ready assistance and co-operation of the members.

A new edition of the pamphlet "List of Members" of the Association, is in preparation. So many new members have been elected since its publication (October 1, 1890), that a new edition is much needed. As soon as completed a copy will be sent to every member.

Members desiring to propose new members should do so at an early date, so that their names may be included in the new "List of Members."

Miss C. A. Shepard of New Britain, Conn. and C. A. Hargrave, Danville, Ind. are Associate Editors of "The Observer" a natural history monthly, published at Portland, Conn.

James H. Ferris, recently elected a member, is Editor of the Daily News, Joliet, Ill. He has chosen for his subject, the Land and Fresh Water Shells of Illinois.

William McCormick, Palm Beach, Fla. is spending the summer North, and stayed, en route, some days in Philadelphia.

John Ritchie Jr., Boston, Mass., has fortunately recovered from a serious attack of typhoid fever. Accompanied by his wife, he spent nearly a week in Philadelphia during the present month, coming and returning by steamer.

Francisco E. Blanes, Key West, Fla., is now on a visit to Cuba.

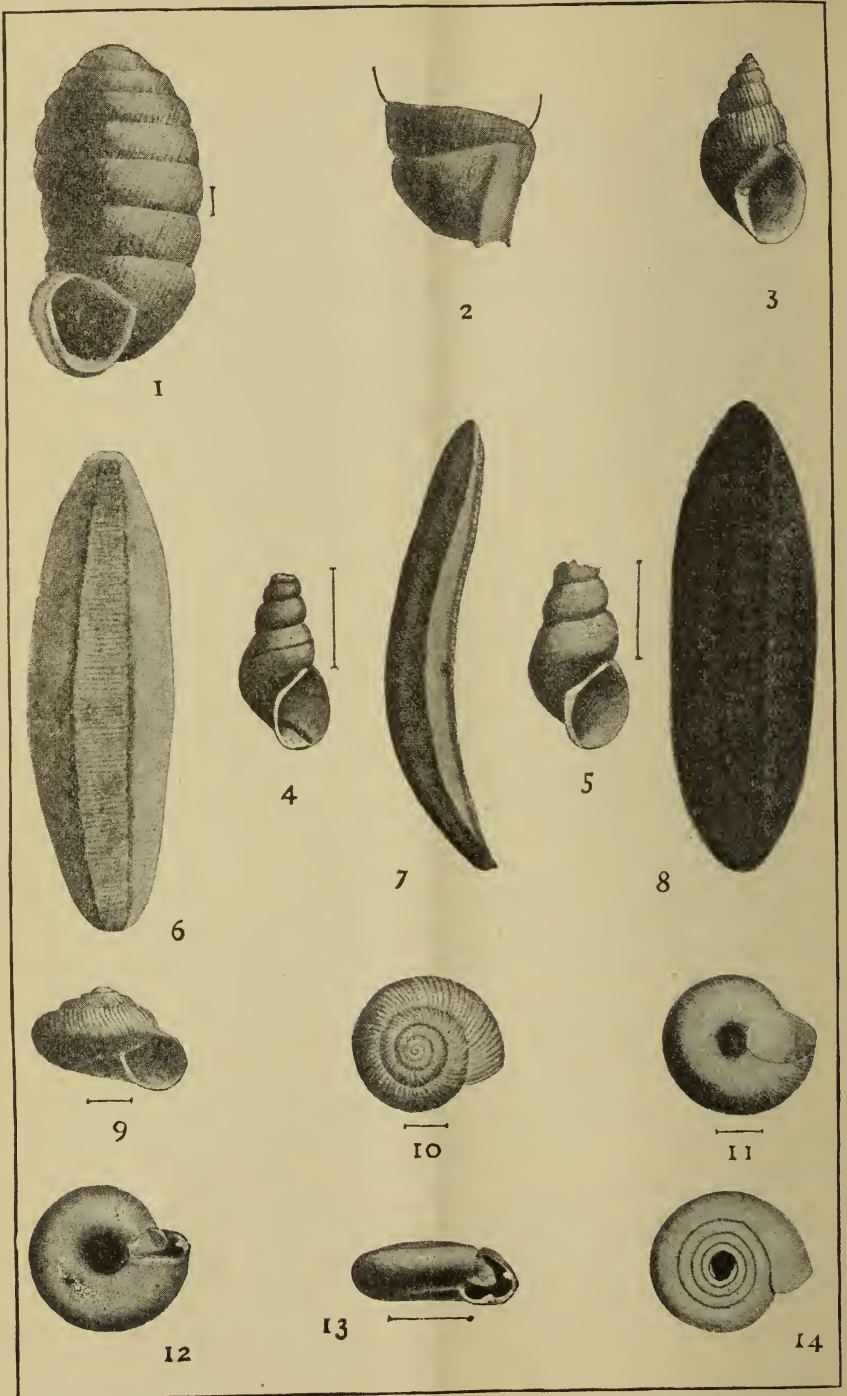
I. Greeger has finishes his winter's business in St. Augustine, Fla. and is now at Cuyahoga Falls, Ohio. He stopped in Philadelphia for a few days on his way home.

Dr. Lorenzo G. Yates, Santa Barbara, Cal. has changed his subject to "West Coasts shells." Harry E. Dore, Portland, Oreg. a new member, has chosen the same subject. Willard M. Wood, San Francisco, Cal., a new member, has chosen "California Mollusca" as his subject.

W. S. Teator, Upper Red Hook, N. Y., recently paid a visit to Philadelphia.

Rev. Joseph C. Carrier is Professor of Natural Sciences in the College of St. Laurent, near Montreal, Canada.

WANTED. The June number of *The Nautilus*, Vol. III, 1889. Ten cents per copy will be paid.—*C. W. Johnson, Manager of the Nautilus, Philadelphia.*



PILSBRY, ON NEW AMERICAN MOLLUSKS.

THE NAUTILUS.

VOL. V.

AUGUST, 1891.

No. 4.

ON HELIX HARFORDIANA COOPER, AND OTHER SHELLS.

BY HENRY A. PILSBRY.

The accompanying plate¹ illustrates a number of species described originally in THE NAUTILUS and elsewhere, as follows :

Figs. 1, 2, *Pupa syngenes*.

Pupa syngenes Pils., THE NAUTILUS IV, p. 3, May, 1890; Proc. Acad. Nat. Sci. Phila., 1890, p. 296.

This is the first sinistral Pupa described from America. It is from Arizona.

Fig. 3, *Bulimulus Ragsdalei*.

B. Ragsdalei Pils., Proc. Acad. Nat. Sci. Phila., 1890, p. 63, 296; THE NAUTILUS IV, p. 122, March, 1890.

Northern Texas.

Figs. 4, 5, *Goniobasis Crandalli*.

Gon. Crandalli Pils., Proc. Acad. Nat. Sci. Phila., 1890, p. 301. Mammoth Springs, Arkansas.

Figs. 6, 7, 8, *Vaginulus Schivelyæ* Pils.

Bermuda.

Figs. 9, 10, 11, *Zonites Shimekii*.

Z. Shimekii Pils., THE NAUTILUS, IV, p. 3, May, 1890, Proc. Acad. Nat. Sci. Phila., 1890, p. 297.

This species has been familiar to me for some years, under the name of *Zonites limatulus*. It agrees with that form in the number of

¹ Reprinted by permission from Proc. Acad. Nat. Sci. Phila.

whorls and sculpture, except that the *Shimekii* is more strongly, regularly ribbed above. It differs from *limatulus* in being far more robust, more elevated, with rounder mouth and narrower, deeper umbilicus. Upon comparing specimens of the two species, I am surprised that they were ever confused; for, except in sculpture, the *Z. Shimekii* is far more like *Z. nitidus* than to *Z. limatulus*. The specimens described and figured were collected by Prof. B. Shimek, of Iowa City, Iowa.

This form is interesting as being the only well-defined species of Loess fossil which seems to have become extinct; although there are a number of others, such as *Helicina occulta* and *Patula strigosa* var., which survive in greatly reduced numbers in a few limited localities, or only in a distant part of the country.

This species is rather widely distributed throughout the Loess formation of Iowa and eastern Nebraska. The name is bestowed in memory of the many happy days spent together by Prof. Shimek and the writer, then college classmates, hunting fossils and shells.

Fig. 12, 13, 14, *Helix (Polygyrella) Harfordiana*.

Dædalochila Harfordiana Cooper, Amer. Journ. of Conch., vol. V, pt. 4, 196, plate 17, fig. 8. See also *tom. cit.*, p. 214.

Helix (Dædalochila) Harfordiana Coop., Tryon, Manual of Conchology, 2d Series, vol. III, p. 130, pl. 27, figs. 55-57.

Polygyra Harfordiana Coop., W. G. Binney, Manual of N. A. Land Shells, p. 114, fig. 81, *but not the description!*

Not *Triodopsis Harfordiana* Cp., W. G. Binney, Terr. Moll. U. S. etc., V, p. 309, fig. 203, 1878.

This shell has been so much misunderstood and so incorrectly figured that I feel impelled to refigure it and to offer a few suggestions concerning the systematic position of the species. It was discovered in the year 1869 by Mr. W. G. W. Harford in the "Big Tree" district, Fresno County, California. The locality is an elevated one, lying 6500 ft. above the sea level, in lat. 37°.

In thus devoting space to the consideration of this question of systematic position, I do not wish to be understood to attach any great importance to those divisions of our Helices which some authors call *sections*, some *subgenera*, and still others designate as full fledged *genera*. I am fully aware that many of these divisions coalesce; we can no more trace the separating line between their species than we can unmix mingled milk and water. Thus, the species *Texasiana*, *triodontoides* and *Levettei* bridge the space between

Polygyra and *Triodopsis*; *Mullani*, *appressa*, etc., form passages from *Triodopsis* to *Mesodon*; and through *germana* with its allies on either side, *Mesodon* flows into *Stenotrema*. The recognition of the fact that these sections are all varying manifestations of one type, and that a native American one, lead me to associate them under the oldest name, *Polygyra*, in my check-list of our land shells.¹

So much for the one side. And on this side there is full as much danger in holding extreme views, as on the side of excessive analysis. Let us not profess sweeping views on coalescence of minor groups until we have the species which actually show transition; and (to pass from generalizations to a special case), it may be noted here that while the species of the *Polygyra* + *Triodopsis* + *Mesodon* + *Stenotrema* group, invariably have a reflected lip, the two species belonging (as I claim) to *Polygyrella* have a blunt lip, not in the least expanded or reflexed. I prefer to keep very different things apart.

Dr. Cooper's original description is excellent, but the figures are bad. The latter are copied by Tryon in the Manual of Conchology. Binney described a wholly different shell in his two publications—a shell which has, he states, an expanded lip. In his Manual of American Land Shells the species is said by him to have four whorls and is placed in *Polygyra*. Still later (3rd Supplement to Terr. Moll. V.) Mr. Binney seems to entertain a suspicion that the *Triodopsis Roperi* Pils. (which he places in *Polygyra*!) is the same species. An examination of the type would doubtless have convinced Mr. Binney that it is, as Dr. Cooper states in his original description, most intimately allied to *Polygyrella polygyrella*. Figure 81 of the Manual of American Land Shells is incorrect in showing the parietal tooth too far within the aperture. The original figures have the same defect.

With *Polygyrella polygyrella*, this species agrees in general form, color, sculpture and texture, as well as in the form of the aperture and the *blunt, not at all expanded* lip. In *texture* and character of the lip, both species are very different from *Polygyra* and *Triodopsis*; the species of these last two sections having the lip expanded and reflexed.

The section *Polygyrella* may be defined thus :

Shell disk-shaped, the spire nearly flat, periphery rounded, even in the young; umbilicus wide within, showing all the whorls. Texture somewhat vitreous and subtranslucent; ribbed-striate above,

¹ Proc. Acad. Nat. Sci. Phila., 1889, p. 193.

polished beneath; color yellow, yellowish-green or light brown. Whorls six to eight, narrow, slowly widening, the last a trifle descending in front. Aperture subtriangular, oblique; peristome blunt, not expanded, thickened within, with or without lip teeth; parietal wall bearing a stout, triangular, erect entering tooth.

The species may stand as follows:

(1.) No lip-teeth; body-whorl with several internal pairs of denticles visible through the base. *H. polygyrella.*

(2.) Peristome with two lip-teeth; no denticles inside the body-whorl. *H. Harfordiana.*

Dr. Cooper's ingenious supposition that the internal denticles of *H. polygyrella* are "swallowed" lip teeth I find to be erroneous, as they are formed quite a distance within the whorl, not at the edge of the advancing lip.

H. Harfordiana has been found only at the spot named above, and only two specimens are known; that figured on the plate accompanying this paper, and one other, a young shell, in the collection of Dr. Cooper. The earlier whorls are broken in the type specimen.

ON SOME MARINE MOLLUSKS FROM THE SOUTHERN COAST
OF BRAZIL.

BY DR. W. H. DALL.

In the preliminary report on the mollusca obtained on the voyage of the Albatross around Cape Horn (Proc. U. S. Nat. Mus. XII, No. 773, pp. 219-362, 1889) I enumerated a number of Antillean mollusks which were found to extend their range from the coast of the United States to the eastern shores of Brazil, to the Abrolhos Islands and even further south. Subsequently a few others, also from the Albatross collection, were noted as extending to Brazil, in Bull. 37, U. S. Nat. Museum. Since then I have received from Dr. H. von Ihering, of Porto Allegre, a small collection of very poor, beach-worn material, largely in fragments, but still identifiable, which still further enlarges the range of some of the species, and adds to the list of species some of the common forms of the United States coast which had not before been suspected to reach such southern latitudes. It is probably that the great volume of fresh

water issuing from the Rio La Plata acts as an effective barrier against the more southern extension of shallow water species which may reach to its northern point of entrance; so that we may expect that few, if any, of these northern stragglers will be found south of Montevideo.

In the following list will be found the names of the species received from Dr. von Ihering and a few, not hitherto noted, from the Albatross collection, the whole embracing between fifty and sixty species, a good many of which have not hitherto been identified from the region in question, and two of which appear to be new to science. The northern range of most of the species common to the northern Antilles and to the coast of the United States will be found entered against the name of the species in Bulletin 37 above referred to. In some cases the identity of the species has hitherto been obscured by the southern specimens having been separately named; as in the case of *Tagelus platensis* Orb. which is positively indistinguishable by any character from *T. caribæus*.

The localities are Santa Caterina near San Francisco, in about Lat. 26° S.; Rio Grande do Sul in S. Lat. 32° 30'; and the mouth of the Rio La Plata near Montevideo and Tozitos in about S. Lat. 35°.

- Ostrea virginica* Gmelin var. *puelchana* Orb. Santa Caterina.
O. cristata Born. Santa Caterina.
Placunanomia rudis Brod. Santa Caterina.
Modiola sulcata Lam. Rio Grande do Sul.
Mytilus canaliculus Hanley (edulis of E. A. Smith). Rio Grande do Sul.
Mytilus magellanicus Reeve. Montevideo.
Arca candida Chemnitz. Santa Caterina.
Arca martinii Recluz. Santa Caterina.
Arca imbricata Bruguière. Santa Caterina.
Arca americana Gray. Santa Caterina.
Arca incongrua var. *brasiliensis* Orb. Santa Caterina.
Lucina jamaicensis Lam. Santa Caterina.
Divaricella quadrisulcata Orb. Santa Caterina.
Chama congregata Conrad. Santa Caterina.
Cardium brasiliensis Lam. Santa Caterina.
Cardium muricatum L. Santa Caterina.
Dione circinata Lam. Santa Caterina.
Dione purpurata Lam. (+ *ligula* Anton). Rio Grande do Sul.

- Cytherea rostrata* Koch (+ *tehuelca* Orb.) Santa Caterina.
Anomalocardia macrodon Desh. Santa Caterina.
Tivela mactroides Born. Santa Caterina.
Tivela fulminea (Val.) Philippi. Santa Caterina.
Tivela ventricosa Gray. Rio Grande do Sul.
Eutivela perplexa Stearns, n. s. Off Rio La Plata, 11½ fathoms.
Eutivela iheringi Dall, n. s. Santa Caterina.
Donax rugosus Lam. Rio Grande do Sul.
Donax owenii Gray. Montevideo and Maldonado.
Iphigenia brasiliensis Lam. Santa Caterina.
Tagelus gibbus Spengler (+ *T. platensis* Orb.). Rio Grande do Sul.
Soletellina rufescens Chemn. Santa Caterina.
Sanguinolaria rosea Lam. Santa Caterina.
Tellina versicolor Cozzens. Santa Caterina.
Macoma constricta Bruguière. Santa Caterina.
Mactra brasiliiana Lam. Santa Caterina.
Mactra scalpellum Deshayes. Santa Caterina.
Mactra symmetrica Deshayes. Santa Caterina.
Mactra byronensis Gray. Montevideo.
Mactra? *isabelleana* Orbigny. Santa Caterina.
Mactra alata Lam. Santa Caterina.
Labiosa canaliculata Say. Santa Caterina.
Mesodesma mactroides Deshayes. Rio Grande do Sul.
Pholas campechiensis Gmelin. Santa Caterina.
Barnea costata Linné. Santa Caterina.
Pisania variegata Gray. Santa Caterina.
Murex senegalensis Lam. Santa Caterina.
Purpura hæmastoma Linné. Santa Caterina.
Litorina irrorata Say, var. *columellaris* Orb. Santa Caterina.
? *Paludestrina australis* Orb. Montevideo.
Crepidula aculeata Gmelin. Santa Caterina.
Polynices brunnea Link. Santa Caterina.
Sigaretus maculatus Say. Santa Caterina.
Sigaretus perspectivus Say. Santa Caterina.
Acmæa onychina Gould. Santa Caterina.
Fissurella rosea Gmel. Santa Caterina.
Glyphis cayennensis Lam. Santa Caterina.

NOTE ON PUPA MUSCORUM LINNÆ.

BY H. A. PILSBRY.

There has been considerable discussion regarding the proper name of this species, some authors preferring the name "*marginata* Drap." In all disputed questions regarding Linnean names, we may turn with confidence to Hanley's book "The Shells of Linnæus." Hanley bestowed a vast amount of study on the actual types of Linnæus' own collection. He says of this species:

"*Turbo Muscorum*. This shell (pl. IV, fig. 6) still remains in the collection, is enclosed in a paper inscribed in the hand of Linnæus, and is the sole species in the entire cabinet which at all agrees with the diagnosis. It is a curious edentulus variety of the *Pupa marginata* of Draparnaud, to which species it had been assigned by Nilsson, in his valuable treatise upon the land and fresh-water shells of Sweden, a work especially illustrative of the *Helices* and *Turbines* of the 'Fauna Suecica.' From a sentence in the last mentioned work, 'aperture ovate-acuminata, mucrone obtuso' we are led to imagine that our author was aware of the frequent presence of a denticle in the mouth of the shell, although in the 'Systema' he had termed it edentulous. None of the Linnean examples, however, are provided with a tooth; yet in England, where this *Pupa* is most abundant, it is rarely that we obtain an example which is not thus furnished."

Hanley figures the type shell of Linnæus; and we have, it seems, little excuse for rejecting the name *muscorum* in favor of the later *marginata*. The following tabulation of the varieties of this species I take from a MSS. of T. D. A. Cockerell:

"In the number of teeth or lamellæ in the aperture of the shell, this species presents a beautifully graduated series from none at all to three, as follows:

- a. *edentula* Moq-Tand. No teeth. Colorado, Massachusetts, Europe.
- b. *unidentata* Stabile. One tooth on parietal wall.
- c. *bigranata* Rossm.=*sterri* v. Voith. Two teeth. This form is figured by Binney, Man. Amer. Land Shells, p. 78, fig. 40.
- d. *blandi* Morse. Three teeth, one being on columella.

"*Bigranata* and *blandi* are often considered as species apart from *marginata*, but I think on wholly insufficient grounds."

Mr. Cockerell is not responsible for the name *muscorum* as applied to this shell. The first variety, *edentula* Moq.-Tand., is of course equal to the typical *muscorum*.

NOTES AND EXCHANGES.

The following extract from a letter written to the Ed. by Dr. W. D. Hartman, will be of interest :

"I have just learned through Mr. Rossiter, of the Island of Noumea, that Mr. de Latour and his son (from whom I have received so many new shells from Aura Island, New Hebrides) have been murdered by natives; Mr. Garrett was wont to tell me of the great danger to be encountered by these collectors in these islands from the natives. When he was collecting in some of these islands he was obliged to be a walking arsenal and would never trust a native behind his back for fear of being stabbed and dragged off into the bushes and eaten.

I much regret the loss of de Latour as a collector. The last box he collected was lost in a vessel that was wrecked, and after floating about on the ocean was wafted to shore, and was found and sent to Mr. Rossiter."

Some of the shells contained in this box were figured in Dr. Hartman's last paper in the Proceedings of the Academy of Natural Sciences of Philadelphia.—Ed.

WANTED.—Atlantic and Gulf Coast Shells in exchange for land and fresh-water shells of the Mississippi Valley.—*Elwood Pleas, Dunreith, Indiana.*

We learn that our valued correspondent, Mr. T. D. A. Cockerell, has been appointed Director of the Natural History Museum at Kingston, Jamaica. Mr. Cockerell has many warm friends among the conchological fraternity of America, who will be glad to hear that he has been called to a field so rich for the Naturalist.—*Ed.*

Correspondence invited, with view to exchange of Conchological specimens. Desiderata: Florida, Texas, California and West Indian land shells. Offers: British, European and South African land, fresh-water and marine.—*C. L. Smout, 40 Braybrook Road, Hastings, England.*

POLYGYRA (TRIODOPSIS) MULLANI var. OLNEYÆ.—Shell very much depressed, the spire nearly flat; aperture transversely oval, the upper and basal lips parallel; peristome completely revolute, more curled over than in any other form I have seen; basal lip with a white callus but no tooth; no trace of a tooth on the outer or upper lip; parietal wall having a small tooth. Alt. 6, diam. 13 mill.; oblique alt. of aperture $6\frac{1}{2}$, width $8\frac{1}{2}$ mill., measured outside of peristome. The specimens are from Spokane, Washington, sent by Mrs. Mary P. Olney.—*H. A. P.*

THE CONCHOLOGIST is the title of a new periodical published at Leeds, England. It is issued quarterly and is devoted for the greater part to the mollusks of Great Britain. The second number, just issued, contains the following articles: Note on the locality of *Helix mandarina* Gray, by E. A. Smith; The glacial Period and British non-marine mollusca, H. E. Quilter; The Land and Fresh-water mollusca of Oxfordshire, W. E. Collinge; Adventitious Protection in Fresh-water mollusca, C. Clare Fryer; On the Burrowing Habits of Testacella, C. D. Horsman. *The Conchologist* is edited by Mr. W. E. Collinge, of Leeds, England. We wish it success.

ON SOME NEW * * WEST AMERICAN SHELLS, ETC., by WM. H. DALL. (Proc. U. S. Nat. Mus. 1891, p. 173-191; three plates.) The dredgings of the *Albatross*, as well as a number of West Coast collectors, Mr. J. J. Rivers, Miss Ida M. Shepard, Mrs. M. Burton Williamson and others, have contributed the shells described and illustrated in this paper. The species of *Eupleura*, both East and West, are first discussed and figured. *Nassa californiana* Conr., originally described as a Miocene fossil under the generic name of *Schizopyga* by Conrad, has been found living from Drake's Bay to Cerros Island, 25-65 fms. *Fusus Kobelti* Dall, *F. Harfordi* Stearns, *Trophon triangulatus* Cpr. and *clementia subdiaphana* Cpr. are figured for the first time. *Trophon Cerrosensis*, *Cancellaria Crawfordiana* and *Tellina Idæ*, spp. nov., are figured and described. The paper concludes with brief descriptions of the following: *Buccinum strigillatum*, *taphrium*, *molinia frielei*, *strombella middendorffi*, *fragilis*, *melonis*, *chrysodomusithius*, *periscelidus*, *phænicens*, *eucosmius*, *hypolismus*, *acrosnius*, *halibrectus*, *Trophon scitululus*, *disparilis*, *punctrella* (*galeatea* var. ?) *major*, *solenya johnsoni*, *calyptogena pacifica* (new genus and species of *carditidæ*), *Limopsis vaginatus*. All are West Coast forms, mostly from Alaska. We hope that illustrations

of these will follow shortly. *Trophon triangulatus* is a fine species, resembling "*Chorus*" *Belcheri*, but smaller, without the basal groove and tooth. It has probably escaped the notice of Dr. Dall that *Belcheri* is not a *chorus* at all, the type of that genus being *C. giganteus* Lesson, of Chili, a shell that looks like a big smoothish *monoceros*.—*H. A. P.*

LIST OF N. A. LAND AND FRESH-WATER SHELLS RECEIVED FROM THE U. S. DEPT. OF AGRICULTURE, WITH NOTES AND COMMENTS THEREON by ROBERT E. C. STEARNS. (Proc. U. S. Nat. Mus.) The species noticed in this paper were mainly collected in Texas, Arizona and Wyoming. *Helix humboldtiana* Val., a Mexican species, is added to our fauna, the single specimen being from Altuda, Texas, at an elevation of 5000 ft. Dr. Stearns erroneously places this in the section *Pomatia*; but it by right belongs to the *Arionta* brotherhood, in Fischer's section of *Arionta* called *Odontura*. *H. (Pomatia) aspersa*, the common European edible snail, is in the National Museum from Puebla, Mexico. The members of the Academy of Science's expedition to Mexico also found this shell very abundant around the City of Mexico, doubtless imported, as the species is an excellent traveller and successful emigrant. Dr. Stearns has been able to connect the *Bulimulus Ragsdalei* with *B. dealbatus* by intermediate examples, showing a gradual transition from the strongly ribbed to the smooth form. Under the old name *B. alternatus* are placed as synonyms, *B. schiedcanus*, *B. patriarcha*, *B. mariæ* and *B. mooreanus*. I am quite disposed to accept this arrangement of our *Bulimuli*, and would add at least two of the Mexican so-called *species* to the list of synonyms under *alternatus*. A large number of new localities are quoted for other and well-known species.—*H. A. P.*

THE NAUTILUS.

VOL. V.

SEPTEMBER, 1891.

No. 5.

LIST OF SHELLS COLLECTED ON FAYAL ISLANDS, AZORES; AND
ON MADEIRA ISLANDS; WITH PREFATORY NOTES.

BY WILLIAM H. RUSH, M. D., U. S. NAVY.

While serving as medical officer on board the Pennsylvania Nautical School-Ship *Saratoga* during the practice cruises of the year 1890 and the Spring of 1891, advantage was taken of the opportunities thus presented to collect any molluskan forms of animal life that by a little trouble and some searching could be found. No special outfit was provided other than the usual collecting box, with its forceps and knife, and the rake. Surface towing nets, made of the common bobinet, were used when sailing to collect the pelagic forms. Two dredges were kindly loaned by the Smithsonian Institution but no opportunity presented for their use.

During the cruises of the Summer of 1890, stops were made at Horta, Fayal Is. Azores; at Southampton, England, where no attempt at collecting was made although a few *H. (Trichia) rufescens* Pennant were taken at Netley Castle; and at Funchal, Madeira.

During the stay at Horta two trips were made to the small fresh water pond in the extinct crater in the mountains, for the purpose of procuring a supply of *Pisidium Dabneyi* De Guerne; but not a single specimen rewarded the visits. The journeys were made on the back of a small donkey, which knowing animal, as soon as the higher parts of the mountains were reached, selected the deep ruts in which to walk, often leaving the rider, unless with special attention upon his part, stranded; and the pleasures of the journey were not materially increased by the community of fleas inhabiting the hang-

ings and cushions of the saddle. To reach the edge of the crater it took four hours; the donkey with the guide, and his yelling companions, were then left to amuse themselves while the descent into the crater was made.

The crater is said to be seventeen hundred feet deep, and its sides are very steep so that the actual time of descent was quite small, but the amount of time, patience, wear and tear consumed in coming up was considerable.

At Funchal, Madeira, the ascent to the mountains was made in a vehicle upon runners and drawn by oxen over roads laid with very small paving stones and often in patterns of ornamental designs. Upon arrival at the desired elevation, the oxen were detached, allowed leisurely to make their way down, and the vehicle was pulled to one side of the road to await the time for making the return trip. That time having arrived the sledge is pulled into position, a man, holding the steering rope attached to the fore corner, stood upon each side, and then, with a shout, a push and a little confusion of the respiratory rhythm, away the whole affair goes amidst a great scattering of sparks, clouds of dust and a confusion of noises; but in an incredibly short time the trip was made that previously had taken the oxen a couple of hours to do.

List of Species Collected.

1. *Argonanta argo* L. A living specimen kindly presented by Mr. Dabney, Consul at Horta, Fayal Is.
2. *Purpura* (*Stramonita*) *hæmastoma* L.
3. *Triton nodiferus* Lam. Two living specimens.
4. *Ranella* (*Lampas*) *scrobiculator* Linn. One dead.
5. *Fusus rostratus* Oliv. Dredged in 800 fms. near Graciosa Is. by the yacht *L'Hirondelle*, Duke of Monaco, kindness Mr. Dabney.
6. *Nassa* (*Hima*) *incrassata* Ström.
7. *Mitra fusca* Swainson. Is smaller but agrees in internal and external coloration with the specimen labelled *M. Adansonii* Phil., in *Phila. Acad. Nat. Sciences*.
8. *Olivella nivea* Gmel. Pico Is.
9. *Columbella mercatoria* Linn.
10. *Columbella* (*Nitidella*) *lævigata* Linn. Pico Is.
11. *Trivia pediculus* Linn. Pico Is.
12. *Bittium reticulatum* Da Costa. Pico Is.

13. *Littorina* (*Melaraphe*) *striata* King.
14. *Littorina* (*Melaraphe*) *cærulescens* Lam.
15. *Fossarus ambiguus* Linn.
16. *Rissoa* (*Cingula*) *cingulus* Mtg.
17. *Leptothyra carinata* Cantr., var. *peloritana* Cantr. 800 fms., near Graciosa Is.
18. *Monodonta sauciata* Koch. Madeira Is.
19. *Haliotis coccinea* Rve.
20. *Patella vulgata* Linn. Horta and Funchal.
21. *Patella Azorica* Linn. Horta and Funchal.
22. *Bulla striata* Brüg. Pico Is.
23. *Hyalinia* (*Polita*) *cellaria* Müll. Horta and Funchal.
24. *Hyalinia* (*Polita*) *crystallina* Müll. Horta and Funchal.
25. *Hyalinia* (*Polita*) *atlantica* Müll. Horta and Funchal.
26. *Helix* (*Patula*) *rotundata* Müll.
27. *Helix* (*Acanthinula*) *monas* Morelet.
28. *Helix* (*Caracolina*) *barbula* Charp.
29. *Helix* (*Vallonia*) *pulchella* Müll. Horta and Funchal.
30. *Helix* (*Placentula*) *fictilis* Lowe. Funchal.
31. *Helix* (*Placentula*) *vespertina* Morelet.
32. *Helix* (*Plebecula*) *nitidiuscula* Sby. In the public garden at Funchal.
33. *Helix* (*Leptaxis*) *undata* Lowe. Funchal.
34. *Helix* (*Leptaxis*) *Drouetiana* Morelet.
35. *Helix* (*Leptaxis*) *Azorica* Alb. Young specimens.
36. *Helix* (*Pomatia*) *aspersa* Müller.
37. *Helix* (*Cochlicella*) *ventricosa* Drap.
38. *Buliminus* (*Ena*) *vulgaris* Morelet.
39. *Buliminus* (*Ena*) *Hartungi* Morelet.
40. *Buliminus* (*Ena*) *delibutus* Morelet.
41. *Buliminus* sp.
42. *Cionella* (*Zua*) *lubricus* Müll. Horta and Funchal.
43. Pupa (*Leucochila*) *fuscidula* M. & D.
44. Pupa (*Leucochila*) *microspora* Lowe.
45. Pupa (*Leucochila*) *fasciolata* M. & D.
46. Pupa (*Leucochila*) *umbilicata* Drap. Horta and Funchal.
47. *Balea perversa* L.
48. *Pedipes afra* Gmel.
49. *Dentalium* sp. 800 fms. L'Hirondelle.
50. *Strigilla carnaria* Linn. Pico. Two odd valves.

51. *Psidium Dabneyi* De Guerne. Kindness Mr. Dabney.

52. *Pinna rudis* L.

Where no locality is mentioned in the list, Horta, Fayal Islands, Azores, is to be understood.

NOTES ON FAMILIAR MOLLUSKS.

BY W. M. BEAUCHAMP.

It is the custom to call *Melantho rufus* Hald., a variety of *M. decisus* Say, and there are some good reasons for this. It is more than a mere color variety, however, as those familiar with its habits know very well. The shell is usually grayer and more polished without, besides the rich purple within. It requires warmer water than *M. decisus*, and in New York is restricted to favorable localities, while the other has a very wide range. Those who have taken the animal from the shell, find that it has a greater muscular adhesion, not separating readily. The young mollusks have well marked features from the very first. Thus far in New York, I have found the shell only where canal boats have been.

Some have also thought *Valvata tricarinata* and *sincera* Say, varieties of one species. There is little to suggest this in the forms or habits of these little shells. The outer appearance is very different, they have not the same haunts, nor do they eat the same food. If they are ever found together, it is in death rather than in life, as far as my experience goes.

Bythinia tentaculata Linn, has become very abundant since I first reported it many years ago. In portions of the Erie Canal it has driven out *Goniobasis livescens* and *Virginica*, merely by eating up their food. It prefers canal waters to any other, as many species do.

In the Erie Canal I collected *Pleurocera subulare* Lea, but with this I found *P. intensum* and *pallidum*, of the same author, which seem only varieties of the former. Mr. Tryon agreed with me in this. The variations are by no means as great as in *Gon. Virginica* Gmel.; in fact there seems little difference beyond the color and markings.

I have had *Margaritana margaritifera* Linn from tributaries of the Mohawk river, but nowhere west of these in New York. It is

likely to occur elsewhere, as the *Unionidae* are not the worst of travellers. I once found a number of *Anodonta Benedicti*, which had been thrown ashore by the waves on Onondaga lake, raising themselves on edge and working their way to the water. Can any one point out an invariable feature distinguishing *Unio radiatus* and *luteolus*? The distinctions do very well for some, but others seem a good deal mixed. Has not every collector some which he has not named?

Shells are not abundant in Colorado, and I took pleasure in showing the actions of *Helix Cooperi* W. G. B. to some there who had never seen a snail. This snail is abundant in Williams' Cañon, near Manitou, but I found it nowhere else, perhaps for want of time. In Cheyenne Cañon I collected some very small snails, which I unfortunately lost before identification. Conditions there are seldom favorable but something might be done by a zealous naturalist. For myself I confess that other things proved more attractive for the time. In the East, rocks are better collecting grounds, which reminds me how greatly *Helix albolabris*, on rocky islands, differs from the same shell in more fertile lands.

A NOTE ON MR. PILSBRY'S "ARTICLE IV."

BY T. D. A. COCKERELL, INSTITUTE OF JAMAICA,
KINGSTON, JAMAICA.

It is very unfortunate that so much discussion should seem necessary about *Limacella* or *Philomyces*, but I am obliged to add still a few remarks to remove what seems to be a slight misunderstanding. (1) *Limacella* Brard. My slug notes are not just now at hand, but I think I may safely assert that when *Limacella* was proposed in 1815, the *Limax* of modern authors was *not* specially provided with a name. The Linnean *Limax* included *Arion*, *Limax*, *Agriolimax* and even an *Eolis*. The first mentioned species in the Linnean *Limax* is what we now call an *Arion* (*A. ater*). Brard's first *Limacella*, I believe was *Limax maximus* of modern authors. Thus, if we were to adopt a very strict rule of priority, we might write as follows:

Limax Linn. (= *Arion* Fér.)

Limacella Brard (= *Limax* Auctt.)

As indeed was done by Dr. Jousseume. But Linné did not specify *types* in his genera, and there are good reasons for believing that he did not regard the first mentioned species specially as the type. Accordingly, Férusac having next proposed *Arion* for another division of *Limax* L., we may adopt his name, and the residue (leaving out *Eolis*, the true affinities of which had been recognized meanwhile) namely *Agriolimax* of modern authors, remains as *Limax* L. Thus we get :

Limax L. = *Agriolimax* Mörch.

Arion Fér.

Limacella Brard = *Limax* Auett.

I do not adopt this arrangement, because I do not consider that we can recognize Brard's name, but this is the logical result if *Limacella* Brard be adopted.

(2). *Philomyces* (or *Limacella*) *nebulosus*. It is hardly fair to say that I give no characters for this, as I expressly state that it is the *T. carolinensis* of Binney, the anatomy, jaw, and other characters of which are well described in the *Terr. Moll. U. S.* I believe still that it is distinct from true *carolinensis*, but I rejoice that Mr. Pilsbry is going to make a more careful study of these slugs, and if he finds after examining ample material that I was mistaken, nobody will more readily accept the fact than myself.

MOLLUSKS OF SAN FRANCISCO COUNTY.

BY WILLIARD M. WOOD, OF SAN FRANCISCO, CAL., AND WM. T.
RAYMOND, OF OAKLAND, CAL.

The following species have been collected by ourselves, with the exception of *Alexia myosotis*, *Limnæa nuttalliana*, *obrussa*, *Physa diaphana*, *Planorbis ammon* and *Ancylus fragilis*, which are given on the excellent authority of Dr. Cooper and others. While the list is undoubtedly incomplete, we believe it indicates fairly well the molluscan fauna of this County. There is no evidence that *Cantarus gemmatus* and *Scala grænlandica* have been found living here. Their occurrence on our beaches is probably accidental.

PELECYPODA.

- Ostrea lurida* Cpr.
Placunanomia macroschisma Desh.
Pecten hastatus Sby. (valves).
Hinnites giganteus Gray (valves).
Mytilus edulis Linn.
Mytilus edulis Linn., var. *glomeratus* Gld.
Mytilus Californianus Conr.
Adula stylina Cpr.
Anodonta Oregonensis Lea (*Nuttalliana* Lea).
Kellia Laperousii Desh.
Cardium corbis Mart.
Pisidium occidentale Newc. (*abditium* Hald.)
Tapes staminea Conr.
Tapes staminea, var. *diversa* Sby.
Tapes staminea, var. *runderata* Desh.
Tapes tenerrima Cpr.
Petricola carditoides Conr.
Tellina Bodegensis Hds. (valves).
Saxidomus aratus Gld.
Macoma nasuta Conr.
Matoma inquinata Conr.
Macoma inconspicua B. & S. (valves).
Angulus modestus Cpr. (valves).
Angulus salmonea Cpr. (valves).
Schizothærus Nuttallii Conr.
Standella Californica Conr. (valves).
Lyonsia Californica Conr.
Lyonsia (Entodesma) saxicola Baird.
Cryptomya Californica Conr.
Mya arenaria Linn. (introduced).
Saxicava arctica Linn. (? *pholadis* L.)
Siliqua patula Dixon.
Pholadidea penita Conr.
Pholadidea penita var. *parva* Tryon.
Zirphæa crispata Linn. (valves).
Xylotrya setacea Tryon (*pennatifera* Blv.)

GASTROPODA.

A. pulmonata.

Selenites Vancouverensis Lea.

Limax campestris L. var. occidentalis Cooper.

Limax campestris L. var. zonatipes Ckll. (MS) new variety.

Limax Hewstoni Cooper.

Zonites cellarius Müll. (introduced).

Ariolimax Californicus Cooper.

Punctum conspectum Bland.

Helix Californiensis Lea.

Var. Nickliniana Lea, (also albino form).

Helix arrosa Gld. (Common in Marin county).

Helix armigerus Ancey.

Helix loricata Gld.

Pupa Californica Rowell.

Succinea Oregonensis Lea.

Alexia myosotis Drap. (introduced).

Limnæa palustris Müll.

Limnæa palustris var. proxima Lea.

Limnæa palustris var. Nuttalliana L.

Limnæa palustris var. Rowellii Tryon.

Limnæa palustris var. umbrosa Say.

Limnæa palustris var. Traskii Tryon.

Limnæa Adelinae Tryon.

Limnæa humilis Say.

Limnæa humilis var. ferruginea Hald.

Limnæa obrussa Say (desidiosa Say).

Limnæa bombycina Lunge (introduced).

Physa Gabbi Tryon.

Physa Gabbi var. D'Orbignyana Lea.

Physa Gabbi var. Traskii Lea.

Physa diaphana Tryon.

Physa virginea Gld.

Planorbis tumens Cpr.

Planorbis ammon Gld.

Planorbis opereularis Gld.

Planorbis vermicularis Gld.

Ancylus fragilis Tryon.

B. Ctenobranchiata.

- Pleurotoma Carpenteriana* Gabb. (fragment).
Olivella biplicata Sby. (dead).
Cantharus gemmatus Rve. (one only dead).
Nassa fossata Gld.
Nassa mendica Gld.
Columbella (Amycla) carinata Hds.
Columbella (Amycla) carinata, var. *gausipata* Gld.
Ocenebra lurida Midd.
Ocenebra interfossa Cpr.
Cerostoma foliatum Gmel.
Purpura saxicola Val.
Purpura saxicola, var. *ostrina* Gld.
Purpura saxicola, var. *emarginata* Desh.
Purpura lima Mart. (*canaliculata* Desh.)
Purpura crispata Chem., var. *septentrionalis* Rve.
Monoceros engonatum Conr.
Scala crebricostata Cpr.
Scala grænlandica Perry. (one only, dead).
Odostomia gravaida Gld.
Litorina planaxis Nutt.
Litorina scutulata Gld.
Lacuna porrecta Cpr.
Lacuna unifasciata Cpr.
Pomatiopsis intermedia Tryon.
Assiminea Californica Cooper.
Crepidula navicelloides Nutt.
Lunatia Lewisii Gld. (dead).
Acmæa mitra Esch.
Acmæa pelta Esch.
Acmæa persona Esch.
Acmæa persona, var. *umbonata* Nutt.
Acmæa testudinalis L., var. *patina* Esch.
Acmæa testudinalis var. *scutum* Esch.
Acmæa testudinalis var. *Cumingii* Rve.
Acmæa spectrum Nutt.
Chlorostoma funebre A. Ad.
Calliostoma canaliculatum Mart. (dead).
Glyphis aspera Esch.
Fissurella volcano Rve. (dead).

POLYPLACOPHORA.

- Chætopleura Hartwegii Cpr.
 Tonicella lineata Wood.
 Ischnochiton Cooperi Cpr.
 Mopalia ciliata Sby.
 Mopalia ciliata, sub-species lignosa Gld.
 Mopalia ciliata, sub-species Hindsii Sby.
 Mopalia wossnessenskii Midd.
 Katherina tunicata Wood.
 Nuttallina scabra Rve.
 Cryptochiton stelleri Midd. (young).

 MOLLUSKS IN THE PORTLAND, OREGON, MARKET.

 BY HARRY E. DORE.

Prof. Keep's article in the January number of THE NAUTILUS on the Mollusks in the San Francisco market interested me very much as it was in direct line with observations and notes made by me here in Portland a little more than a year ago.

The small number of species which are usually exposed for sale is as noticeable here as it is in San Francisco though not so much to be wondered at for we are 120 miles from the ocean and further still from points where the mollusks are to be found, but I find that occasionally something out of the ordinary run is sent to the fish dealers, as for instance: about three years ago the deep sea fisheries were first attempted and the schooner "Geo. H. Chance" started outside the Columbia River Bar from Astoria for fish. Through lack of experience the nets were thrown too deep and were badly cut by the large pectens, *Amusium caurinum* Gld. allowing many of the fish to escape. In the first shipment to Portland were about two dozen large fine examples of this beauty, nearly all of which I was fortunate enough to secure at a moderate price. I have never seen it in the market since. At another time I secured one very large and perfect example of *Lunatia Lewisii* Gld. sent with bivalves to the market.

In this connection I will state that I remember when a boy and living in San Francisco that *Macoma nasuta* Conr. was commonly sold in the market; it was very abundant on the mud flats near Long

Bridge in Mission Creek at that time. It is probably not sold there now or Prof. Keep would have included it in his list.

There are practically but four species of mollusks sold commonly in the Portland fish markets:

1st. The native oyster, *Ostrea lurida* Cpr. which is so abundant on Puget Sound and Shoal Water Bay. Nearly all of the oysters sold come from either Olympia, Wash. or Oysterville, on Shoalwater Bay, Wash. The few eastern or transplanted oysters sold here are shipped from San Francisco. There are also a great many canned oysters sold here.

2d. The hard shell clam has an excellent representative in *Saxidomus squalidus* Desh., which may prove to be merely a variety of *S. nuttalli* Conr. These come from Puget Sound and are very abundant, have a large, heavy shell and can be found at all times in the fish markets. They are cheap enough to be indulged in by all, selling for one cent apiece or even less.

3d. *Tapes staminea* Conr. is also very common. The variety sent here is larger and fuller than the variety usually sold in San Francisco but not as finely sculptured.

4th. *Mya arenaria* Linn. as well as *Tapes staminea* are sent here from Shoal Water Bay, Wash. It was introduced here from the Eastern States and grows to a very large size.

By the above it would seem that Portland depends upon her neighboring state for her supply of shell fish. There is, however, a source of supply in Oregon which will become better known and its shell fish product more eagerly sought for in the near future—this is Yuquina Bay. Occasionally there are shipped to Portland a few sacks of *Ostrea lurida* and several boxes of the rock oyster, *Pholadidea penita* Conr. Newport, at the entrance to the bay, is the home of this fine piddock which attains large size and is excellent for eating.

Machæra patula Dixon and *Cardium corbis* Mart. are also occasionally offered for sale in the Portland markets; and the Chinese eat the squid which is sometimes shipped here.

The edible mussel, *Mytilus edulis* Linn. seldom finds its way so far inland; but still we seem to have our share of mollusks.

[CONTRIBUTED.]

AMERICAN ASSOCIATION OF CONCHOLOGISTS.

SEPTEMBER 9, 1891.

Though the usual notes have not appeared for some time in the NAUTILUS, the work of the Association goes on. Judging from the correspondence received, there has been much activity among the members during the last summer and much valuable material has been collected. Quite a number of new members have been enrolled, and the new "List of Members," which will contain all their names, will be ready not later than September 30th and probably by September 20th. If there are any new names to be proposed send them to the Secretary.

Two of our members, Chas. W. Johnson, Secretary of the Association, and Wm. J. Fox, brought back with them from their Jamaica trip last spring a large amount of valuable material, collected by them in that island. Most of it has been presented to the Academy of Natural Sciences and the Wagner Institute, Philadelphia.

Prof. Benjamin Sharp, Corresponding Secretary of the Academy of Natural Sciences, was a member of the Peary Expedition to Greenland. He returned home on the 7th inst.

George T. Marston, Green Bay, Wis., recently paid a visit to Philadelphia and inspected the U. S. Collection. He expressed himself as much pleased with its progress. He has been on vacation for the benefit of his health.

President Campbell paid a flying trip to Washington in the early part of August and was the recipient of much courtesy from Professor Dall, of the Smithsonian Institute. Prof. Dall is up to his eyes in work, and is one of the busiest of our members. A painstaking, conscientious student, he does everything well and stands among the foremost of living conchologists to-day. The Government is fortunate in having such a man at the head of its conchological work.

Vice-President Ford has been summering along the New Jersey Coast and discovered several "finds" of living Naticas, Fulgurs, Solens, etc. He got tired collecting them, the specimens were so numerous. There is no man in the United States, who can clean, prepare and mount shells as beautifully as Mr. Ford. His private collection, a labor of love for more than thirty years, is one of the finest in the country.

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MOLLUSKS OF SPOON RIVER, ILL.

BY DR. W. S. STRODE, BERNADOTTE, ILL.

Spoon river is a tributary of the Illinois. For a hundred miles from its junction with that stream its average width is about one hundred and fifty feet. It is a clear, swift-running stream, pursuing a sinuous course through a valley a half mile wide. Its banks are fringed by willows that here and there sweep the current in rhythmical response to every passing breeze. Overshadowing this border are silver-leaved maples, elms, and intertwining undergrowth, and beyond, towering above all like gigantic sentinels, stand the monarchs of the forest—giant sycamores.

No systematic study of the mollusks of this river has ever been made. Prof. Jno. Wolf, an aged naturalist of Canton, Ill., has made some researches, and probably knows more of the mollusks of the Illinois and Spoon Rivers than does any other living man, but he has written little of his discoveries.

Some of the Unios found, attain a size and perfection of form rarely equalled by shells of the same species found elsewhere. This perfection is due to the fact that each species finds in the variety of deep and shallow water, swift and sluggish currents, deposits of black mud, blue clay, sand, rock, and gravel, or a mixture of all these, the environment most suitable for perfect development.

Specimens of *U. multiplicatus* have been found over eight inches in length, and weighing three pounds. *Margaritana complanata* also

grows very large, one specimen found two years ago being nine inches long.

A half a mile below the milldam at Bernadotte there is a noted mussel bed where for many years the fishermen have resorted for bait for their trout lines; here in a few minutes an ample supply of big fat mussels was to be had, and a catch of the toothsome channel cat assured. If an eel was desired the red meat of a *trigonus* was thought to be almost a sure means of luring the slippery *Anguillidæ*. Here within a space of two feet square I have taken at one time such species as *Unio plicatus*, *ventricosus gibbosus*, *asperrimus*, *pustulosus*, *tuberculatus*, *anodontoides*, and *Marg. rugosa*. A little higher up in deeper water and muddier banks *U. multiplicatus*, and *Marg. complanata* were plentiful. A little lower down, where there was much sand, the *U. occidentalis* and *anodontoides* could be found by tracing the path made by them in moving about. A half mile further down stream are great ledges of rocks that in places project far out over the water. This is a favorite resort for pic-nics, fishing parties, and experts at throwing the gig or fish-spear can sometimes obtain fine buffalo or catfish that are disporting under the shadows of these immense rocks.

At this picturesque point are to be found in considerable numbers, *U. trigonus*, *gracilis*, *pustulosus*, *tuberculatus*, and *levissimus*. The latter, up to date, I have not succeeded in finding in any other location on the river.

Above the dam, where the water for a distance of five miles is from eight to fourteen feet deep, the *Ano. grandis* and the little *U. parvus* are the main shells. Here also are to be found many *Sphaerium solidulum*, and *Paludina integra*. The *Physa heterostropha* and *Somatogyrus subglobosus* I find below in more shallow water.

On a large moss-covered rock I found at one time last fall large numbers of *Pleurocera Lewisii*, and in a few minutes gathered an oyster-can full. Visiting the locality again a few days later not one could I find, nor could I again locate them during the season.

The pearl craze struck this village last fall and wagon loads of the larger species were carried ashore and eagerly opened with the expectation of finding pearls that would at once enrich the possessor. The mussel bed before mentioned was almost annihilated. The final summing up showed about one hundred pearls of various sizes and colors. These were sent to Geo. F. Kunz, gem expert with Tiffany & Co., N. Y., who reported them of little or no value.

I append a list of the mollusks that I have found to date.

Unio multiplicatus Lea.
plicatus LeS.
anodontoides Lea.
rectus Lam.
gracilis Barnes.
alatus Say.
pustulosus Lea.
tuberculatus Barnes.
metanevrus Raf.
trigonus Lea.
coccineus Lea.
fragosus Cond.
verrucosus Barnes.
parvus Barnes.
occidens Lea.
gibbosus Barnes.
laevissimus Lea.
asperrimus Lea.

Unio ventricosus Barnes.
luteslus Lam.
ligamentinus Lam.
lacrymosus Lea.
cornutus Barnes.
elegans Lea.
zigzag Lea.
Marg. rugosa Barnes.
complanata Barnes.
Anodonta grandis Say.
edentula Say.
plana Lea.
Paludina integra Say.
Physa heterostropha Say.
Somatogyrus subglobosus Say.
Sphærium solidulum Prime.
Pleurocera lewisii Lea.

LOCAL VARIATION.

BY REV. HENRY W. WINKLEY.

A good title for nature would be "Unity differentiated," and the words may be used not only of the whole, but of any part. Take as examples, the cell with its modifications, the class mollusca and its species, (an excellent comment on the variations as contributed by Mr. Chas. T. Simpson, to the February NAUTILUS and reminds the writer of a few which are noted below.)

A large continent is a grand field for the evolution of many varieties. Yet small areas often afford excellent examples of local variation. I mention a few as seen in this State.

Examples of *Fusus Islandicus* Gmel., from Eastport, Old Orchard or the Sheepscoote now are before me. Specimens with about the same number of whorls vary greatly in size, being 3; 3½, and 1½ inches respectively. The color variations are also marked.

At Eastport numerous specimens of *Chiton marmoreus* Fabr. are found. In the midst of two hundred individuals distinctly marked with shades of red, one specimen was found whose color was a clear blue, a striking contrast in a species where there is much similarity.

Buccinum undatum Linn. is famous for its color variations. Its form is strikingly modified. Two specimens before me have the following characters. Length $2\frac{1}{2}$, divergence 75° , and length 4 inches, divergence 50° . They are from near Eastport and Old Orchard respectively. The deep water specimens near Old Orchard are apt to be elongated. At the northern end of Grand Manan, (near Eastport) a variety occurs which has no waves, and is thus deprived of the very characteristic which gives the name *undatum* to the species.

Purpura lapillus Lamarck, is also famous for its variation in color; black, white and orange may be found, with multitudes of mixtures. The variation in thickness is conspicuous. As a rule this may be explained by its surroundings. Individuals on the open coast, exposed to the surf, are thick shelled, and in sheltered bays a thin shell suffices. I was much puzzled last summer to find them extremely thick at a point ten miles from the sea on the Sheepscote river. The situation being most sheltered I could not account for this extra strength. There is a possible explanation in the climate. The temperature at the sea shore is very much warmer than ten miles inland. Perhaps there is a protection against the cold in this case, where the surf is certainly not responsible.

The fauna of the Sheepscote river has an unusual combination. As mentioned in a previous article, oysters are found living at a point some fifteen miles inland. There are representations of a more southern fauna a few miles nearer the sea, *Pecten tenuicostatus* Mighels & Adams is very abundant. To return to the example mentioned, *i. e.* *Purpura lapillus* and its dwelling place, we may observe another variation. The removal of a long pile from the bridge gave me a chance to examine the mollusca attached to it. *Mytilus edulis*, Linn. was conspicuous, also *Saxicava* and others. Those living in the deep water were delicate in color and texture, resembling forms found in warm water. Directly over these, between tide marks, occur specimens, as above noted, of extremely thick shells. These are but chance examples to illustrate a variation which is as great as that seen in the human race. Could we perfect our knowledge of the lower forms we could name them as

individuals as we do men, and feel that each had some marks even though slight, to distinguish him from his companions.

LIST OF SPECIES COLLECTED ON THE ISLANDS ST. THOMAS, ST. KITTS, BARBADOS, JAMAICA, AND AT PENSACOLA, FLORIDA ; WITH PREFATORY NOTES.

BY WILLIAM H. RUSH, M. D., U. S. N.

The first four months of 1891 were spent by the Pennsylvania School Ship *Saratoga* in cruising in the West Indies, the stops being at Bridgetown, Barbados ; at Basseterre, St. Christopher's Island ; at Charlotte-Amalia ; at Kingston, Jamaica, and at Pensacola, Fla. At Bridgetown, St. Leonard's Church-yard and St. Agnes' Cemetery were the chief resorts. In the former were seen many specimens of *Bulimus oblongus*, Müll, all buried, to within a whorl or two of the apex, in the damp ground next to the vaults and under the roots of trees. They appear to be night prowlers as the sexton stated that he had often observed them walking at night, especially when moonlight. Their eggs were discovered around the roots of trees upon the surface of the ground, but none were found buried with the animal in the burrow in the earth.

In the latter cemetery were taken specimens of *Helix*, *Streptaxis*, *Stenogyra* and *Bulimulus*.

A narrow-gauge railroad crosses the island from Bridgetown to the eastern coast and advantage was taken of it to make a trip to Bathsheba Beach.

At all the other islands carriage hire was too expensive and the time at my disposal too short for any extended trip, so footing it was resorted to as the only way to reach reasonably near hunting grounds. In this manner the deep gorges up in the mountains of St. Kitts, at an elevation of one or two thousand feet, were visited, and the delightful view from that elevation, the cool continuous trade wind, and the beautiful forms of vegetation almost caused the object of the journey to be forgotten. However, many specimens of *Bulimulus*, *Helicina*, *Helix* and *Amphibulima* were taken.

On Jamaica, Long Mt. and Rockfort, both near Kingston, were visited at the suggestion of Mr. Henry Vendryes. At Mona House,

Long Mt., thousands of dead specimens of the genera *Helix*, *Cylindrella*, *Cyclotus*, *Choanopoma*, etc. were observed, but only a few living *Lucidella aureola* Fér., were found. At Rockfort *Orthalius undatus* Beck were seen aestivating and a supply obtained, each *epiphragm* being carefully preserved.

At Pensacola two cemeteries were visited. In the older one *Helix* (*Dædalochila*) *pustula* Fér., were tolerably abundant, and a few *Hyalinia*. In the newer one *Helix* (*Mesodon*) *jejuna* Say, var. *Mobiliana* Lea, were seen in great numbers. As the soil is very sandy and as it had rained the night before, each shell was covered with a small heap of sand. They were found on the head and foot stones and on posts. They had crawled up from one to two feet from the ground.

The following are the lists for the regions visited :

West Indian Islands.

Where no locality is mentioned it is to be understood that the specimens were found equally abundant at Barbados, St. Kitts and St. Thomas. No marine forms were collected at Kingston, Jamaica.

1. *Hyalæa limbata* D'Orb. Surface N. Atlantic Ocean.
2. *Hyalæa gibbosa* Rang. Surface N. Atlantic Ocean.
3. *Cleodora pyramidata* D'Orb. Surface N. Atlantic Ocean.
4. *Styliola subula* Quoy and Gaimard. Surface N. Atlantic Ocean.
5. *Styliola*, (*Hyalocylix*) *striata* Rang. Surface N. Atlantic Ocean.
6. *Cuvieria columella* Rang. Surface N. Atlantic Ocean.
7. *Murex* (*Chicoreus*) *brevifrons* Lam. St. Thomas.
8. *Murex* (*Chicoreus*) *pomum* Gmel. St. Thomas.
9. *Purpura patula* Linn.
10. *Purpura hæmastoma* Linn.
11. *Purpura undato* Lam.
12. *Purpura deltoidea* Lam.
13. *Ricinula* (*Sistrum*) *nodulosa* Ad. St. Thomas.
14. *Triton nobilis* Conrad. Purchased at St. Thomas.
15. *Triton* (*Simpulum*) *pilearis* Linn. St. Thomas.
16. *Fasciolaria tulipa* Linn.
17. *Fasciolaria distans* Lam.
18. *Leucozonia cingulifera* Lam. Bathsheba.
19. *Cantharus Coromandelianus* Lam. Bathsheba.

20. *Phos Guadeloupensis* Petit. St. Thomas.
21. *Nassa, vibex* Say. St. Thomas.
22. *Mitra Barbadosis* Gmelin. St. Thomas.
23. *Olivella* sp. St. Thomas.
24. *Columbella mercatoria* Linn. St. Thomas.
25. *Columbella* (*Nitidella*) *lævigata* Linn.
26. *Columbella* (*Nitidella*) *cribaria* Lam. St. Kitts.
27. *Columbella* sp. Barbados.
28. *Conus mus* Hwass. Barbados.
29. *Pleurotoma* (*Drillia*) *fuscescens* Gray. Barbados. Semi-fossil.
30. *Strombus pugilus* Linn. Purchased at St. Thomas.
31. *Strombus gallus* Linn. Purchased at Barbados.
32. *Cassis flammea* Linn. Purchased at Barbados.
33. *Cypræassis testiculus* Linn. Barbados.
34. *Vermetus varians* D'Orb. St. Thomas.
35. *Eulima Jamaicensis* C. B. Ad. St. Thomas.
36. *Littorina nodulosus* Gmel.
37. *Littorina muricatus* Linn.
38. *Littorina ziczac* Chem.
39. *Littorina meleagus* Beck. St. Thomas.
40. *Littorina* sp. Barbados.
41. *Modulus lenticularis* Chem. St. Thomas.
42. *Planaxis lineatus* Da Costa.
43. *Planaxis nucleus* Lam.
44. *Litiopa bombyx* Rang. On gulf-weed, N. Atlantic Ocean.
45. *Cerithium* (*Lampanella*) *minus* Gmel.
46. *Cerithium* (*Lampanella*) *minus vas se temstriatum* Say.
47. *Cerithium* (*Lampanella*) *atratum* Born. St. Thomas.
48. *Rissoina* (*Schwartziella*) *Chesnelii* Mich. St. Thomas.
49. *Rissoina* sp. St. Thomas.
50. *Choanopoma interruptum* Lam. Two dead and badly weather-worn specimens, Long Mt.
51. *Tudora fecunda* Ad. All dead, from Long Mt.
52. *Cyclotus Jamaicensis* Ch. All dead, from Long Mt.
53. *Helicina* sp. St. Kitts.
54. *Helicina Antillarum* Sby. St. Kitts.
55. *Helicina induta* Shuttl. St. Thomas.
56. *Helicina convexa* Pfr. Bridgetown.
57. *Lucidella aureola* Fér. Long Mt.
58. *Nerita fulgurans* Gmel.

59. *Nerita tessellata* Gmel.
60. *Nerita peloronta* Linn.
61. *Nerita versicolor* Gmel.
62. *Neritina virginea* Linn. St. Thomas.
63. *Phasianella (Tricolia) umbilicata* D'Orb. St. Thomas.
64. *Astralium (Lithpoma) tuber* Linn.
65. *Astralium brevispina* Lam. St. Thomas.
66. *Livona pica* Linn.
67. *Chlorostoma maculostriatum* C. B. Ad. St. Thomas.
68. *Chlorostoma scalare* Anton. St. Kitts.
69. *Chlorostoma fasciatum* Born. St. Kitts.
70. *Chlorostoma excavatum* Lam.
71. *Chlorostoma* sp. St. Kitts.
72. *Fissurella (Cremides) nimbose* Linn.
73. *Fissurella (Cremides) nodosa* Bom.
74. *Fissurella (Cremides) barbadensis* Gmel.
75. *Glyphis listeri* d'Orb. St. Thomas.
76. *Glyphis alternata* Say.
77. *Submarginula octoradiata* Gmel. St. Thomas.
78. *Acmæa cubensis* Rve. Barbados.
79. *Acmæa candeana* d'orb. St. Kitts.
80. *Acmæa punctulata* Lam. St. Thomas.
81. *Lepidopleurus pectinatus* Say. Barbados.
82. *Lepidopleurus productus* Rve. St. Thomas.
83. *Lophyrus marmoratus* Chem.
84. *Lophyrus squamosus* Linn. and vars.
85. *Lophyrus fasciatus* Wood.
86. *Lophyrus assimilis* Rve.
87. *Lophyrus ? viridis* Spengl. St. Thomas.
88. *Acanthopleura piceus* Gmel.
89. *Atlanta peronü* Les. Surface N. A. Ocean.
90. *Oxygyrus keraudrenü* Rang. Surface N. A. Ocean.
91. *Bulla striata* Brug. St. Thomas.
92. *Aplysia* sp. St. Thomas.
93. *Aplysia* sp. St. Thomas.
94. *Streptaxis deformis* Fér. Bridgetown.
95. *Hyalinia incisa* Pfr. St. Kitts.
96. *Hyalinia indentatus* Say. Pensacola, Fla.
97. *Helix (Microphysa) vertex* Pfr. St. Thomas.
98. *Helix (Microphysa) subaquila* Shuttl. Barbados.

99. *Helix* (*Microphysa*) *sincera* ad. Long Mt.
100. *Helix* (*Microphysa*) *perdepressa* ad. Long Mt.
101. *Helix* (*Sagda*) *jayana* rd. Long Mt.
102. *Helix* (*Dædalochila*) *pustula* Fer. Pensacola, Fla.
103. *Helix* (*Mesodon*) *jejuna* Say var. *Mobiliana* Lea. Pensacola.
104. *Helix* (*Dorcasia*) *similaris* Fer. Bridgetown.
105. *Helix* (*Lucerna*) *sinuata* Müll. Long Mt. dead spec.
106. *Helix* (*Lucerna*) *acuta* Lam. var. *lamarckii* Fer. Long Mt.
107. *Bulimus* *oblongus* Müll. Barbados.
108. *Bulimulus* *multifasciatus* Lam. St. Kitts.
109. *Bulimulus* *exiles* Gmel.
110. *Amphibulima* *patula* Brug. St. Kitts.
111. *Orthalicus* *undatus* Brug. Rockfort, Jam.
112. *Orthalicus* *zebra* Müll. Bridgetown.
113. *Stenogyra* *beckiana* Pfr. Bridgetown.
114. *Stenogyra* *octona* Ad.
115. *Stenogyra* *subula* Pfr. Long Mt.
116. *Stenogyra* *octonoides* Ad. Bridgetown.
117. *Stenogyra* *læviusculus* Ad. Jamaica.
118. *Cylindrella* *brevis* Pfr. Long Mt.
119. *Cylindrella* *minuda* Ad. Long Mt.
120. *Succinea* *augustior* Ad. Rockfort.
121. *Succinea* *barbadensis* Pfr. Bridgetown.
122. *Succinea* *approximans* Shuttl. St. Thomas.
123. *Succinea* sp. St. Kitts.
124. *Melampus* *pusillus*? Gmel. St. Kitts.
125. *Pedipes* *mirabilis* Muhl. Bathsheba and St. Kitts.
126. *Physa* *jamaicensis* Ad. St. Thomas.
127. *Macoma* *constricta* Burg. St. Kitts.
128. *Sanguinolaria* *sanguinolenta* Gmel. St. Kitts.
129. *Donax* *denticulatus* Linn. St. Kitts.
130. *Venus* *cancellata* Chem. St. Thomas.
131. *Venus* *granulata* Gmel. St. Thomas.
132. *Chama* *lazarus* Linn. St. Thomas.
133. *Lucina* *trigerina* L.
134. *Arca* *gradata* Brod.
135. *Arca* *noæ* D'Orb. St. Thomas.
136. *Arca* *fusca* Brug. Yg. of St. Thomas.
137. *Arca* *barbata* Linn. Yg. of St. Kitts.
138. *Mytilus* *exustus* Linn.

139. *Perna alatus* Gmel.
 140. *Lima scabra* Born. St. Kitts.
 141. *Semele decussata* Gray. St. Thomas.
 142. *Semele orbiculata* Say. St. Thomas.

SYNOPSIS OF THE PRINCIPAL VARIETIES OF *AGRIOLIMAX*
AGRESTIS (L.)

BY T. D. A. COCKERELL.

As this species is now quite extensively naturalized in America, and varies considerable, it is of interest to ascertain what varieties exist on this continent, and whether they are identical with those of Europe. The following table has been prepared as a guide to the identification of the more usual forms. In some cases varietal names have been interpreted rather more widely than used by their original authors, but a certain amount of modification must be allowed under varietal groupings, just as examples of a species must be admitted to diverge from the original type.

A. *Without Spots.*

- | | | |
|---|-----------|-------------------------------|
| (1) Ashy or pale ochreous | - - - - - | <i>*typicus</i> Less & Poll. |
| (2) Reddish-ochre | - - - - - | <i>rufescens</i> Less & Poll. |
| (3) Reddish-ochre above, white beneath | - - - - - | <i>*succineus</i> Westerlund. |
| (4) Yellowish-amber, tentacles bluish-brown | - - - - - | <i>xanthosoma</i> Fischer. |
| (5) Purplish or lilac-brown | - - - - - | <i>lilacinus</i> Moq. |
| (6) Grey, rather dark | - - - - - | <i>griseus</i> Ckll. |
| (7) Greyish-white, mantle darker | - - - - - | <i>cineraceus</i> Moq. |
| (8) Whitish or nearly white | - - - - - | <i>*albidus</i> Picard. |
| (9) Albino | - - - - - | <i>albus</i> Ckll. |
| (10) Very dark brown | - - - - - | <i>tristis</i> Moq. |
| (11) Black | - - - - - | <i>niger</i> Butterell. |

B. *Spotted or blotched.*

- | | | |
|---|-----------|-------------------------------------|
| (12) With numerous black or blackish points | - - - - - | <i>punctatus</i> Picard. |
| (13) With grey or blackish mottling | - - - - - | <i>*sylvaticus</i> Moq. (non Drap.) |
| (14) Often reddish; spots blackish, inclining to reticulation on body | - - - - - | <i>*reticulatus</i> Moq. |
| (15) Grey, with black spots or mottling, tentacles fuscous | - - - - - | <i>*varians</i> Westerlund. |
| (16) Grey, with black markings tending to coalesce, tentacles dark | - - - - - | <i>nigricans</i> Westerlund. |
| (17) Reddish-ochre, with obscure brownish mottling or brown spots. | - - - - - | <i>*obscurus</i> Moq. |

The varieties marked with an asterisk have been found in America. I have seen no American varieties that differ at all from those of Europe. Vars. *sylvaticus*, *varians* and *succineus* were sent to me by Mr. H. F. Wickham, who collected them at Portland, Oregon. This is, I believe, the first record of the species from the Pacific coast, but Mr. W. G. Binney informs me that he has *L. agrestis* from San Francisco.

NOTES AND EXCHANGES.

WESTERN RANGE OF BYTHINIA TENTACULATA.—This introduced European species is rapidly spreading in America, having already invaded a large part of Canada and New York. It has recently been found by Wm. H. DeCamp, M. D., in Black Lake, Ottawa Co., Michigan. Dr. DeCamp has deposited specimens in the collection of the American Association of Conchologists.

HELIX ASPERSA IN CALIFORNIA.—Apropos of the remarks in the August Nautilus on Prof. R. E. Stearns' "List," recording this snail from Puebla, Mexico, reminds me that I have some fine specimens of *Helix (Pomatia) aspersa*, collected in a garden in the city of San Jose, Santa Clara County, California, some twelve years ago; they were doubtless introduced by some of the European residents of that place. Lorenzo G. Yates, Santa Barbara, Cal., Sept. 1891.

EXCHANGE.—What am I offered in exchange for a collection of California Land, Fresh-water and Marine shells containing 65 species and numbering 130 specimens? Have plenty of duplicate sets of the above collection. Address, Williard M. Wood, C. C., 2817 Clay Street, San Francisco, Cal.

DR. GEORGE HEWSTON

DIED SEPT. 4, 1891.

Dr. George Hewston, well-known to most American conchologists for his great interest in shells, died Sept. 4, at his residence, 1132 Sutter street, San Francisco, California, from Bright's disease of the kidneys. He was born at Philadelphia on Sept. 11, 1826,

graduated from the University of Pennsylvania, and for a short period was demonstrator of anatomy in the Philadelphia College of Medicine. Dr. Hewston removed to San Francisco in 1860 and has practiced medicine there ever since. In addition he served one term as a member of the Board of Supervisors and at the time of his death was second Vice-President of the Academy of Sciences and Past Grand Master of Apollo Lodge, Independent Order of Odd Fellows. Dr. Hewston was for many years an enthusiastic collector and student of shells. Several species discovered by him bear his name. Dr. Hewston leaves a widow, two sons and daughter, as well as a large circle of friends and correspondents to mourn his loss.

NEW PUBLICATIONS.

BIBLIOGRAPHY OF THE GEOLOGY OF MISSOURI. By F. A. Sampson. Published by the Geological Survey of Missouri. Mr. Sampson has given to the compilation of this bibliography the labor of several years. The result, an 8vo. of 178 pages, leaves little to be desired, and will be found indispensable to the student of the geology or paleontology of Missouri. Under each title, a brief résumé of the contents, or list of species described in each publication, is given. The amount of investigation and labor required for the production of such a volume can be appreciated only by those who have attempted similar projects. Mr. Sampson is to be congratulated upon the completion of his work—*H. A. P.*

LIST OF SHELLS COLLECTED ON THE WEST COAST OF SOUTH AMERICA, etc. (From Proc. U. S. Nat. Mus. xiv, pp. 307-335). By Robt. E. C. Stearns, Adjunct Curator, Dept. of Moll., U. S. Nat. Mus. A valuable contribution to our knowledge of the distribution of West American mollusks, with critical notes in Dr. Stearns inimitable style. A new species, *Tectarius atyphus*, from Manta, Equador, is named but not described.—*H. A. P.*

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No. 7

A BYSSUS IN UNIO.

BY DR. V. STERKI, NEW PHILADELPHIA, OHIO.

In the early morning of Oct. 2nd, while collecting "mussels" in the Tuscarawas river, I found a young specimen of *Unio ligamentinus* Lam., 27 mill. long, with a thread-like byssus 8 inches long, at the distal end attached to a small stone of about 8 mill. diameter. The whole thing was wound up, wrapped in a paper and put in the pocket. Several hours later, when I had time to look at it, the thread was dry, brittle, and broke, becoming detached from the stone. Thus the object was put in water with some glycerine and carbolic acid, for microscopic examination, for which I found leisure two days later.

The thread was now rather dark-brown in coloration, while, when fresh, it had shown different shades from horn color to light-brown; as far as seen in the shell—4.5 mill.—it still was colorless. Irregularly cylindrical or somewhat flattened, it had a diameter varying from 0.18–0.26 mill. The distal end, where it had been attached to the stone, was flattened and split into several irregular flat filaments, while the proximal end, which now slipped out of the shell as soon as I laid hold on it with the pincers, was thickened to a short bulb of 0.42 mill. in diameter.

The inner or main part of this byssus is composed of hundreds of finest fibres, of different diameters from about 0.0015–0.007; but many of them still show more or less distinct longitudinal striation. Even at the proximal or bulb end I could not see any other formation. Outside of this cord of fibres there is a cortical layer of a

different structure; it shows a somewhat irregular, more or less oblique and waving, but in general transverse, i. e. circular striation. These undulations are almost everywhere of two different kinds; larger, averaging in width from 0.01 to 0.022 mill., and smaller, between them, about 0.004, also only 0.007 mill. In many places the two systems are not distinct, and in others the undulations are mingled with similar figures of quite irregular form and distribution. On the youngest part, that is the inner end near the bulb, there is nothing of this transverse striation, but in its place a rather thick layer of spindle cells of about 0.006 mill. diameter, more or less transversely arranged, which become the longer and narrower as they are farther from the bulb, and it is evident that the circular striation is derived from these cells. Some acetic acid added brought to appearance the endoplasts (nuclei) in some of the cells, but not very distinctly; probably the object was not fresh enough.

It is to be expected that more such specimens will be found, also of other species of *Unionidæ*; for *U. ligamentinus* is hardly the only one to have a byssus long after the embryonic stage. And some points, in which my examination was not sufficient, may then be better ascertained.

CRITICAL NOTES ON EASTERN TEXAS UNIONIDÆ.

BY H. A. PILSBRY.

A collection of *Uniones* lately obtained by the writer from Mr. W. L. McDaniel of Tyler, Texas, has given new localities for a number of species, as well as occasion for notes on their synonyms and relationships.

The species of the southern Mississippi River, described originally from Louisiana, Mississippi and Arkansas, will mostly be found in eastern Texas, and constitute nearly the entire naiad fauna of that region. There are besides these, a few forms common to the whole Mississippi drainage, and found also in the Alabama basin, and a few peculiar to Texas and Mexico, the latter becoming more and more numerous as we travel southward.

Most of the characteristically Texan species belong to Mississippi River types, a circumstance which first struck me when working up

the *Uniones* collected by myself in Texas, during two visits some years ago.

In the matter of synonyms I have mentioned only such indisputable facts as have forced themselves to my notice while identifying the specimens in hand. Far more extensive name duplication exists in many cases.

It has been obvious to me for years that Lea's system of sections founded on contour, for the classification of *Unionida*, is hopelessly and radically wrong. It builds up false groups in about nine cases out of ten. Lea doubtless knew this as well as we, intending his system merely to be a convenient working guide. In this case, as in most others, the natural system will supercede the artificial, as it will, when well worked up, be found vastly more convenient.

One of the main characters of the new system will be *the sculpture of the beaks*, which is greatly varied in the different types, and remarkably constant specifically. The importance of collecting *young* with old specimens cannot be too strongly impressed upon the field naturalist. The character of being winged over the hinge-ligament is of minor importance. Lea's *alate* group including a number of very diverse types.

Among the more prominent groups represented in the collection here commented on, are the *group of U. plicatus*; the *group of U. parvus* (including *parvus*, *Bealei*, *Texasensis*, *Sayi*, *camptodon*, etc., etc.); the *group of U. pustulosus*, (including *Houstonensis*, and *nodiferus* below, and a number of northern species); the *group of U. alatus* (including *purpuratus*, *alatus*, *lavissimus*, etc., etc.)

The species are as follows:

U. plicatus Les. Leon Cr., Lee Co., Texas. Common and typical at least as far south as the Colorado River at Austin.

U. trapezoides Lea. Sabine River, Shelby Co., and Neches River near Tyler, Texas. Say's name *interruptus* has priority, despite Lea's assertion to the contrary, but it had better be dropped on account of the earlier *interruptus* of Rafinesque, Conrad, *et al.*

U. perplicatus Conrad. Big Eddy in Neches River near Tyler, Texas. Apparently distinct from the numerous plicate *Uniones* of Texas, many of which are mere varieties.

U. Chunii Lea. Big Eddy in Neches River near Tyler, Texas. Belongs to the *trigonus* group, but is far less angular. It is very variable.

U. castaneus Lea. Neches River near Tyler, Texas. A compact little shell, described originally from Alabama. Specimens from "Ouichita, Kansas" are also before me. Mr. Simpson called my attention to the identity of these specimens with the Alabama species.

U. Houstonensis Lea. West Yegua Creek, Lee Co., Texas. A smooth species of the *U. pustulosus* group. It is somewhat allied to *U. petrinus* Gld., an unfigured species of which *U. Bollii* Call is a synonym.

U. nodiferus Conrad. Big Eddy in Neches River near Tyler, Texas. Lea unites this with his *Schoolcraftii*, but it is apparently as distinct as most of the *pustulosus* group.

U. asper Lea. Kickapoo Creek, Henderson Co., and Neches River at Tyler, Texas. This Janus looks on one side toward *apiculatus* Say, and on the other in the direction of *lachrymosus* Lea and *fragosus* Con. Some queer episodes will sometime be revealed in the family history of the "*apiculatidæ*." The mingling of blood has been something scandalous.

U. tuberculatus Barnes. Neches River near Tyler, Texas. Some specimens have the tubercles arranged very distinctly in V-shaped rows, as in *Unio apiculatus* Say. In fact, *tuberculatus* belongs to this same group, despite its different contour. This shell is found throughout the Mississippi (including Ohio and Missouri) drainages, as well as in the Alabama River. Some southern specimens have the nacre pink, a character I have never observed in Northern shells.

U. Berlandierii Lea. Colorado River near Austin. This is very closely allied to *U. Tampicoensis* and *U. Tecomatensis* of Lea. Belongs to the group of *U. crassidens* Lam.

U. purpuratus Lam. Big Eddy in Neches River near Tyler, Texas. Stands between *alatus* and *coloradoensis*. Lea gives the correct synonymy.

U. Hydianus Lea. Kickapoo Creek, Henderson Co.; Neches River near Tyler, and Texarkana, Texas. An apparently distinct species of the *luteobus* type. Varies in color from black to yellow or red rayed with green. The males and females are notably dissimilar in form, as in *U. luteobus*, etc. Compare *U. approximus* Lea.

U. Bealei Lea. Near Forney, Texas. Closely allied to *U. Texasensis* Lea, but the teeth are much more compressed.

U. Texasensis Lea. Wimberly Lake, Lee Co., Texas. Allied to *U. parvus*, *U. Bealei*, etc. Lea's *U. Bairdianus* is a synonym.

U. Sayi Tappan. Texarkana, Texas. Allied to *camptodon*, but easily separable from the types of that species. *U. suberoceus* Con. seems to be the same.

U. camptodon Say. Water works reservoir, Tyler, Texas. I do not propose to go into the tremendous and involved synonymy of this member of the *U. parvus* group. Typically the *camptodon* is distinguished by the form of the hinge-line, which is decidedly curved under the beaks. Forms very similar are found from the Ohio River to East Texas and to Florida.

U. declivis Say. Sabine River, Shelby Co., Texas. More angular posteriorly than *U. symmetricus*. *U. geometricus* of Lea is a synonym, as Lea himself ascertained.

U. symmetricus Lea. A species allied to *declivis* Say, but less angular. It has much the general appearance of the common eastern *U. complanatus*. The synonymy of *symmetricus* includes *U. porrectus* Conrad, *U. manubius* Gould, and (according to Mr. Simpson) *U. Jamesianus* Lea. Mr. Simpson kindly compared specimens with the types of *symmetricus*, confirming my identification. The localities are Blackfork Creek, near Tyler, Texarkana, and West Yegua Creek, Lee Co., Texas.

U. subrostratus Say var. *Rutersvillensis* Lea. Texarkana; Wimberly Lake, Lee Co., Texas. The extensive synonymy of this species has been worked out by Prof. R. E. Call, (Bull. Washb. Lab.)

U. anodontoides Lea. Blackfork Creek near Tyler; West Yegua Creek, Lee Co., Texas. Exhibits no variation from the common Mississippi and Ohio River types.

Anodonta Stewartiana Lea. Neches River near Tyler. Belongs to the *A. corpulenta* group. *A. virens* Lea is probably a synonym, and *H. Linneana* Lea is closely allied.

ON THE DISTINGUISHING CHARACTERS OF UNIO RADIATUS
AND UNIO LUTEOLUS.

BY GEO. W. DEAN, KENT, OHIO.

In the September NAUTILUS, Rev. W. M. Beauchamp has the following queries: "Can any one point out an invariable feature

distinguishing *Unio radiatus* and *luteolus*? The distinctions do very well for some, but to others they seem a good deal mixed. Has not every collector some which he has not named?"

After long familiarity with *luteolus* in many streams and reservoirs and having several suites of *radiatus* from different localities, and seeing it plentiful in the Susquehanna River at Muncy, Pa., the thought has not come to me that they were even closely related; nor do I think they are. Sometimes there is an *indescribable* something plainly discernible to the eye of an expert that separates species, but there is no such difficult or intangible distinction in this case and I think I can make the distinctions plain to Mr. Beauchamp.

I can emphatically say that I have nothing at all like either species that is not easily named.

As a first distinction I give the *form of the female of luteolus* which at maturity becomes very broad and inflated at the posterior end and truncated, while forward it remains narrow and very small, comparatively. This characteristic I have not seen in *radiatus* and do not think it exists. The difference between the male and female is so great in *luteolus* that Anthony thought them distinct and gave to the male the name of *U. distans*.

Another and very marked difference is in the epidermis. In *luteolus* it is, in its perfect state, polished and hard as glass, giving to the radiating stripes a distinctness rarely seen in the genus. While the lines of growth in *radiatus* are very much larger, giving the surface to the naked eye more the appearance of velvet or fine plush also giving to the radiating stripes a corresponding dimness. Of course these distinctions in the epidermis come out only in cleaned shells or young specimens naturally clean; they would not be noticed in mature shells as taken from the water. But even in this state I should readily distinguish either species as it came to the light. If there is such a thing as an intermediate specimen, I should like to see it and would agree to put it in the right place at sight.

As a third distinction, the range of color in the nacre of *radiatus* is very great, whilst in *luteolus*, as far as I have seen, it is uniformly light-blue. I have heard of *luteolus* with pink nacre but have never seen one. I do not know either whether these two species are ever found together.

A NEW JAPANESE LIMPET.

BY H. A. PILSBRY.

In the pages of the NAUTILUS some months ago, the writer described a new species of *Patella* collected in Japan by Mr. Frederick Stearns of Detroit, Mich. It was with great surprise that still another large and apparently undescribed species was received, in a recent sending from the same source.

The new species, which it is proposed to call *PATELLA BONINENSIS*, was seen and purchased by Mr. Stearns at the Third National Exhibition at Tokyo, in 1890. It belongs to the subgenus *Helcioniscus*, as far as shell-characters enable one to judge.

The shell is large (90–100 mm. in length, 40 in alt.), solid, erectly conical, of a somewhat soiled buff color. It is sculptured with from 48–53 riblets, which vary from crenulated to markedly tubercular. The interior has a snow-white muscle-scar, surrounded by a broad brown zone, outside of which there is a silvery zone of equal width, the extreme edge being narrowly bordered with brownish or yellow. The central callus is creamy with a dark border of umber-brown. From each of the lateral angles of the “head-piece” of the central spatula, diverges a brown streak.

The nearest ally of this species is apparently the *Patella nigri-squamata* of Reeve’s *Conchologia Iconica*, vol. 8, pl. 2, figs. 3a, 3b, a species reported by Reeve from Australia, but of which I have specimens from the Province of Concepcion, Chili. Reeve’s species differs in having the central spatula of the interior constantly much smaller, having no diverging streaks, etc.

The Japanese know this species as *Yome-gaisara* or “Bride-cup shell.”

The species of *Patella* now known from Japan may be tabulated as follows:

Shell more or less silvery or iridescent inside (Helcioniscus.)

Conical, having about 50 strong, close, elevated riblets, alternating or subequal
[in size.]

Large, light buff; border of the inside narrow, yellowish, *P. Boninensis* Pils.

Variegated with brown; border of the inside conspicuously black-blotched,

P. Stearnsii Pils.

Conical, having several smaller riblets in each interval between the larger ribs,

P. pallida Gld.

Ribs fine or obsolete.

Solid, with radiating dark lines; spatula brown or orange; ribs obsolete,

P. nigrolineata Rve.

Thin, with very finely beaded riblets or striæ,	<i>P. amussitata</i> Rve.
Thin, with very fine striæ, not beaded,	<i>P. toreuma</i> Rve.
<i>Shell porcellanous inside, opaque, not iridescent (Scutellastra.)</i>	
Depressed, having strong irregular ribs,	<i>P. stelleformis</i> Rve.

[COMMUNICATED.]

DONATIONS TO UNITED STATES COLLECTION.

Owing to illness in Mr. Campbell's family, he was unable for several months, to pay much attention to the United States Collection, but since September 10th, work has been fully resumed and the collection is making its usual rapid strides. It would be impossible in the limited space granted to us in the NAUTILUS to acknowledge all the shells sent since the date of the last acknowledgment, but the following will give an idea of them.

I. Greegor, Jacksonville, Fla.—

Ranella Californica, Hinds; Oliva litterata, Lam. and Nassa vibex, Say.

F. E. Blanes, Key West, Fla.—

An interesting lot of Key West Shells including Marginella guttata, Dillw., and pellucida, Pfr.; Cypræa cinerea, Gmel.; Olivella nivea, Gmel. and floralia, Duclos; Natica lactea, Guild, and canrena, Linn.; Ianthina communis, Lam.; Nerita tessellata, Gmel. and versicolor, Linn.; Glyphis listeri, D'Orb.; Astralium longispinum, Lam.; Murex Salleanus, Adams; Conus verrucosus, Hwass; Strophia incana, Binney; Helix cereolus, Mühl. and numerous others.

Prof. Josiah Keep, Mills College, Cal.—

Punctum conspectum, Bld. and Pedicularia Californica, Newc.

H. A. Pilsbry, Philadelphia, Pa.—

Helix Rœmeri, Pfr.; Corbula undifera, Meek, cretaceous of Wyoming.

J. J. White, Palm Beach, Fla.—

A number of marine species from Lake Worth, Fla. including Arca Noæ, Linn.; Columbella mercatoria, Linn.; Cassis sulcosa, Born; Ovulum gibbosum, Linn.; Astralium tuber, Linn.; Iphigenia Brasiliana, Lam. and Echinella nodulosa, Pfr.

W. S. Teator, Upper Red Hook, N. Y.—

More than 30 species of land and fresh-water shells, including Helix pulchella, monodon, labyrinthica, palliata and hirsuta; Succinea obliqua, avara, ovalis aurea; Limnæa humilis, columella, palustris and catascopium; Zonites fuliginosus and nitidus; Planorbis bicarinatus and campanulatus. The Succinea obliqua Say are magnificent specimens, the largest we have ever seen, and beautifully cleaned.

Chas. LeRoy Wheeler, Cape May, N. J.—

Purpura hæmastoma, Linn., dredged at Cape May, not known there hitherto and the largest specimens we have seen; *Venus mercenaria*, Linn.; *Modiola modiolus*, Linn.

John H. Campbell, Philadelphia, Pa.—

Pholas Pacifica, Stearns; *Unio ligamentinus*, Lam.; *Tellina Gouldii*, Cpr.

Dr. Wm. H. Rush, U. S. N., Philadelphia, Pa.—

Atlanta Peronii, Les.; *Xylotrya fimbriata*, Jeff.; *Oxygyrus Keraudrenii*, Rang; *Litiopa bombya*, Kien.; and a fine series of Pteropoda, including *Hyalæa limbata*, *tridentata*, *longirostris*, *gibbosa* and *labiosa*; *Cleodora pyramidata*, *Lessonii* and *spinifera*; *Cuvieria columella*, Rang and *Diacria trispinosa*, Les.

John Ford, Philadelphia, Pa.—

Fasciolaria gigantea, Kiener, (a real giant); *Oliva idonea*, Conr. (Miocene); *Oliva araneosa*, Lam.; *Strombus costatus*, Gmel.; *Terebratella Sayii*, Morton (cretaceous, N. J.)

Geo. T. Marston, Green Bay, Wis.—

A suite of the finest and largest *Limnæa megasoma* Say we have ever seen, (Oconto, Wis.)

Dr. J. J. Brown, Sheboygan, Wis.—

Unio Canadensis, Lake Ellen, Wis.

Joseph Willcox, Philadelphia, Pa.—

A fine lot of recent and fossil shells from Florida and Md., including the *Fulgur* described by Prof. Heilprin as *rapum*, Heilpr.; *Fulgur contrarium*, Conrad (Pliocene); *Arca plicatura*, Conrad (Pliocene); *Arca idonea*, Conrad (Miocene); *Fasciolaria scalarina*, Conrad (Pliocene); *Mitra lineolata*, Heilpr. (Pliocene); *Panopæa Americana*, Conrad (Miocene); *Panopæa Florida*, Heilpr. (Pliocene); *Acanthopleura picea*, Gmel.; *Melampus coffeus*, Linn.; *Helix varians*, Mke.; *Cardita Florida*, Conr.; *Perna ephippium*, Lam.; *Conus proteus*, Hwass; *Avicula alaperdicis*, Reeve.

Dr. Wm. H. De Camp, Grand Rapids, Mich.—

Goniobasis livescens, Mke. (a fine series showing varieties); *Goniobasis depygis*, *gracilior* and *brevispira*; *Planorbis bicarinatus*, Say; *Anodonta subgibbosa*, Anth.; *Physa integra*, Hald.

Henry A. Ward, Rochester, N. Y.—

Spondylus princeps (fine large, white specimen.)

John Shallcross, Philadelphia, Pa.—

Spondylus princeps (fine large, red specimen.)

Mrs. M. Burton Williamson, University, Cal.—

Melampus olivaceus, Cpr.; *Chlorostoma ligulatum*, Mke.; *Helix Traskii*, Newc.; *Scalaria Hindsii*, Cpr.; *Bittium armillatum*, Cpr. (Post-pliocene);

Margarita lirulata, Cpr. (Post-Pliocene); *Mytilus unguatus*, Linn.; *Macoma nasuta*, Conr.; *Donax flexuosus*, Gould; *Solen rosaceus*, Cpr.; *Acmaea spectrum*, Nuttall; two very interesting specimens of *Haliotis Cracherodii*, Leach, showing pink iridescent tints inside; and others.

Chas. W. Johnson, Philadelphia, Pa.—

Triton Oregonensis, Redf.; *Arca ponderosa*, Say and *Americana*, Gray; *Lithophagus appendiculata*, Linn.; *Ancylus filosus*, Conr.; *Alexia myosotis*, Drap. and a magnificent specimen of *Turbinella regina*, Heilprin, from the Pliocene of the Caloosahatchie River, Florida.

Rev. H. W. Winkley, Saco, Maine.—

Lacuna vineta, Turton; *Nucula proxima*, Say; *Margarita helicina*, Fabr.; *Melampus lineatus*, Say; *Margaritana margaritifera*, Linn.; *Limnæa desidiosa* Say—all fine specimens.

Total to date 329 genera, 706 species, 855 trays. (Eight large display cases are already devoted to the collection.)

All of the above have been mounted and placed in the collection. Others have yet to be mounted and will be announced in future. Owing to the rapid growth of the collection, it would be well for members, wishing to contribute to the collection, to send lists in advance to the President of the Association and he will check off the species already received and thus avoid duplicating.

All shells should be addressed to John H. Campbell, care of Academy of Natural Sciences, 19th and Race Streets, Philadelphia, where he and his Philadelphia associate members assemble once a week, to superintend the naming, preparation and placing of them in the collection.

NOTES AND EXCHANGES.

AN EXCHANGE COLUMN will be opened in our next number. Subscribers wishing to exchange shells may insert their notices free, the limit of length being 40 words.

MR. C. W. JOHNSON, Business Manager of THE NAUTILUS, has been collecting fossils in the Carolinas for the past several weeks.

NOTE ON *FISSURELLA PICTA* Gmel. In looking over the plates of Martyn's beautiful book, *Universal Conchology*, (London, 1784), I noticed on plate 64 a splendid figure of the above-mentioned species, under the name *Patella personata*. All authors seem to have overlooked this figure heretofore, including myself, for I had not seen it when I called the species *picta* in the *Manual of Con-*

chology, xii, p. 144. There remains now nothing to do but to restore Martyn's name to this fine shell.—*H. A. Pilsbry*.

TESTACELLA IN PHILADELPHIA. Mr. Robert Walton has found during the summer, the European *Testacella maugei* Fér. in a greenhouse at Lower Roxborough, Philadelphia. From their being so numerous and the green-house an old one in which no new plants have been introduced for some years, we would infer that they have been living there for some time. The specimens brought by Mr. Walton were from very small to extra large ones.—*C. W. Johnson*.

NEW SPECIES OF SHELLS.—At the regular meeting of the Academy of Nat. Sci. of Phila., Tuesday Nov. 3, Mr. Pilsbry offered descriptions of and remarks on the following new species of West Indian land shells; *Choanopoma caymenensis*, a shell having the general form and characters of *C. newtoni* Shutt., 5 whorls remaining; sutures impressed, remotely beaded, whorls encircled by spaced, unequal spiral liræ, the longitudinal striæ very close, every 8th one on the body-whorl stronger; light-yellowish, having zigzag longitudinal chestnut streaks. Umbilicus moderate, lip formed as in *C. newtoni*, except that the columellar edge is fluted. Alt. 16, diam. 9 mm., alt. of apert. 6 mm.; measured outside peristome. Caynem Is.

Helix xanthophaës, the smallest known species of *Hemitrochus*, measuring only, alt. $6\frac{1}{2}$, diam. 8 mm. It is subglobose, obtusely carinated, narrowly rimate. Whorls 4. Surface shining, striatulate. Obliquely streaked with reddish-chestnut on a pale, yellowish ground, with or without a dark peripheral zone, bordered below with light. Locality Inagua. *Helix (Plagioptycha) Maynardi*, allied to *H. Brownii* Pilsbry, but not carinated, having thread-like striæ, banded with chestnut above the periphery, and having numerous lighter brown bands above and below. Umbilicus nearly covered by the reflexed baso-columellar lip, which has a heavy callus within. Alt. 8, diam. $13\frac{3}{8}$ mm. Bahamas.

PATULA COOPERI, SINISTRAL.—Mr. Leslie M. Cockerell, writing from Norwood, San Miguel Co., Colorado, informs us that he has found a sinistral specimen of the above. This is a rare malformation in America, but it occurs more frequently in *P. cooperi* than in most species, as several cases are on record.—*H. A. P.*

RECENT CHANGES IN NOMENCLATURE.—Mr. R. B. Newton, in the *Systematic list of British Oligocene and Eocene Mollusca*, London, 1891, has made a number of changes in generic nomenclature, the principal of which are as follows:

For *Pecturculus* Lam. 1799, is substituted *Axinæa* Poli, 1795.

For *Hindsia* Desh. 1858 (not of A. Ad., 1853) is substituted *Hindsiella* Stol.

For *Cyprina* Lam. 1818, is substituted *Arctica* Schum, 1817.

For *Terebellum* Lam. (not of Linn.) is substituted *Seraphs* Montf.

For *Triton* Montf. (not of Linn.) is substituted *Lampusia* Schum., 1817.

For *Pteronotus* Swains. 1840 (not Gray, 1838) is substituted *Triplex* Humph., 1797.

For *Leiostoma* Swains. 1840 (not Lacépède, 1802) is substituted *Sycum* Bayle.

For *Lampania* Gray, 1847, is substituted *Batillaria* Bens., 1842.

For *Pomatias* Hartm. 1821 (not Studer, 1789) is substituted *Hartmannia* Newton, 1891.

For *Proserpina* Sowb. 1839 (not Hübner, 1816) is substituted *Despæna* Newton, 1891.

For *Cylichna* Loven, 1846 (not Burm., 1844) is substituted *Bulinella* Newton, 1891.

A portion of these changes may prove unnecessary, as in the case of *Proserpina*, where Mr. Newton's new name must be suppressed in favor of one of the several subgeneric names already proposed under *Proserpina*. Some others hang upon such preoccupation as *Cyprinus* for *Cyprina*, and it is still doubtful whether these should be considered equivalent as names. A further review of the work will appear later.

IN THE ADDUCTOR MUSCLES OF UNIONIDÆ.—The newly formed parts, anterior, and posterior, are easily distinguished from the older parts by their coloration, being lighter, even whitish. This is found most marked in spring and early summer when new growth is going on rapidly; but also in fall I have seen it in different species.—*Dr. V. Sterki.*

IN EUROPE, A SMALL FISH, *Rhodeus amarus*, is known to deposit her eggs, by means of a long, flexible ovipositor, through the mantle opening, in the cavity of fresh-water mussels, *Anodonta*, where they are hatched, and remain until developed sufficiently to live without protection. Is anything like this known from our continent?—By the way, we know that young *Unionidæ* attach themselves on the fins, etc. of fishes, after leaving the branchial uteri of their mothers. But observations of this kind are, probably, seldom made, and it would be of value to report on each instance observed. Malacologists living in the neighborhood of fisheries could do good work in this direction.—*Dr. V. Sterki.*

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ACMÆA CANDEANA VS. ACMÆA ANTILLARUM.

BY H. A. PILSBRY.

So difficult a group are the limpets that their nomenclature has been in a condition little better than chaotic from the earliest times. Years ago the West American species were studied by CARPENTER, whose genius reduced them to comparative order. It was, however, left for DALL to point out, with penetrating insight, their generic relationships.

The species of the Gulf of Mexico have never been studied with the same facilities as those of West America. Dall, in his 'Blake' Report, enumerates the forms he had seen, with critical notes on their nomenclature; and the writer has this year given a somewhat elaborate account, founded upon the specimens in the Philadelphia Academy and the Smithsonian Institution collections.

In the case of *A. Candearia* however, the earliest publication of the species, under the name *Lottia Antillarum*, has been overlooked by all. In this case, as elsewhere, we can only find safety amid the flood of conflicting names, by taking our stand upon the solid rock of *priority*.

Sowerby's figure of *Lottia Antillarum* is an excellent and characteristic picture of this species in its finest development.

The synonymy will stand as follows:

Lottia Antillarum SOWERBY, Genera of Shells, fig. 4. (Issued before 1831.)

Lottia Antillarum SOWERBY, A Concholog. Manual, p. 59, fig. 231, 1839. (A somewhat different color-form.)

Lottia Antillarum Sowb., REEVE, Conchol. System., pl. cxxxvii, f. 4 (printed from same plate as Sowerby's *Genera*) 1842.

Patella tenera C. B. ADAMS, Proc. Bost. Soc. N. H. ii, p. 8 (1845).

Patella tenera Ad., REEVE, Conch. Icon. fig. 104.

Patella Candeana ORB., Moll. Cuba, ii, p. 199, atlas pl. 25, figs. 1-3.

Acmæa Candeana Orb., DALL, Catal. Mar. Moll. S. E. U. S., p. 159.

Acmæa Candeana Orb., PILSBRY, Manual of Conchology, xiii, p. 38, pl. 5, figs. 91-95, and pl. 42, figs. 92-95.

? *Patella (Acmæa?) elegans* PHILIPPI, Abbild. u. Beschreib. iii, p. 34, *Patella* p. 6, pl. 2, fig. 2 (1846).

? Not *P. antillarum* Sowb., PHILIPPI, Abbild. iii, *Patella* pl. 2, fig. 12.

Acmæa Antillarum is found throughout the West Indies, from the Bahamas and Southwest Florida to Tobago.

NOTES ON UNIONIDÆ.

BY CHAS. T. SIMPSON.

The November number of the NAUTILUS seems to be devoted mostly to Unios, and to me is an exceedingly interesting issue.

Lea's classification of the *Unionidæ* was almost wholly an artificial one, and I believe he instituted it for convenience in working, just as Linnæus founded the artificial system of classification in botany. Both these great pioneers in science recognized the natural systems, and probably used these as makeshifts. All through the latter part of his writings, Dr. Lea acknowledged the fact that the *Unionidæ* were divisible into natural groups. To some capable student of the future is reserved the task of determining these groups and assigning the species to them. The accomplishment of this will be well worth a working lifetime of careful and honest study.

Mr. Geo. W. Dean claims to be able at sight, to refer to its proper species any specimen of either *Unio luteolus* or *radiatus*. I confess that this is more than I can do, and I have handled many thousands of specimens of both, collected from the entire territory inhabited by these familiar forms. The distinguishing features

given by Mr. Dean are excellent. There is generally that intangible something which is apparent to the experienced eye by which they may be separated, a difference more particularly in the texture of the epidermis than anything else; but even this difference is not always visible to my eyes, and I have handled many specimens that were so puzzling and close that I have been obliged to ask, "Where did they come from?" before I even dared to guess what they were.

Generally *luteolus* is solidier, more inflated, wider posteriorly and narrower anteriorly, as well as smoother than *radiatus*, but not always. A specimen of *radiatus* in Dr. Lea's collection from Lake Champlain, collected by Dr. Ingalls (Museum No. 85035), is very solid, and as much inflated as *U. hydianus*, is narrow before, and broad behind, and can only be distinguished from *luteolus* by the color and texture of the epidermis.

It was one of the great objects of Dr. Lea in making his collection, to get material from all the different parts of the territory through which the species were distributed, to get all the variations possible, and carefully preserve the name of the collector, and the record of the place in which they were obtained. Had he never done anything more than get together in this way this unequalled collection—requiring, as it did, the educating and training of a corps of able assistants in various parts of the world—he would have deserved the gratitude of students of conchology for all time to come.

In this collection are varieties of *radiatus* of every possible form, from a great number of localities; they vary from flattened and almost lenticular, to oval, quadrate, elongated, obovate and inflated. One of these shells from Newton Creek, N. J. (85058) which is labelled *Unio radiatus*, has a smooth yellowish epidermis, save when eroded, and I should unhesitatingly pronounce it *M. luteolus* if it had come from Ohio or Indiana.

Are *luteolus* and *radiatus* ever found together? From the following table it will be seen that although *U. luteolus* is a Mississippi drainage species, and *radiatus* belongs to the waters that flow into the Atlantic, the habitats of these species considerably overlap. This last includes only a few of the localities of specimens in the Lea collection.

<i>Unio radiatus.</i>	<i>Unio luteolus.</i>
Saratoga Lake, N. Y.	Niagara Falls, N. Y.
Troy, N. Y.	Mohawk R., Erie, N. Y.
Little Lakes, Lycoming Co., N. Y.	Genessee R., N. Y.

Genessee R., N. Y.	Cohoes Falls, Hudson R.
Ottawa, Can., Rideau Canal.	Seneca Lake, N. Y.
Montreal, Can.	Oneida Lake, N. Y.
St. Lawrence R., Thousand Isles.	Moose R., Hudson Bay.
Camden, S. C.	Lake Winnipeg.
Oguchee R., Ga.	Athabaska Lake.
Savannah R.	Great Slave Lake.
Charles Co., Indiana!	Small Lakes, Mackenzie R.
	Red River of the North.
	New Mexico.

I have collected *Unio luteolus* in Eastern Colorado, and it is in the General Collection of the National Museum from Mississippi and Texas. It probably ranges from the Arctic circle to the Gulf of Mexico, and from the Rocky Mountains east to the Atlantic, except in the southeastern states lying east of the Appalachian Chain. A small form occurs in Canada and the more northern states, which is quite solid, and has a dark, rather rough, brown epidermis, often without rays, sometimes almost black, and in form and texture is strikingly like some specimens of *U. Downiei* from Southern Ga., but has not a lurid nacre as the latter has. This was named *Unio borealis* by A. F. Gray, and differs sufficiently from the type to be considered a distinct species, but it connects insensibly through forms found in Wisconsin and Michigan with the western shells. One of these in the collection of Dr. Lea (85045) from Montreal, was referred by him to *radiatus*. Other forms of this protean species are so close to *ligamentinus* that it is almost impossible to separate them and this is true of certain specimens of *radiatus*.

ON THE USE OF THE GENERIC NAME SCUTELLINA.

BY H. A. PILSBRY.

The name *Scutellina* was proposed by Gray in 1847, to replace *Scutella* of Broderip, preoccupied by Lamarek for a genus of Echinoderms. It has apparently escaped the attention of malacologists who have written upon this small but excessively interesting group, that Agassiz, in 1841, used the name *Scutellina* for a genus of Echinoderms allied to *Scutella* Lam. This generic term is still in use, appearing in the latest publications relating to that group. It

therefore becomes necessary to substitute a new generic name for the molluscan *Scutellina*, and since the root of that word has become associated with the *Echinodermata*, a change to something totally different may be advisable. As a substitute, therefore, I offer the term PHENACOLEPAS, "a deceptive limpet."

The synonyms are as follows:

Scutella BRODERIP, P. Z. S. 1834, p. 47 (in part).

Not *Scutella* LAMARCK, An. s. Vert. iii, p. 7 (1816).

Scutellina GRAY, P. Z. S. 1847, p. 168, and of authors generally.

Not *Scutellina* AGASSIZ, Monogr. d'Échinodermes, Second Monog. des Scutelles, p. 98 (1841).

DESTRUCTION OF ANODONTA CORPULENTA CPR. AT THOMPSON'S
LAKE, ILL.

BY W. S. STRODE, M. D., BERNADOTTE, ILL.

Recently while on a collecting trip to Thompson's Lake on the Illinois River, I was greatly surprised at the immense number of dead mussels that lined the shores from one end of this body of water to the other.

A windrow of them extended a little beyond the water's edge clear around the lake a distance of not less than ten miles.

Upon going on to the lake in a boat I found that dead shells, with the animal still in them, were also floating all over its surface. There was absolutely thousands of them and it certainly amounted to extinction of a very beautiful and interesting species, the *Anodonta corpulenta* of Cooper.

The other *Anodonta*, the *suborbiculata* of Say, for which this lake is headquarters, did not seem to be affected and there were not more dead ones to be seen than in previous years.

I immediately set about to ascertain the cause of this wholesale destruction of the corpulenta.

On enquiring of Captain Schulte and other fishermen who owned the lake, they had but one theory as to the cause, and that it was the common northern bull-head catfish, *Amiurus nebulosus* L. S., that was doing the mischief.

They explained that this fish would attach his wide mouth over one end of the shell and suck until the muscular power of the mus-

sel was exhausted, the shell relax, when the juices would be withdrawn, after which the animal would die.

On further enquiry I could find no one that had ever caught Mr. Catfish in the act, and I was not altogether satisfied with this theory.

This lake, in common with the Illinois, Mississippi and nearly all of the western rivers, is at lower ebb than ever before known in the history of the country. From accounts in the daily papers there is great mortality among the fish of the Mississippi River, and immense numbers are dying as a result of this low water.

Might not this be the cause of the death of the mollusks in this lake? Is the same phenomena observed in other bodies of water? Let us hear from other points. Or, have the catfish in this lake, like an egg-sucking dog, learned a trick and are making the most of it.

ON THE BYSSUS OF UNIONIDÆ. II.

BY DR. V. STERKI.

Some time since I succeeded, not without hard work, in finding three more specimens of *Unio* with a byssus, one *U. luteolus* Lam., 15 mm. long, one *U.* (prob.) *ligamentinus*, only 9 mm. long, and *U.?* 8 mm. Unfortunately I had not leisure to make an examination as exact as I wished; yet to my account in the last NAUTILUS I can add the following: the threads were for the most part colorless, or only slightly brownish. On the parts examined I found the cortical layer little developed. The byssus were more or less branched; on a piece of one about three inches long, I counted seven branches. Of the formation of these I can give an idea best by comparing them with a grass stalk: the branches sprung out from like leaves with short sheath, the latter with circularly arranged fibres, apparently not derived from the inner part of the "stem," but at a short distance, the branch, first flat, like a leaf, further off growing more or less cylindrical, was entirely composed of longitudinal fibres, which consequently are formed for themselves by apposition and the main thread is not split.

Later I had a chance to get some other very young mussels, among which was one only 3.5 mm. long, the smallest I have found so far,

and none of them had a byssus. Possibly it was detached while being caught and washed—with other materials—in the net.

A NEW SPECIES OF LEUCORHYNCHIA.

BY H. A. PILSBRY.

Leucorhynchia Tryoni Pilsbry.

Shell having the contour of *L. Crossei* Tryon, but larger, the umbilical tongue of callus much smaller. The margin of the umbilicus has several strong lobes or teeth. Surface smooth except the first half of the base, in front of the aperture, which shows about eight radiating grooves. Color white.

Alt. 2·8; diam. 3·8 mm.

Collected at Singapore by Dr. S. Archer.

Four specimens are before me. This group is considered by Fischer a subgenus of *Teinostoma* H. & A. Adams. *Leucorhynchia* was founded by Mr. H. Crosse in 1867, for a species from New Caledonia. In 1888, Mr. Tryon, in his monograph of *Teinostoma* described a second species as *T. (Leucorhynchia) Crossei*.

The subgenus now consists of three species which may be distinguished as follows:

Umbilical lobe of callus large; surface smooth,

Periphery carinated,

L. Caledonica Crosse.

Periphery rounded,

L. Crossei Tryon.

Umbilical lobe small; base radiately grooved,

Periphery rounded,

L. Tryoni Pilsbry.

LAND SHELLS OF VANCOUVER ISLAND.

BY G. W. TAYLOR, ST. BARNABAS RECTORY, VICTORIA B. C.

1. *Selenites Vancouverensis* (Lea).
2. *Selenites sportella* (Gould).
3. *Limax agrestis* Linn.
4. *Limax hyperboreus* Westerlund.
5. *Vitrina Pfeifferi* Newcomb.
6. *Hyalina arborea* (Say).
7. *Hyalina milium* (Morse).

8. *Hyalina Binneyana* Morse.
9. *Conulus fulvus* (Müller).
10. *Pristiloma Lansingi* (Bland).
11. *Pristiloma Stearnsi* (Bland).
12. *Ariolimax Columbianus* (Gould).
13. *Prophysaon Hemphilli* Bland & Binney.
14. *Prophysaon Pacificum* Cockerell.
15. *Patula striatella* (Anthony).
16. *Patula asteriscus* (Morse).
17. *Punctum minutissimum* (Lea).
18. *Punctum conspectum* (Bland).
19. *Lysinoe fidelis* (Gray).
20. *Mesodon Columbianus* (Lea).
21. *Mesodon devius* (Gould).
22. *Stenotrema germanum* (Gould).
23. *Pupilla corpulenta* (Morse).
24. *Vertigo simplex* (Gould).
25. *Vertigo ovata* Say.
26. *Ferussacia subcylindrica* (Linn.).
27. *Succinea Nuttalliana* Lea.
28. *Succinea Oregonensis* Lea.
29. *Succinea rusticana* Gould.
30. *Onchidella Carpenteri* W. G. Binney.
31. *Onchidella borealis* Dall.
32. *Carychium exiguum* (Say)?

LIMAX AGRESTIS LINN. ON THE PACIFIC COAST.

BY G. W. TAYLOR.

In the October number of the NAUTILUS, Mr. T. D. A. Cockerell writing of *Limax agrestis*, recorded its occurrence at Portland, Oregon, and remarked that he believed this to be "the first record of the species from the Pacific Coast." However two years ago I myself noticed the introduction of the species into this part of the world, in a little paper on "The Land Shells of Vancouver Island" published in the *Ottawa Naturalist*, vol. 3, p. 84, etc. (December, 1889.)

I believe that I first observed this slug about seven years ago in the Victoria gardens, and it has since developed into a dreadful pest. There cannot I think be any doubt as to the species being an

introduced one as it has not yet been noticed in any part of Vancouver Island other than in Victoria, and the specimens resemble British ones in every respect save that the milky slime is not nearly so copious. The principal varieties occurring here are those that Mr. Cockerell would call *sylvaticus* and *varians*. I have appended to this note a list of the Terrestrial Mollusca of Vancouver Island as at present known to me. Further information concerning their occurrence may be found in my paper above referred to, a copy of which I shall forward with pleasure to any conchologist who may desire it, so long at least as my stock holds out.

GENERAL NOTES.

PUPA HOLZINGERI STERKI, IN OHIO. Three, specimens of this species occurred among other small species collected last spring at Put-in-Bay Island, Lake Erie. A comparison with specimens received from Dr. Sterki leaves no doubt in my mind as to the identification.—*Bryant Walker, Detroit, Mich.*

UNIO COMPLANATUS SOL. IN NORTHERN MICHIGAN. In the NAUTILUS for June 1889 (vol. 3, p. 16) I recorded the discovery of an isolated colony of this species at Ocqueoc Lake, in the northern part of the lower peninsula, and queried as to how it got there. Since then I have found the species in the St. Mary's river at Lime Island, Michigan. The occurrence of the species at this locality would seem to make it probable that it will be found quite generally distributed through the upper peninsula and also affords an explanation for the existence of the Ocqueoc colony.—*Bryant Walker, Detroit.*

NEW JAPANESE SHELLS. *Terebra Stearnsii*, n. sp. Shell large, much elongated, having 22 whorls remaining, the apical portion (probably $\frac{1}{4}$ the entire length) being broken off. The whorls are narrowly but distinctly shouldered just below the suture. The surface of the body-whorl is divided into three subequal parts by two spiral grooves, and below the lowest of these grooves there are several others. Base cut by about 15 unequal impressed lines; growth-striae faint. Whitish, with a single series of brown spots. Total length 105, breadth $17\frac{1}{2}$ mm.; length of aperture 12, breadth 7 mm.

Thylacodes medusæ n. sp. Shells large, generally clustered, resembling *Thylacodes polyphragma* Sassi, of the Mediterranean, but

the sculpture (consisting of spaced longitudinal cords, the intervals striate), continuous around the whole circumference of the cylinder. Aperture circular, its diameter averaging 13 mm. For illustrations see Proc. Acad. Nat. Sci. Phila. 1891.—*H. A. Pilsbry*.

FOOD OF LIMNÆIDÆ. Our fresh-water snails are generally believed to be herbivorous. But they greedily feed upon animal matter whenever and wherever they find such; on insects, worms, mollusks (even their own species), flesh of any kind, even when living. A *Limnæa palustris* was seen last summer having a small leech (about 3 cm. long and 4 mm. wide) in his mouth; he slowly drew it in and rasped, while the victim was moving and winding about in vain efforts to escape. This I observed for about half an hour, but had not seen how the snail had caught the worm. Afterward the *Limnæa* held the leech, its anterior part projecting and constantly moving, firmly in his mouth, not rasping, now resting, now creeping about as usual, for an hour and a half more. At that time I had to go away and when I came back no leech was to be seen; whether it was eaten or dropped I do not know.

When these animals are grazing on stones, glass walls in the aquarium, on leaves, or on each other's shells, they always find a good supply of small animals besides algæ, etc., as anyone knows who has examined those "pastures."—*Dr. V. Sterki*.

ADDITIONAL MOLLUSKS OF SAN FRANCISCO COUNTY. Since the list by Mr. Wm. J. Raymond and myself was published in the September number of THE NAUTILUS, I have found five more species as follows:

Limax agrestis Linn.

Limax maximus Linn.

Prophysaon Andersoni J. G. C. var. *marmoratus* Ckll.

Acmæa fenestrata Nutt.

Mopalia Wosnessenskii Midd. var. *Swansii*.

Making the total number found up to date, 126 species. But two specimens of *Limax maximus* have I collected, they being apparently young specimens.—*Williard M. Wood*.

PLANORBIS TRIVOLVIS Say, and also other related forms, has a peculiar way of moving on or in sand; he goes "a step," as far as he conveniently can, with the shell deep down and close to the head; then he pushes it forward and upward, thus shoving the sand away, and making room for another "step." It is more than probable

that this digging is done not merely for locomotion—for he could do it much easier—but in search of food.—*Dr. V. Sterki.*

SOME OBSERVATIONS on how snails move their odontophores, may be of interest, and more should be done in this direction. *Limnæidæ* feeding on glass are easily observed, if not by the naked eye, then with a good glass. In *Planorbis* the radula is narrow, and is moved from behind forward—as seen in quite a number of species. *Physa* moves its wide, expanded radula from the sides toward the middle, not forward. *Limnæa* moves it forward, but not as decidedly as *Planorbis*, and at the same time somewhat from the sides to the middle. These different ways will be found to correspond with the formation of the teeth in the different genera.—*Dr. V. Sterki.*

EXCHANGES.

MR. A. W. HANHAM will be glad to correspond with members of the American Association of Conchologists with a view to exchanging land and fresh-water shells. Address, *Bank of British North America, Québec, Canada.*

WANTED—Zonites from any locality in exchange for British Land and Fresh-water shells.—*Robert Walton, Charles St., Lower Roxborough, Philadelphia, Pa.*

NORTHWEST LOUISIANA land and fresh-water shells for exchange. Wanted, other shells.—*T. Wayland Vaughan, Mt. Lebanon, La.*

ANODONTA SUBORBICULATA Say. I have fine specimens of this beautiful *Anodonta*, as well as many other *Unionidæ* for exchange.—*W. S. Strode, M. D., Bernadotte, Illinois.*

JAPANESE SHELLS. A large variety of Marine, Fresh-Water and Land Shells of Japan and of the Bahamas, my own collection, printed list.—To exchange for species not now in my cabinet from any part of the world; rare American *Unionidæ*, *Strepomatidæ* etc., desired.—*Frederick Stearns, Detroit, Michigan.*

OBITUARY.

DR. JOHN CLARKSON JAY.

Dr. John Clarkson Jay, a son of Peter Augustus Jay and grandson of Chief Justice John Jay, a distinguished member of the First

Continental Congress, died at his home, "Rye," at Rye, Westchester County, N. Y., on Sunday, being in the eighty-fourth year of his age. The immediate cause of his death was senile gangrene. Mr. Jay was graduated from Columbia College in 1827, and afterward took his diploma as M. D. Upon his marriage with Laura Prime, a daughter of Nathaniel Prime, a well-known banker, he left the practice of medicine and for a short time was engaged in the banking business, but in 1843 retired from both business and professional pursuits, to live at the country seat at Rye, on Long Island Sound, left to him by his father's will. This beautiful residence gave him full occupation, as it embraced upward of 400 acres of land.

Dr. Jay was well known in the scientific world as a specialist in Conchology, and his collection of shells was for many years the most noted in the United States. It was purchased several years ago by Miss Catharine Wolfe, and presented by her to the American Museum of Natural History.

Dr. Jay was for many years a trustee of Columbia College, was one of the early presidents of the old New York Club, and was one of the founders of the New York Yacht Club. He was a Republican in politics, and one of the early members of the Union League Club of this city. An Episcopalian, he was a moderate Churchman, strict in his own religious observances, but not in the least intolerant as to the views of others.

Dr. Jay was also actively interested in the Lyceum of Natural History (now the New York Academy of Sciences) and was its Treasurer from 1832 to 1843. At this time he was a man of twenty-five or thirty, of light complexion, open and pleasing countenance, and somewhat nervous temperament. During his more vigorous years Dr. Jay was much interested in aquatic sports and was the owner of a famous yacht called "Coquille." The valuable addition to the treasures of the Natural History Museum purchased by Miss Wolfe is now known as the Jay Collection. The shells gathered during the expedition to Japan under command of Commodore Matthew C. Perry were submitted to Dr. Jay and he wrote the article on them that appeared in the Government Reports. Dr. Jay was the author of "Catalogue of Recent Shells," which was published here in 1835; "Descriptions of New and Rare Shells," and of later editions of his Catalogue, in which he enumerated about 11,000 well-marked varieties and about 7,000 well-established species.

THE NAUTILUS.

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No. 9.

ON SOME TYPES NEW TO THE FAUNA OF THE GALAPAGOS ISLANDS.

BY WM. H. DALL.

Dr. G. Bauer has recently made some energetic and praiseworthy explorations in the Galapagos Islands, with the view of obtaining material for a discussion of the origin of their fauna. Among other things obtained was a series, small but extremely interesting, of the land shells of the various islands of the group. This collection in all probability is not exhaustive, but it seems by far more complete than any yet made at this point and a full report upon it is in preparation by the writer. Among the mollusks, which comprise a large number of races of *Bulimulus* (of the sections *Pleuropyrgus*, *Nesiotus*, *Raphiellus*, etc.) and *Succinea* (*S. Bettii* E. A. S.) are four minute forms each of which introduces a wholly new group to the faunal list of Galapagos land shells. Preliminary descriptions of three are appended; the fourth is a *Pupa* of the usual Antillean type.

Helicina (*Idesa*) *nesiotica* n. s.

Shell small, depressed, four-whorled, with periphery rounded, base moderately arched, and peristome not thickened nor reflected; epidermis of a bright reddish-chestnut, polished, but with very evident and regular incremental lines, base with a thin white callus merging into the lower lip without notch or angle; spire depressed, suture very distinct, not channelled; operculum smooth, whitish, angulated only at the upper extreme; alt. of shell 2.3, max. diam. 3.3 mm.

Found on leaves of plants on Chatham Island at an elevation of 1600 feet above the sea.

No species of this family has been reported from the Galapagos before. The type is not unknown in the Panamic region but is said to be absent from the west slope of the Andes.

Leptinaria chathamensis n. s.

Shell small, horn-colored, with a blunt apex and six rounded whorls; suture very distinct, surface polished, delicately marked with lines of growth; base rounded, widely umbilicated; aperture with the margin hardly thickened; rounded in front and at the suture; pillar broad, thin; body with a single elevated thin, sharp lamina, extending spirally inward from a point a little behind the peristome and nearly equidistant from the inner and outer lips. Alt. of shell 3·0, max. diam. 1·6 mm.

Chatham Island, on ferns at 1600–2000 feet above the sea.

Somewhat analogous forms are found in the mountains of the Panamic region.

Zonites (Hyalinia) Baueri n. s.

Shell small, horn-colored, polished, with four whorls; periphery subangular or rounded; dome of the base more elevated than that of the spire; suture distinct; surface with delicate incremental lines and finely grooved throughout by sharp but microscopic spiral striæ. Aperture rounded-lunate without sharp angles, wider than high; lip sharp, unreflected, throat unarmed; base minutely perforate; alt. of shell 1·5, max. diam. 2·2, min. diam. 1·6 mm.

South Albemarle Island on weathered bones of tortoises.

The single specimen of this very interesting form may not be quite adult, and therefore the slight tendency to angulation on the periphery may be lost in the full-grown shell. The absence of any form of *Helix* or *Zonites* has been commented on by most of those naturalists who have treated of the Galapagos shell fauna and it was certainly a most extraordinary deficiency from any point of view. This discovery of Dr. Bauer's removes the most striking anomaly of the fauna.

In addition to the above Dr. Bauer obtained specimens of an undescribed *Bulimulus (Pleuropyrgus)* which had also been collected by Dr. Habel on his visit to the Galapagos in 1868. Dr. Habel presented the writer with specimens on his return and these have been named in manuscript by Dr. R. E. C. Stearns *B. (Pleuro-*

pyrgus) *Habeli*. This species is distinguished from *B. (P.) Chemnitzoides* by its nearly smooth polished surface, light-brown spiral bands on a white ground and usually more slender form. It has about fifteen whorls, a blunt apex and rounded base. It measures 18.0 by 3.5 mm. It was also collected on Chatham Island by the U. S. S. Albatross on her late voyage from Norfolk to San Francisco. It does not appear among shells enumerated by Wimmer from the Habel Collection in his catalogue of the Galapagos mollusk-fauna.

A NEW SPECIES OF ZONITES FROM ARKANSAS.

BY H. A. PILSBRY.

Zonites Brittsii n. sp.

Shell *imperforate, depressed, obtusely angled at the circumference*, about equally convex above and below. Color yellowish-green, somewhat translucent, becoming light straw-yellow and opaque on the last fourth of the last whorl. Surface shining, having oblique striae under the sutures, the growth lines being quite light on the rest of the surface; base seen under a lens to be *very densely concentrically striated*. Whorls 6. Base slightly indented at the axis. Aperture slightly oblique, depressed-lunar, *the outer and basal walls lined with a heavy, opaque-white calcareous layer*.

Alt. 5, greater diam. 8.5, lesser 7.7 mill. Aperture, oblique alt. 4, width 5.6 mm.

Hot Springs, Arkansas.

This species was collected by Mr. JOHN H. BRITTS, and sent by him to the collection of the *American Association of Conchologists*, where the types may now be seen. They were submitted to the writer by the President of the Association.

The more prominent characters of this shell are its imperforate base, depressed, almost quoit-like form, the base closely concentrically striated, the shining surface, and the contrasting colors of the last whorl.

Mr. Britts sent also, specimens of the rarely found 3-toothed form of *Helix appressa* Say, from Booneville, Mo., and a number of other interesting shells.

SOME NOTES ON NORTH AMERICAN FORMS OF VALLONIA.

BY DR. V. STERKI.

According to the investigations of Dr. v. Ihering¹ this group is to be separated from *Helix* and regarded as a genus, for anatomical characters. The study of these forms seems to have been somewhat neglected in our country. These are some distinct and characteristic forms and probably more will be found. Those known to me at present are shortly pointed out in the following, in order to direct the attention of conchologists to them and have them collected wherever and whenever possible, with records of the natural features of their habits.

1. *V. pulchella* Müller, the common form of the old and new continents. Here it seems to be remarkably constant in its appearance throughout the country, while on the other hand, slightly but constantly different forms may be found in neighboring places. Besides the smooth surface it is characterized by the slowly increasing whorls, the inner ones being comparatively large, and the last not so peripheric as in most of the other forms.

2. *V. costata* Müller. The typical form seems to be not generally distributed, in North America. It deserves specific rank, beside *pulchella*, and differs from the latter not merely by the rib-striæ, but by the more depressed spire, the more rapidly increasing whorls, the last one being more peripheral, so that a *costata* may be recognized, even when the ribs are wanting; generally it is also somewhat smaller; thus I found them in Europe as well as in this country. And the fact that the two forms keep distinct side by side, on both continents, is in itself a strong evidence in favor of their being different species. In some localities the one is found predominant, or exclusively, in some the other, and frequently they are found together.

3. From Illinois (Mr. Jas. H. Ferriss), Iowa (Prof. B. Shimek and Mr. Geo. W. Webster) and Kansas (Mr. Frank J. Ford) I have, in 1890 and '91, obtained a peculiar form: it is decidedly smaller (in bulk about $\frac{1}{2}$ of *pulchella*), strongly costate, the umbilicus comparatively wider than in *costata*, especially widening towards the aperture by the last whorl receding to the periphery, so that the

¹ Les Relations Naturelles des Cochlides et des Ichnopodes, Bull. Scient. 1891, p. 214.

aperture is very narrowly coherent with the penultimate whorl, and the aperture is circular, almost continuous, with a strongly thickened lip. The first whorls are remarkably small, the last grows rapidly in width and is more predominating than in the other forms. The spire is flat, but the whorls are well rounded above and the suture is very deep.

4. In a lot of minute shells, kindly sent for inspection a few days ago by Mrs. Judge Geo. Andrews, collected in damp moss on rocks at the Cliffs on Holston river, near Knoxville, Tennessee, there were a few specimens of a form nearly related to the preceding, and of the same size, yet with peculiar characters: the umbilicus is very wide, the "ribs" less strong, the last whorl comparatively narrower, widening more gradually; the peristome is continuous, somewhat "free" and the margin only slightly expanded, thin with no lip-thickening.

5. Mr. Theo D. A. Cockerell sent me two specimens of *V. cyclophorella* Ancey, from West Cliff, Colorado. They are of about the size of a typical *costata*, densely rib-striate, the spire is higher umbilicus a trifle narrower, the whole shell more compact in its appearance. The whorls are more slowly and regularly increasing, such as it is in *pulchella*, and the peristome is only slightly "reflected;" thin without a thickened lip.

Whether, and in how far, these forms are to be regarded as distinct species, or partly rather as well marked varieties, will and can be decided only after careful comparison of much more extensive material from different parts of the country. The soft parts also will have to be examined.

NEW PHILADELPHIA, OHIO, Dec., 1891.

LIMAX AGRESTIS LINN. IN CALIFORNIA.

BY W. J. RAYMOND.

In the NAUTILUS for October and December are notes concerning the earliest recorded appearance of this slug on the Pacific Coast, from which it appears that Rev. G. W. Taylor first observed it about seven years ago in Victoria, and recorded its presence there,

¹ Containing also, *Pupa contracta*, *curvidens*, and *Vert. Bollesiana*.

in the Ottawa Naturalist for December, 1889. I believe that the species was brought into Oakland about the same time as into Victoria, or, perhaps, a year or two earlier; certainly in 1884-5 it had become very abundant here, in gardens. In the Proc. Cal. Acad. Sci., Second Series, Vol. I, p. 13 (issued Dec. 31, 1887) Dr. J. G. Cooper published my observations on the presence of this *Limax* in Oakland, and predicted that it would become a pest to gardeners, as in fact it has done. This is the earliest published record of which I have knowledge, and the specimens, sent to Mr. Binney at that time, are probably those mentioned at the close of Mr. Cockerell's article. This slug is now gaining a foot-hold in San Francisco, for Mr. W. M. Wood has lately submitted specimens, from that city, to me, for examination, and has added the species to the San Francisco County list.

CATALOGUE OF FISSURELLIDÆ OF THE UNITED STATES.

BY H. A. PILSBRY AND C. W. JOHNSON.

A complete catalogue of the shells of the United States has long been desired by the many collectors who devote their energies especially to American mollusks, and naturally wish to know just what species are to be had. Mr. Campbell has already in these pages catalogued the *Haliotidæ*, and from time to time other groups will be taken up by various members of the American Association of Conchologists.

The *Fissurellidæ* of our area may be easily known by these peculiarities: the shell is limpet-like, and has either a perforation at or near the apex of the cone, or a slit or notch in its front edge. There are many anatomical characters also, peculiar to the family.

The group has been divided into three subfamilies, as follows:

- I. Apex of shell entirely removed by the perforation, which is bounded inside by a callus-rim which is not truncated behind. Central tooth of the radula narrow. Shell entirely external. FISSURELLINÆ.
- II. Shell as in *Fissurellinæ*, but hole larger. Central tooth of radula very broad, not narrowed above. Mantle wholly or nearly concealing the shell. FISSURELLIDINÆ.

- III. Apex of shell subspiral, not removed ; or if it be removed, the hole-callus inside is truncated or has a pit behind ; or there is a plate inside, as in *Crepidula*. Central tooth of radula wide, EMARGINULINÆ.

Subfamily I. *Fissurellinae*.

There is only one genus, *Fissurella*.

- A. Summit of the shell near the middle ; basal margins level, not elevated at the ends, Subgenus *Fissurella*.
 a. Edge of shell not crenulated, dark-bordered inside-true, Section *Fissurella*.
 b. Edge of shell crenulated, not dark bordered inside, section, Section *Cremides*.
- B. Shell flattened, shield-shaped, the narrow hole in front of the middle ; ends of shell elevated, Subgenus *Clypidella*.

Genus 1. FISSURELLA Brug.

1. *F. volcano* Reeve. Santa Cruz, Cal., southward.

(Section *Cremides* H. & A. Ad.)

2. *F. barbadensis* Gmelin. Charlotte Harbor, Fla., southward.
 One of the commonest West Indian shells, easily known by its almost circular perforation.
3. *F. nodosa* Born. Florida Keys.
 The ribs are nodular, orifice oblong.

(Subgenus CLYPIDELLA Swains.)

4. *F. pustula* Lam. Cape Lookout, southward.
5. *F. fascicularis* Lam. Florida Keys.
 The anatomy of these is not known. Collectors should preserve specimens of the animal.

Subfamily II. *Fissurellidinae*.

- A. Mantle entirely or nearly covering the shell ; hole large.
 a. Edges of shell nearly level, beautifully crenulated, *Lucapina*.
 b. Edges of shell elevated at each end, blunt at the sides, not crenulated, *Megatebennus*.
- B. Mantle not enveloping the shell.
 a. Perforation about central, the shape of the shell, *Lucapinella*.

Genus 2. LUCAPINA Gray, 1857.

6. *L. crenulata* Sowb. Monterey to San Diego, Cal.
The largest and most beautiful of the American *Fissurellidæ*.
7. *L. adspersa* Phil. Key West, Florida.
(*Fissurellidea fasciata* Pfr. of authors.)
8. *L. cancellata* Sowb. Tortugas.
The edges of the hole are bluish-black.

Genus 3. MEGATEBENNUS Pilsbry, 1890.

9. *M. bimaculatus* Dall. Monterey, Baulinas Bay, Purissima and Lobitas, Cal.
(*Clypidella bimaculata* of collectors.)

Genus 4. LUCAPINELLA Pilsbry, 1890.

10. *L. callomarginata* Cpr. Lobitas and San Diego, Cal.
11. *L. limatula* Reeve. Key West, Florida.

Subfamily III. *Emarginulinae*.

- A. Apex absorbed by the hole, which is bounded inside by a posteriorly-truncated callus, *Fissuridea*.
- B. Apex absorbed or remaining; anal fissure either a hole or a slit in the front margin; no hole-callus, but having a more or less developed septum back of the hole or slit.
- a. A perforation at apex or on front slope, *Puncturella*.
- C. No internal hole-callus or septum; apex not absorbed.
- a. Having a distinct slit in front, and a slit-band extending from it to apex, *Emarginula*.
- b. Having a hole on the front slope, *Rimula*.
- c. Slit short; no slit-fasciole, *Subemarginula*.

Genus 5. FISSURIDEA Swains, 1840.

This name was proposed for a highly arched species from the Philippine Is. It has hitherto been regarded as a subgenus of *Fissurella*. Its synonymy is as follows:

Fissuridea Swains., Malacol., p. 356, 1840, type *F. galeata* Helbl.

Glyphis Carpenter, P. Z. S. 1856, p. 223, type *G. aspera* Esch.

Not *Glyphis* Agassiz, 1843, nor of Gibbes, 1848, a genus of fishes.

(Atlantic and Gulf coast species.)

12. *F. Listeri* Orb. Florida Keys.
A strongly latticed species, related to the *F. greca* of the Mediterranean Sea.
13. *F. fluviana* Dall. Florida Straits, 76–100 fms.
14. *F. alternata* Say. Chesapeake Bay, southward.
Dead specimens have been collected at Cape May, N. J. by Prof. C. LeRoy Wheeler, but the species is not found there living.
15. *F. Tanneri* Verrill. Off Delaware Bay to Hatteras, in 104–142 fms.
16. *F. minuta* Lam. Turtle Harbor, Fla.
According to Deshayes, this is not the *minuta* of Lamarck ; We believe, never-the-less that it is. If not, however, it will be called *F. granulata* Anton. It is often called by Reeve's later name, *gemmulata*.

Several other small species, allied to *minuta* will probably be found in Florida, such as *F. variegata* Sowb., *F. arcuata* Sowb., etc.

(West coast species.)

17. *F. aspera* Eschscholtz. Sitka to Monterey.
The common West Coast form.
18. *F. saturnalis* Carpenter. Santa Barbara and San Diego, Cal.
This has been known universally as "Glyphis densicathrata Reeve," but I am informed by Dr. Dall and Dr. Stearns that Reeve's shell is a young *F. aspera*.

(Fossil species.)

19. *F. redimicula* Say. Miocene. Yorktown and James River, Va.; Patuxent River, Md.
Allied to *F. alternata*, but with far finer sculpture, and the hole nearly round. *F. catilliformis* Rodgers (Trans. Amer. Philos. Soc. n. ser. vi, pl. 26, f. 4, 1839) seems to be a synonym.
20. *F. alticostata* Conrad. Miocene. St. Mary's, Md.; James river, Va. (See Foss. Sh. Med. Tert. Form. p. 28, pl. 44, f. 19.)
The type is in the Acad, N. S. Phil. coll. Typically quite distinct from *redimicula*, but transition forms collected by Mr. Johnson in Va., seem to unite the two.

21. *F. Marylandica* Conrad. Miocene. Calvert Cliff, Md.
Types in Acad. Coll. Allied to *F. tenebrosa* Con., of the Ala.
Eocene. (See Fos. Med. Tert. p. 79, pl. 45, f. 4.)
22. *F. nassula* Conrad. Miocene. St. Mary's, Md.
Type in Acad. Coll. Distinguished from the following species
by its larger size, more depressed form, etc. The riblets are
notably equal, close, and not conspicuously latticed. (See
Foss. Med. Tert. Form. p. 78, pl. 44, f. 8.)
23. *F. Griscomi* Conrad. Miocene. Stow Creek, betw. Salem and
Cumberland Cos., N. J. (See Fos. Med. Tert. Form. p. 78,
pl. 44, f. 8.)
Type in Acad. Coll.
24. *F. tenebrosa* Conrad. Eocene. Claiborne, Ala. (See Fos.
Med. Tert. Form. p. 39, pl. 14, f. 9.)
Type in Acad. Coll.
25. *F. Mississippensis* Conrad. Eocene. (See Jour. A. N. S. P.,
2d ser., p. 113, pl. 11, f. 2.)
Allied to *F. tenebrosa* in sculpture, but the hole is quite differ-
ent. Type in Acad. Coll.
26. *F. Carolinensis* Conrad. Miocene.
A very distinct species, of which Mr. Johnson has collected
specimens on the Cape Fear River, N. C. (See Kew's Rep. Geol.
Surv. N. C. I, 1875, p. 22, pl. 4, fig. 1.)

Genus 6. PUNCTURELLA Lowe, 1827.

27. *P. noachina* Linn. Circumpolar, extending south to Cape
Fear in deep water.
28. *P. galeata* Gld. Puget Sound.
Dr. Dall has lately described a mammoth variety of this
species (var. *major*), from Bering Sea; it will probably occur
in Alaskan waters.
29. *P. Cooperi* Carpenter. Catalina Id., Cal.
30. *P. cucullata* Gld. Puget Sound to Monterey.
31. *P. circularis* Dall. Florida Strait. 539 fms.
32. *P. eritmata* Verrill. Off Rhode Island, 1451 fms.
33. *P. erecta* Dall. Off N. Carolina, 107 fms.

Genus 7. EMARGINULA Lam., 1801.

34. *E. compressa* Cantraine. Fla. Strait in deep water.
35. *E. bella* Gabb. Monterey, Cal.
36. *E. radiata* Gabb. Eocene. California.

We have not seen this species.

37. *E. arata* Conrad. Eocene. Claiborne, Ala. (See Foss. Tert. Form. p. 44.)

A magnificent species, having some characters of *Submarginula*.

Subgenus RIMULA Defrance, 1827.

38. *R. frenulata* Dall. W. Fla. and Keys.

Genus 8. SUBEMARGINULA Blainv., 1825.

39. *S. octoradiata* Gmel. Tortugas.
40. *S. Rollandii* Fischer. S. Fla.
41. *S. emarginata* Blainv. Florida Keys.

* * *

42. *Cemoria crucubuliformis* Conrad. Miocene of Cal.
We have not been able to find this species among Conrad's types. Its generic position is of course doubtful.
43. *Cemoria oblonga* H. C. Lea. Miocene. Petersburg, Va.
Type in Coll. A. N. S. P. (See Trans. Amer. Philos. Soc. 1843, p. 247, pl. 35, f. 37.)

We would consider this tiny shell a *Rimula* were it not that there is no anal fasciole extending from fissure to apex, and for the callus around the hole inside. These features cause us to believe it a very young *Fissuridea* ("Glyphis"), probably *F. alticostata* Conrad.

The authors will be glad to have any criticisms on this list, and also any extensions of the geographic or geologic range of the species.

GENERAL NOTES.

FOOD OF SNAILS. Have kept since last May a dozen *Helix alboblabris* in confinement. Have fed them 53 species of plants of which number they have refused to eat but five species, as follows: *Achillea millefolium* L., *Brunella vulgaris* L., *Vernonia noveboracensis* Willd., *Xanthium Canadense* Will. and a species of *Euphorbia*. They generally prefer the tenderest plants but refuse some that are tender and eat of others that are hard and stringy. They refuse the stalk and leaves of young growing maize but dig down and eat the germinating kernels. I kept them in a box with soil in the bottom and wire on the top. The corn was planted in the soil and grew to

the height of three or four inches. I shall continue these experiments next summer.—*Dr. G. D. Lind, St. Louis, Mo.*

MR. ELLWOOD PLEAS, of Dunreith, Indiana, has returned from a very successful collecting trip in Alabama. He secured about 100 species of marine shells from the Gulf, nearly 20 species of land shells, about 30 Strepomatidæ and 50 Unionidæ. About 250 species of fossils were collected, many very large and choice specimens among them.

EXCHANGES.

EXCHANGE.—Land, fresh water and marine shells from France and all other regions—shells also purchased readily. Species of the genus *Pecten* solicited.—*Mr. Bavay, Grand rue, Brest, France.*

FOR EXCHANGE.—The beautiful *Anodonta suborbiculata* Say and *corpulenta* Cp. from Thompson's Lake, Ill. Also many fine Unios from Spoon River, Ill. Fine *Helix multilineata* Say, and others. Will exchange for any species, not in my collection, land or sea.—*Dr. W. S. Strode, Bernadotte, Ill.*

A FEW NEW AND RARE SHELLS for exchange for other rare shells. *Clementia subdiaphana* Carpenter, *Nassa californiana* Conrad, *Surcula carpenteriana* Gabb, *Cancellaria crawfordiana* Dall.—*J. S. Arnheim, 8 Stewart St., San Francisco, Cal.*

EXCHANGE.—Offered British shells, land, fresh water and marine, for other shells not in my collection.—*E. R. Sykes, 15 Doughty St., London, W. C., England.*

WANTED.—Pacific Coast land and fresh water shells, slugs included. Will give British land and fresh water and marines, or Virginia land and fresh water species. Address, *Capt. W. J. Farrer, Box 43, Orange, Va.*

OFFERED—*Helix profunda, tridentata, albolabris*; *Zonites fuliginosus, inornatus, ligerus*; *Patula perspectiva, alternata*; *Selenites concavus*; *Physa heterostropha*; *Sphærium striatum*; *Ancylus fuscus*. Wanted, United States land and fresh water shells.—*S. H. Stupakoff, E. E. Pittsburgh, Pa.*

WANTED.—*Zonites* from any locality in exchange for British land and fresh water shells.—*Robert Walton, Charles St., Lower Roxborough, Philadelphia, Pa.*

WANTED.—*Vallonia* from all localities.—*Dr. V. Sterki, New Philadelphia, O.*

THE NAUTILUS.

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No. 10.

MOLLUSKS OF DORCHEAT BAYOU AND LAKE BISTENEAU, LOUISIANA.

BY T. WAYLAND VAUGHAN.

Dorcheat Bayou might, with some degree of propriety, be called a river. It is the largest stream crossed by the V. S. and P. Railroad between Shreveport and Monroe.

It rises in Nevada County, Arkansas, flows across Columbia County, in that state, into Webster Parish, Louisiana. Toward the southern portion of Webster Parish, it widens out, and forms Lake Bisteneau, which extends out of Webster Parish, forming the boundary between Bienville and Bossier Parishes, and empties into Red River, between Bossier and Red River Parishes.

I do not know precisely the length of Dorcheat. Its width and depth are both variable, depending upon the flooding rains. When I collected there in June, during low water, in some places one could wade across without getting in water much over knee deep. The stream was from twenty to fifty feet wide, I should judge. My collecting was done near the railroad crossing. Here Dorcheat had well defined banks, often composed of white sand or pebbles. These pebbles are very note-worthy. In some places, they form the bed of the bayou, and are fine places to collect from.

Lake Bisteneau is almost thirty miles long. Its width varies from thirty to sixty feet in summer to one mile in winter. There are no well defined banks to Bisteneau, the land sloping down gradually to the water's edge. The bottom of this body of water is abominable; one often mires almost to his waist in the nasty mud.

This is a striking contrast to the firm, pebbly bottom of Dorcheat. My collecting was done near Port Bolivar in Bienville Parish.

Before the railroad was built from Shreveport to Monroe, in high water steamboats ascended Lake Bisteneau and Dorcheat Bayou to the steamboat landing two miles from Minden, in Webster Parish.

This stream, Dorcheat and Bisteneau really being one stream, is of considerable interest on account of its shells. Of these it has a fair number of species. There are some interesting facts presented as regards the differences in the mollusks of the different portions of this same stream; for instance: I could not find a single specimen of *Unio hydianus*, *castaneus*, *nigerrimus* or *turgidus* in the portion of Bisteneau that I examined, while all are very abundant in Dorcheat.

The specimens of *castaneus* were nearly all much thickened anteriorly, something that was not noticed in specimens of *castaneus* collected elsewhere. The *nigerrimus* were larger and thicker shells than any other specimens found here. The specimens of *nigerrimus*, *hydianus*, *castaneus* and *anodontoides*, in Dorcheat, were found usually where they had bored into the sloping banks, *about at the water's edge*. The other specimens of *Unio* were found mostly on the rocky bottom. I have only one *mississippiensis* from Dorcheat. It was given me in a large lot of shells from there.

The *anodontoides* from Lake Bisteneau were large, heavy shells. It was the most abundant species of *Unionida* there. The bottom of Bisteneau in many places was almost covered with *Campeloma decisa*, and *Vivipara subpurpurea*. *Ammicola cincinnatiensis* was very abundant.

The following is a list of the species with their localities.

Unio anodontoides Lea. Bisteneau, Dorcheat.

Unio boykinianus Lea. Dorcheat.

Unio castaneus Lea. Dorcheat.

Unio chunii Lea. Dorcheat.

Unio gracilis Bar. Bisteneau, Dorcheat.

Unio houstonensis Lea. Bisteneau.

Unio hydianus Lea. Dorcheat.

Unio lachrymosus Lea. Bisteneau, Dorcheat.

Unio mississippiensis Con. Dorcheat.

Unio multiplicatus Lea. Dorcheat.

Unio nigerrimus Lea. Dorcheat.

Unio purpuratus Lam. Bisteneau, Dorcheat.

- Unio pustulatus Lea. Bisteneau.
 Unio pustulosus Lea. Bisteneau, Dorcheat.
 Unio texasensis Lea. Bisteneau.
 Unio trapezoides Lea. Bisteneau, Dorcheat.
 Unio trigonus Lea. Dorcheat.
 Unio tuberculatus Lea. Dorcheat.
 Unio turgidus Lea. Dorcheat.
 Unio zigzag Lea. Bisteneau.
 Margaritana confragosa Say. Bisteneau.
 Anodonta imbecillis Say. Bisteneau, Dorcheat.
 Anodonta stewartiana Lea. Bisteneau.
 Anodonta tetragona Lea. Dorcheat.
 Sphærium transversum Say. Bisteneau, Dorcheat.
 Campeloma decisa Say. Bisteneau, Dorcheat.
 Vivipara subpurpurea Say. Bisteneau, Dorcheat.
 Physa heterostropha Say. Bisteneau.
 Planorbis trivolvis Say. Bisteneau.
 Amnicola cincinnatiensis Anthony. Bisteneau.

(Extract from Proc. Cal. Acad. Sci. 2d. Ser., Vol. III.)

A NEW VOLUTOID SHELL FROM MONTEREY BAY.

BY J. J. RIVERS.

Scaphella (Voluta) Arnheimi.

Shell regularly formed, elongate-ovate; body whorl more than two-thirds as long as the spire; the spire an inch long, and made up of six whorls, the terminal nucleus being very small, pointed and oblique, which latter character places this species in the section *Scaphella* of Dall.

Ground color obscure yellow, covered by a layer of chalk-like deposit. The body whorl has some coarse longitudinal elevations and depressions, remnants of former lip extensions, and there are two large patches of dark rusty red at a wide interval which do not appear to form an interrupted band. The aperture is elegantly formed and measures $1-\frac{7}{8}$ inches long by $\frac{7}{8}$ inch wide. The inner lip is regularly outlined on the columella; columellar plaits four,

sharply oblique, the last one strongest, forming a prominent ridge parallel to the canal. The upper outlines of the mouth meet in a sharp angle, but the base has a well defined bifurcation. The whole of the aperture and the edge of the outer lip are heavily coated with enamel of a yellowish tint, and rust stained. Size $3\frac{1}{8}$ inches long, and $1\frac{1}{8}$ inches wide. Animal without operculum.

Dredged in Monterey Bay, California.

MORE ABOUT UNIO LUTEOLUS AND U. RADIATUS.

BY GEO. W. DEAN, KENT, OHIO.

I must admit after reading Mr. Simpson's notes in the December NAUTILUS that *Unio radiatus* is too erratic for my abilities. A species that takes on every *possible* form I apprehend would baffle any expert.

A specimen exactly like *luteolus* and wholly unlike *radiatus* as I know it, although in the Lea collection labelled *radiatus* with the locality Newton Creek, N. J., would, I fear, get into my collection in the tray with *luteolus*.

Locality is certainly important but with me does not overshadow everything else, and labels have told me so many lies that I have not the respect for them that I otherwise should have. With me the shell is the *central* idea, not the locality or the label. 'These are usually aids in determining species—not always.

Mr. Lea named a shell, now found in the Mahoning, *Unio sub-ovatus*, though from what locality his types came I do not know. It is now known to be the mature male of *U. occidentis* Lea. The following are, I think, all *occidentis*: *U. ventricosus* Barnes, *U. ovatus* Say and *U. cariosus* Say.

Another Mahoning River shell Mr. Lea named *U. kirtlandianus*. This is probably a variety of that protean species *U. subrotundus*, Lea.

It is a beautiful shell when young and may very properly retain the name as a variety.

I am in favor of weeding out the surplus names as fast as possible, but I apprehend that both *luteolus* and *radiatus* will remain good

and well defined species, all attempts to connect them proving failures.

I recognize the existence of abnormal sports and possibly hybrids and albinos, etc. These I did not contemplate, nor did I consider very young or old and eroded or decayed specimens. Barring these I still think I could find a dividing line sufficiently distinct.

I have not seen the dark colored *U. borealis* Mr. Simpson mentions but the types were furnished to Mr. Gray by Mr. Latchford of Ottawa, Canada and were taken from the Ottawa river. Mr. Latchford has given me a good suite of like specimens. They seem distinct enough for a good species but it is a close relative of *luteolus*, so close indeed that very young specimens are not easily separated. The glass, however, shows the lines of growth a little coarser and the shell consequently a little rougher.

My mind still dwells on the wonderful vagaries of the *Unio radiatus* as described by Mr. Simpson. I should have some dread of looking over the Lea collection with him for fear of getting so confused that I should not know my wife unless I had her labeled and was sure of her locality.

ADDITIONAL U. S. FISSURELLIDÆ.

We are informed by Mr. T. H. Aldrich that two species were omitted from the Catalogue of this family published in the last NAUTILUS, viz:

GLYPHIS ALTIOR Meyer and Aldrich.—Eocene, Ala. Jour. Cin. Soc. N. H. 1886, p. 41, pl. 2, figs. 16, 16a, 16b. Described under the genus *Fissurella*.

PUNCTURELLA JACKSONENSIS Meyer.—Eocene, Jackson, Miss. Bericht der Senckenbergischen naturforschenden Gesellschaft zu Frankfort a. M., 1887, p. 6, pl. 1, fig. 15.

The types of both of these species are in the collection of Mr. Aldrich.—*H. A. P. & C. W. J.*

PALUDINA JAPONICA MART. FOR SALE IN THE SAN FRANCISCO
CHINESE MARKETS.

BY WILLIARD M. WOOD, SAN FRANCISCO, CAL.

While on my way down town to business from my residence one morning, about nine o'clock, I found it necessary to pass through Chinatown in order to reach a certain store where I desired to leave an order, and while walking through the narrow, crowded, ill-smelling streets of that portion of the city, which by the way, contains some twenty-five thousand Chinese, my attention was called to a very large flaring red sign, upon which were Chinese letters, hung in front of a Chinese vegetable and butcher shop. I stopped a few moments to glance down toward the bottom of this sign, and saw a good sized wooden bucket. This was filled up to the top with dirty looking water and little brown shells.

I examined one and found it alive. Now was my chance to obtain a Japanese species for my cabinet; a species which I had never seen alive in this State before.

I found the proprietor of the shop and said to him, "Where did you get these, John?" "Me no sabbe," was his reply. Then I ventured to ask him for how much he sold them, and again came his reply, "Me no sabbe." Just then a Chinamen who was standing by, turned around, and evidently saw that we could not make each other understand, for he stepped up to me and said in very good English, "What you want? I tell him. I speak English."

By this fellow acting as interpreter, I found out that the shells in the bucket were the first lot brought alive from Japan. He informed me that they were called by the Chinese "Teen Law." I immediately asked him for the translation of this name. It means Field Shell.

He went on to tell me that these shells were very good to eat, and he had just bought some, intending to take them to his wife. She would throw them into boiling water, letting them remain for a few moments. Then they were to be taken out, the operculum removed, and the foot separated from the soft body, salted, peppered and eaten.

Having asked all the questions I desired, I thanked the interpreter and then purchased some, for which I paid the small sum of ten cents per dozen.

I visited the aforesaid Chinaman the next day intending to buy a few more of the shells, but was told that so eager were the Chinese in this city to eat the delicious meat of these shells that all of them had been sold in a very short time after arriving from the Steamer.

Not knowing the exact name of this species, I forwarded a few to my ever-helpful friend, Mr. Wm. J. Raymond of Oakland, Cal., who, comparing them with some of his Asiatic *Paludinidæ*, found them to be identical with a pair of specimens under the name of *Paludina Japonica*, Mart.

While preparing some of the shells for my cabinet, I discovered that each specimen contained inside, from twelve to eighteen young shells, about the size of a small *Succinea*.

I have kept two of the larger specimens alive in a tumbler full of water, changing it every two or three days, and often putting in a piece of cabbage leaf for them to feed upon.

A gentleman who recently arrived from Japan, tells me that children of the poorer classes go out in the rice fields, near Yokohama and gather the shells, selling them for a few cents a quart.

As this was the first shipment to America of this species alive, and it being also an additional species offered for sale in the markets of San Francisco, I write the above, hoping that the same will be recorded in the "NAUTILUS" and will be of some interest to its readers.

DO MOLLUSCA SHOW CHANGE OF CLIMATE IN NEW ENGLAND?

BY REV. HENRY W. WINKLEY.

A few days ago I received from Connecticut a series of shells which I was asked to identify. The specimens being in all probability a species of *Goniobasis*, I was not only unable to identify, since I know little or nothing of that genus, but also I had never known an instance of that genus being found in New England. If it is common in Connecticut will someone kindly inform me, and if not, may I ask observers if there is a tendency among shells to migrate in a northerly direction?

Reasons for the above question are as follows: A change of climate is claimed for New England, said change bringing a warmer

temperature and is probably due to the removal of forests. It is a well-known fact that species formerly common on the coast of Maine are now extinct, or nearly so, but these would indicate a colder temperature of the sea.

In support of the changed climate of the land, botany has revealed some proofs. The writer had just published a note on this subject in "The Observer" when the above named shells were received, and hence the question naturally arose, is this species a new-comer from the south? I should be glad to hear from others, for I see no reason why the mollusca may not give interesting facts as well as plants or other animal forms.

[SELECTED.]

ANTIPODEAN OYSTERS.

If I have a deep and lasting affection for anything in this world, it is for oysters. Wherever I go, one of the first inquiries I make is as to the oyster supply. If that is all right, I can look at the rest of things through rosy spectacles. I find a bivalvular view of life is always a cheerful one. I have made many strange acquaintances among oysters in the South Pacific, but never had any great difficulty in adapting myself to my company. You remember how wisely and feelingly dear old Tom Moore sang on that point :

'Tis sweet to know that where'er we rove
 We are sure to find oysters delicious, if dear;
 And when we are far from the beds that we love,
 We have but to make love to the beds we are near.

I may not have quoted the lines quite correctly, but they are near enough. The chosen Paradise of the oyster-eater is the North Island of New Zealand, for there the oysters are not only delicious but ridiculously cheap. Along the seashore in the lonely, sheltered friths and inlets about Auckland, every rock consists of a mass of oysters clustered together in a wonderful manner, but easily detached and opened when you know how. The best oyster-opening machine is a Maori girl with a brad-awl. The Auckland rock oysters have long, deep, ragged shells, but the oysters themselves are very small, plump, and beautifully shaped, very sweet and not at all coppery or watery. They are equally good raw, stewed, fried, frittered, or in a pie or

timbale. If you want to get them in perfection, however, you should sail down to the Island of Waihéké, in the Frith of Thames, fifteen miles from Auckland, a veritable Fairyland. Have your fairy on hand with her brad-awl; pick out a rock just awash at high tide; sit under a tree-fern, or in the shade of the sail of your boat; swallow the oysters alive as they come from the nymph's deft hands in their pearly, cup like shell; give each just one bite, to bring out all the flavor, as it goes down; and offer up pæans of praise to the Giver of all good things. Charles Kingsley declared a genuine Havana cigar was a thing to thank God for, and Charles Lamb wanted a form of grace to be said after reading an interesting book. The soul of man ascends to Heaven in gratitude, without a shadow of profanity, after assimilating a peck or so of Waihéké oysters. They are the most ethereal of all food. From time immemorial the Maoris have come from all the neighboring parts, and even from long distances, every summer, to feast on oysters in a particular bay at Waihéké. I have been there often. It is worth a pilgrimage from the other end of the earth. In the middle of New Zealand there are the famous Queen Charlotte Sound oysters, round and flat, and very firm in flesh, with just that sub-flavor of copper which some connoisseurs set such a value on, but which I confess I am not very partial to. Not but that I can eat a couple of dozen of Queen Charlotte Sound oysters with pleasure at any time—when Auckland rocks are not to be had. In the far south, at Stewart's Island—Providence has been very gracious to those people—superb oysters of quite a different kind are obtained in vast quantities, just when Auckland rocks are out of season. Stewart's Island oysters are large, round, flat, symmetrical oysters, which look simply splendid on the half-shell, and have a grand flavor and plenty of it, which makes them invaluable for cookery. A timbale or soufflé of Stewart Island oysters is something to make your hair curl. But nothing can shake my devotion to the Auckland oysters. It is founded on a rock. I am quite safe in saying that the biggest edible oysters in the world are found at Port Lincoln in South Australia. They are as large as a dinner-plate, and the same shape. I have seen them more than a foot across the shell, and the oyster fits his shell so well he does not leave much margin. It is a new sensation, when a friend asks you to lunch at Adelaide, to have one oyster set before you fried in butter or egg and bread-crumbs. But it is a very pleasant sensation, for the

flavor and delicacy of the Port Lincoln mammoths are proverbial in that land of luxuries. I mean, when they are cooked. Many people eat them raw, cutting off pieces with a knife and fork. I draw the line there. I was going to tell you about the Sydney oysters, in New South Wales, on the other side of the Australian Continent; but I must refrain. The memories are too tender. As Mr. Guppy said: "There are chords in the human heart."—*Edward Wakefield in Once a Week.*

GENERAL NOTES.

SHELLS IN PINE FORESTS.—In "Some Notes on American Land Shells," Prof. A. G. Wetherby states that "it is not worth while to search under or about pine logs for snails . . . and such I have ever observed to be the case in Tennessee, Kentucky and North Carolina; and the scarcity of land shells in forests almost or exclusively pine, is a fact well known." This statement has been of especial interest to me, having collected mollusca in Switzerland for years. There pine—especially fir—are the principal, and to a great extent exclusive, components of the forests in the valleys, and to a great percentage in the mountains, both Alps and Jura, and many of these forests are rather rich in snails. I can state from remembrance that almost all the land mollusca living in forests at all are found also in pine woods; and on the very trunks, logs, etc. of the same wood I collected *Limax*, *Vitrina* (as high as 3 feet from the ground), *Helix* (*personata*, *obvoluta*, etc.), *Buliminus montanus* sometimes higher than can be reached by the hand; *B. obscurus*; *Clausilia*, different species, etc.—*Dr. V. Sterki.*

LAND SHELLS IN PINE WOODS.—As a supplement to Dr. Sterki's observations, we must say that our collecting in pine districts both North and South, has given the impression that Prof. Wetherby's conclusion is correct as far as the Eastern U. S. is concerned. We have always found land shells rare in pine woods. In the Catskill Mts. where the writer collected during the past summer, the land shells ascend only as far as deciduous trees grow, none being found in the coniferous belt.—*H. A. P.*

MR. CHAS. T. SIMPSON left Washington last month for a collecting tour in Florida.

THE PHYSA seem to be a rather difficult object of study, as they present various aspects in different ages and from different places. They should be carefully collected and labelled and compared from a locality in the various seasons, as far as possible.—Conf. Mr. Stearn's article in NAUTILUS IV, 5.—*Dr. V. Sterki.*

FLORIDA HELICES.—We collected 500 well developed *Helix jejuna* on the tops of grass and weeds where they had taken refuge from the water a foot or more in depth. We also found a small form of *Vertigo ovata* and *V. ovulum* Sterki, also *Helix auriculata* and a variety of *Helix Postelliana* in great abundance. The water had driven them out to where they were easily found.—*Geo. W. Webster, Lake Helen, Florida.*

IN *Zoe*, vol. II, p. 134, Mr. Henry Hemphill has given a list of the West Coast mollusks which he has himself eaten, or known to be eaten by others. "All four of the Abalones, *rufescens*, *corrugata*, *fulgens* and *Crachrodii*, are edible, and their fine flavor has long been known to the sailors, fishermen and ranchers along the coast of California."

HELIX JEJUNA is found in the pine woods of Florida, and, so far as I know, is the only snail found in high pine timber.—*Geo. W. Webster.*

A specimen of *Pleurotomaria Adansoniana* Crosse & Fischer, lately found on the Island of Tobago, West Indies, has been purchased by Mr. R. F. Damon, of Weymouth, England. It is the largest specimen of the species known. Mr. Damon has published a life-size figure of this magnificent specimen.

EXCHANGES.

MARINE, land and fresh-water shells to exchange for the same from other localities. Lists exchanged. Would also exchange shells for works on conchology.—*Thomas Morgan, P. O. Box 164, Somerville, N. J.*

FOR EXCHANGE.—Land, fresh-water and marine shells from East and South-east Fla., for shells from other localities.—*Geo. W. Webster, Lake Helen, Volusia Co., Florida.*

I STILL HAVE a few more sets of California land, fresh-water and marine shells to exchange for other Pacific Coast and Eastern species, etc. Kindly send lists to—*Williard M. Wood, 2817, Clay St., San Francisco, Cal.*

VALLONIA WANTED.—Dr. V. Sterki, of New Philadelphia, Ohio, desiring to make a critical study of the American forms of this groups, solicits specimens of *Vallonia* from all parts of the Country. Named sets will be returned to each person contributing specimens. The editor heartily recommends collectors to communicate with Dr. Sterki.—*Ed. Nautilus.*

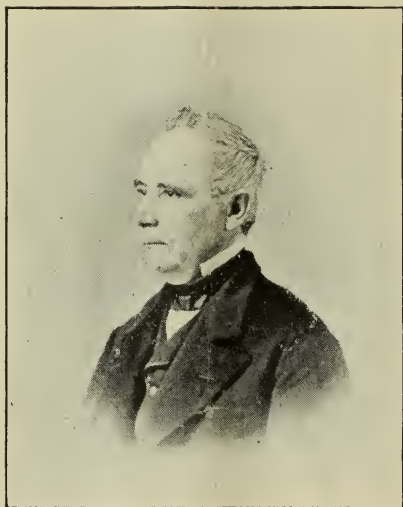
NEW PUBLICATIONS.

PROCEEDINGS OF THE CALIFORNIA ACADEMY OF SCIENCES, III, Sept. 1, 1891, contains the following conchological papers:

Notes on the Subalpine Mollusca of the Sierra Nevada near Lat. 38°, by W. J. Raymond, with appendix by Dr. J. G. Cooper. A valuable paper, giving the altitudes at which many species were found, with other useful notes. In an appendix Dr. Cooper gives additional notes on the same subject and describes and figures *Spharium Raymondi* n. sp., *S. lenticula* Gld., *S. partumieum* Say, *S. truncatum* Linsl., *Ancylus caurinus* Cp., *A. fragilis* Tryon, *Planorbis suberenatus* var. *disjectus* n. var., with many useful comparative notes. As a generic term for the "calyculate" species of *Spharium*, Dr. Cooper proposes *Primella*. This name becomes a synonym of *Calyculina* Clessin, founded upon the same peculiarity. *Planorbis suberenatus*, v. *disjectus* is a form like Ingersoll's *P. plexatus*, having the inner whorls on a different plane from the last one.

On land and fresh-water shells of Lower California, by Dr. J. G. Cooper. The following species are described: *Bulimulus inscendens* W. G. B. var. *Bryanti*, *Rhodea californica* Pfr. subsp. ? *ramentosa*. The last is an extremely interesting discovery, as the genus has been supposed to be entirely South American, the Californian citations of earlier authors having been discredited by many.

CATALOGUE AND SYNONYMY of the recent species of *Muricidæ*, by Frank C. Baker. The species of *Muricina* are enumerated in this paper by Mr. Baker, with notes on their distribution, variation, etc.



Dr. WESLEY NEWCOMB

THE NAUTILUS.

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No. 11.

IN MEMORIAM—DR. WESLEY NEWCOMB.

Dr. Wesley Newcomb, the last of the old school of conchologists, died at his home in Ithaca N. Y. on the 26th. of January at the advanced age of 84 years.. His name belongs on the roll of honor as one of a distinguished group of American Naturalists, who made themselves illustrious by their services in the development and advancement of the study of Natural History in this country, and their contributions to scientific knowledge. Among those who may be specially regarded as Dr. Newcomb's contemporaries, the names of Gould, Binney the elder, C. B. Adams, P. P. Carpenter, Bland, Conrad, Lea, Anthony, Couthouy etc., at once occur. While Lea and Jay were among the last to pass within the folds of

“ * * * the low green tent,”

before Dr. Newcomb, sad as it was, no doubt, to him, to note the loss of one old friend after another, he was happy in this, that his prolonged life, brought him in contact with many kindred spirits among the younger men and workers of the present, and he had the knowledge of their friendship and regard as a consolation.

In his early life he was more fortunate than many of his scientific friends. He had the conspicuous advantages of excellent teachers and a good education. He first attended the Academy at White Plains N. Y., and afterwards the Rensselaer now the Polytechnic Institute, at that time in charge of one of the best of the earlier scientists, Professor Amos Eaton; subsequently at the Jefferson Medical College, Philadelphia, and last at the Castleton Medical College, Vermont, where he graduated most creditably. As a pupil of Professor Eaton, he was, to use his own expression “forced into

the study of *shells*," in order to intelligently study *fossils*, of which otherwise he would have learned but little that was satisfactory. Living or recent shells were then termed "*Concha Marina*"—a lumping together amusingly indefinite and vague as seen in the light of to-day. To quote him further "I fancied recent shells would furnish a key to Paleontology and I expected in a few weeks of study to master the science of conchology." The result was somewhat disappointing; he found as all true students have found, whatever the path of study, that fresh vistas, eternally new, are constantly opening, and that with increased knowledge comes a wider and more distant horizon, and so like others who have the love and thirst and courage of learning, undaunted he kept right on.

His father, Simon Newcomb, of the fifth generation of the family in America, the first being Andrew who came to this country in 1635, was a physician. The son it will be noticed followed the father's profession. In 1838 he was fortunate in making a marriage that was in every way congenial; his wife a most estimable woman, his companion and friend for 54 years, survives him. After practising medicine in Albany, and a prolonged visit to the Antilles in 1846-7, in 1849 he went to California, thence to the Hawaiian islands in 1850, where he resided for five years. Here the opportunity for studying the interesting shells of the *Achatinellidae* was open to him, and he added over a hundred species to the number previously known. His exhaustive series of these beautiful forms is probably the finest extant, and the conclusions reached by him are without doubt more nearly correct, than those of other authors who have published on this rather difficult group.

In 1856 he returned to New York. In 1857 he went to Europe and part of the time had Dr. Gould for a companion. In London he had the pleasure of meeting many of the leading naturalists of the old world, Reeve, Gray, Sowerby, Adams, Hanley, Owen and others, and Deshayes, Kiener, Bernardi, Hupé and others in Paris. On his return to the United States he went to California in 1858 and established himself as a physician in Oakland, where he became well and agreeably known and soon had an ample practice. Here as elsewhere he continued his conchological studies, ever enthusiastic and ever ready to assist others as he had been from the beginning and was unto the end, all the while adding to his collection, already magnificent, and one of the finest and best arranged in the world. His generous encouragement to collectors as well as

occasional field-work himself, resulted in his adding several new species of Land, Freshwater and Marine forms to the molluscan fauna of the West Coast.

In 1867 the Newcombian collection was purchased by Mr. Cornell for the University that bears his name. Doctor Newcomb soon followed it to Ithaca and its re-arrangement and installation in the Museum of said institution, received his personal attention.

The same liberality that characterized his dealings with brother conchologists and collectors in the past, and the comprehensive system of exchanges established years before, notwithstanding the serious gaps that death had made in the list of his correspondents, continued to yield good fruit, and the collection after it had ceased to be his property, still received his fostering care, and was enriched by numerous and valuable accessions.

Dr. Newcomb was no closet naturalist wise in books yet unfamiliar with the things themselves. His erudition was inclusive and covered both. Twice he visited Europe, the chief object of his first visit being the further study of his profession; thrice he collected on the reefs in the Bay of Panama and southerly to Ecuador; also at many places in the United State of Colombia, Costa Rica, Nicaragua, Honduras and San Salvador. In 1846-7 before briefly referred to, he collected on twenty-one of the West Indian islands from Santa Cruz to Demerara, and subsequently at San Domingo, Hayti and Key West, also one winter on the Gulf coast of Florida where he made a large collection on the shores and by dredging the Sarasote Bays. In 1870 he was appointed sanitary expert to the San Domingo expedition by President Grant, the voyage being made on the U. S. S. Tennessee, and the following year, he was made one of the commissioners, to examine and report on the Sutro Tunnel, Nevada.

Dr. Newcomb was an honorary and corresponding member of many scientific societies at home and abroad. His numerous papers covering the period from 1849 to 1866, have appeared in their publications.

From the above it will be seen, how active was his life, and how enthusiastic his love of Nature. This love possessed him to the last. Of his character nothing can be said but praise. All who knew him will bear testimony to his noble sincerity and great goodness of

heart, unconsciously exhibited in numberless acts of kindness, generosity and benevolence.

So closed a life well rounded with fullness of years, of good will and of generous service.

R. E. C. S.

A NEW FLORIDA UNIO.

BY BERLIN H. WRIGHT, LAKE HELEN, FLORIDA.

Unio Oscari, n. sp.

Shell smooth, oblong, subcylindrical, greatly inflated; abruptly rounded anteriorly below and subangular above; basal margin subemarginate, posterior margin truncate and biangular, dorsal margin slightly arched; valves solid and not thick; beaks not prominent and always eroded; epidermis reddish-brown, darker toward the umbos and in the juveniles with fascicles of broad greenish and narrow orange-colored rays; umbonial angle rather sharp; posterior slope depressed in adults but broad; sides deeply grooved near the umbonial ridge with concentric rounded furrows; cardinal teeth very broad but depressed and not thick, oblique, very variable but usually double in the left and single in the right valve; lateral teeth curved and double in left valve; cavity of the beak nearly obsolete, cavity of the shell deep; cicatrices well impressed, the anterior distinct, posterior confluent, dorsal under the base of the posterior branch of the cardinal tooth; nacre purple and somewhat iridescent.

Diam. .8, length 1, breadth 2.4 in. (*extreme*).

Habitat. A creek from Lake Osceola, at Winter Park, Florida.

Collections of G. W. and O. B. Webster, B. H. and Dr. S. H. Wright, Museum Acad. Nat. Sciences, Phila. and National Museum.

Remarks. Over 100 specimens of all ages of this well marked and beautiful species were taken by the Messrs. Webster and submitted for examination. They are remarkably uniform in character and most nearly related to *U. Aheneus* Lea, from which it differs in having a smoother and nearly *polished* epidermis, cavity of the shell very much deeper and the lateral teeth shorter, heavier and wider.

It must not be confounded with *U. Hazelhurstianus* Lea, which has a rougher, blackish epidermis, greater breadth and not so inflated.

We take pleasure in naming this species for the discoveror, Mr. Oscar B. Webster, of Lake Helen, Florida.

ON THE SPECIES OF DONAX OF EASTERN NORTH AMERICA.

BY W. H. DALL.

Genus DONAX Linné.

The name *Donax* is derived according to most authorities from a Greek word meaning a reed or pole, perhaps in allusion to the radiating striæ which might recall a tuft of reeds. This word is derived from the feminine verb *doneo*, to wave or shake, and the author of the genus has regarded the resulting noun as feminine, forming the terminations of his adjective specific names in *a*. Some later authors have taken the derivative Latin *Donax* a reed, or, secondarily, a slender fish (Pliny), as the original form and have regarded the word as masculine. It would seem best to follow the original usage. In the endeavor to identify some species of this genus from the Tertiaries of North Carolina it has been necessary to review the recent species of the genus from the eastern coast of the United States and the result may be summarized in the following table.

DONAX s. s.

- A. With a distinctly sculptured lunule.
- a. Striæ punctate, lunule smaller than the truncation.
 - D. denticulata* Linné. Texas, Bahamas, West Indies to Rio Janeiro.
 - b. Striæ simple, lunule co-ëxtensive with truncation.
 - D. rugosa* Linné. Extra-limital, West Indies to Rio.
 - B. Without lunule, striæ simple.
 1. Sharply truncate.
 - a. Riblets of the truncate area simple.
 - D. striata* Linné. Extra-limital, Antilles, Colon.
 - D. Roemeri* Phil. Short, triangular. Galveston to Vera Cruz.
 - D. variabilis* Say. Longer, sculpture feeble. Hatteras to Galveston; W. I.?

b. Riblets granular or vermiculate.

D. texasiana Phil. Small, shape of *variabilis*. Galveston to Vera Cruz.

2. Posterior end more rounded, sculpture feeble.

a. Shell compressed.

D. fossor Say. Olive with blue rays. New Jersey to Mayport, Florida.

D. incerata Hanley. Small, subovate, very flat. Extra-limital, Bahamas.

b. Shell inflated.

D. tumida Phil. Small, very stout, polished. St. Augustine to Texas and Vera Cruz, Mexico.

IPHIGENIA Schumacher.

I. brasiliانا Lam. Lateral teeth obsolete. Indian River, Florida south to Rio Janeiro.

Donax protractus Conrad is an extremely large and senile specimen of *D. fossor*. *D. variabilis* presents similar modifications when very old, becoming abnormally long and arcuate. *D. parvula* Phil., is the very young *D. fossor*. *D. Lamarekii* Desh., is identical with *D. striata* Linné. *D. angustatus* Sow. is a well-grown *D. fossor*, not quite so old as the type of *protractus*. *D. elongatus* Sow. and *Hanleyana* Phil. (*vide* Sow.) equal *rugosa* Linné, *non* Sow. The writer has received adventitious specimens of *D. californica* Conr., *D. navicula* Rve. and *D. punctostriatus* Hanl. from Florida, as indigenous to that coast. The following species are known in the fossil state from the eastern United States: *D. idonea* Conrad is supposed to be Miocene and was described from a valve cast up on the coast of North Carolina and supposed to be from a submarine bed of fossils; *D. emmonsii* Dall (Emmons Geol. N. C. p. 298, fig. 227 which has been misplaced in the text) from the later tertiaries of Cape Fear River; *D. æquilibrata* Dall, same locality, collected by Mr. C. W. Johnson; *D. fossor* Say occurs in the Pliocene of Florida and South Carolina; *D. variabilis* in the Pleistocene of South Carolina. The Miocene references to these two forms are in need of confirmation and the *variabilis* of the Pliocene of Tuomey and Holmes is *D. fossor*. The Eocene forms referred by Conrad to the genus *Egeria* are doubtfully related to *Donax*. *D. æquilibrata* may be briefly characterized as follows: shell longer in proportion to its height than in any of our recent species, rounded in front, the posterior

end rostrate and pointed; truncated area impressed, its borders not carinated and ill defined, rostrum faintly grooved, the rest of the shell polished, with obsolete impressed lines; inner margin denticulate; hinge teeth well developed, laterals strong and near the cardinals; pallial sinus rounded and extending a little in front of the beaks; the latter are well-defined, not prominent and nearly central. Lon. of shell 17, Alt. 8.9, diam. 6 mm.

MOLLUSKS AS CAT-FISH FOOD.

BY CHAS. C. ADAMS, 806 EMPIRE ST., BLOOMINGTON, ILL.

In the NAUTILUS for Dec., 1891, Dr. W. S. Strode spoke of the destruction of Anodonta which some thought was the work of cat-fish.

Speaking of the food of the cat-fish, *Ictalurus nebulosus*, L. S. in Vol. II, p. 461, Bull. Ill., St. Lab. Nat. Hist., he says: "Mollusca make one-fifth of the entire amount of the food—more than one half of them Sphærium. This genus made nearly all the food of a large group taken from the Illinois River at Pekin in September, 1882, and also of two other specimens taken in the Illinois River at Peoria in Oct., 1887. Univalves were rarely present, amounting to only two per cent. of the food, taken, however by eight of the specimens. These included the usual forms—*Valvata*, *Melantho*, and *Ammicola*, taken with two or three specimens of *Physa*. Examples of *Pisidium* were rarely noted, and two had eaten Unios."

Speaking of *Ictalurus punctatus*, Raf., p. 456, he says; "Molluscan food was a decidedly important element, being found in fifteen of the fishes and amounting to fifteen per cent. of the whole. Several specimens had taken little or nothing else—notably six secured at Havana in Sept., 1887, and one at Peoria in Oct., of the same year. The Mollusca were about equally divided between gasteropods and lamellibranchs, the former largely *Melantho* and *Vivipara*, the latter usually Unio or Anodonta."

"Notwithstanding the number of bivalves eaten by these fishes, no fragment of a shell was ever found in their stomachs, but the bodies of the animals had invariably been torn from the shell while yet living as shown both by the fresh condition of the recently indigested specimen and likewise by the fact that the adductor

muscles were scarcely ever present in the fragments. Indeed, in only a single bivalve had the posterior adductor been torn loose. The Unionidæ were usually large and thin—probably in most cases Anodonta.

“I have been repeatedly assured by fishermen that the cat-fish seizes the foot of the mollusk while the latter is extended from the shell, and tears the animal loose by vigorously jerking and rubbing it about. One intelligent fisherman informed me that he was often first notified of the presence of cat-fish in his seine, in making a haul, by seeing the fragments of clams floating on the surface, disgorged by the struggling captives.”

“Still more interesting and curious was the fact that the univalve Mollusca found in the stomachs of these fishes were almost invariably naked, the more or less mutilated bodies having only the opercles attached. How these fishes manage to separate mollusks like *Melantho* and *Vivipara* from the shell, I am scarcely able to imagine, unless they have the power to crack the shells in their jaws as a boy would nuts, and then pick out the body afterward. Certainly the shells are not swallowed, either whole or broken.

“The number of Mollusks sometimes taken by a single cat-fish is surprising. As high as one hundred and twenty bodies and opercles of *Melantho* and *Vivipara* were counted in a spotted cat-fish taken at Havana in September of last year.”

PUBLICATIONS RECEIVED.

TERTIARY MOLLUSKS OF FLORIDA, by W. H. Dall. Part II. *On the Marine Pliocene Beds of the Carolinas.* (Trans. Wagner Institute, 1892.) In connection with his studies of the Caloosahatchie Pliocene fauna, Dr. Dall found it necessary to consider the other east American faunas supposed to be of the same age. The area where Pliocene might be expected to occur is bounded on the north by part of Virginia, and extends southward along the coast to South Florida. In his studies of the Carolinian fauna, which Heilprin has called “Carolinian or Upper Atlantic Miocene,” Dr. Dall was “forced to the conclusion that the fauna catalogued and illustrated by Tuomey and Holmes in their ‘Pliocene Fossils of South Carolina’ was not a true fauna at all, but a confusion of several distinct faunas, of which one was of true Miocene age, like

the Virginia Miocene, while another might reasonably be regarded as genuine Pliocene, and the stratigraphical equivalent in South Carolina of the Caloosahatchie beds of Florida.

“These views having been communicated to Mr. Joseph Willcox, of Philadelphia, that gentleman, with the assistance of Mr. Chas. W. Johnson, Assistant Curator of the museum of the Wagner Free Institute of Science, undertook to contribute to the solution of this interesting problem. In the autumn of 1891 Mr. Johnson, under the direction of Mr. Willcox, after conferring with the writer, undertook the search for genuine Pliocene beds in South Carolina. It was thought that the search would be most likely to be successful on the Waccamaw River and vicinity, a majority of Tuomey’s really Pliocene species having come from that region, while the seaward position of it relative to known Miocene of the State enhanced this probability.”

The sections obtained by Mr. Johnson during his investigations, and the collections obtained, enable Dr. Dall to “assert with confidence that—1, the presence of genuine Pliocene beds has been established in both the Carolinas; 2, the Pliocene of Tuomey and Holmes has been shown to be a confusion of species belonging to at least two horizons; and 3, that the classifications based upon the supposed characteristics of this non-existent fauna may now be consigned to oblivion, or at least removed from the geologic pathway in which they have been so long a stumbling-block. That their biological anomalies enabled the writer practically to predict this result is satisfactory testimony to the value of paleontology in geological work—a value which some modern writers have too hastily called in question.”

The general conclusions reached upon the conditions from the close of the eocene to the present time are of such general interest that we cannot forbear quoting them in full:

“The close of the Eocene was marked by a movement in elevation which raised Central Florida as an island above the level of the sea, separated by a wide strait from the continental shore-line of Georgia. At the same time a change of conditions took place by which the character of the fauna was subjected to a notable alteration. *Nummulites* and *Orbitoides*, genera which had formed until then most conspicuous members of the fauna, together with other foraminifera of smaller size, disappeared entirely, with numerous molluscan genera, and were replaced by others, notably *Orbitolites*. The fauna was a subtropical assemblage similar to that of the Central Antilles, and this continued for a time to be its character. Orogenic changes elsewhere intervened, and, probably by modifying the course of

the ocean-currents, affected the character of the Floridian fauna even more profoundly than did those changes which terminated the Eocene.

“The period between the inception of the Miocene and the modification of its original fauna covered the deposition of the beds comprising the Chattahoochee group of Langdon and the Tampa group of Dall, and, from the fact that its warm-water fauna is best displayed in the Chipola beds of Northwest Florida, along the river of the same name, may be called the *Chipola epoch*. During this epoch sub-tropical mollusks, such as *Cymia* and *Voluta*, flourished as far north as New Jersey. The temperature-indications of the fauna do not differ essentially as far as our knowledge goes, from those of the previous later Eocene fauna. At no succeeding epoch do we find subtropical or tropical mollusks extending northward to such a distance from their present range. If any of the leaf-beds of Greenland are really Miocene, these facts authorize the suspicion that the period when walnuts ripened on the shores of the Arctic Sea may have been synchronous with the warm Chipola epoch of the early Miocene.

“Whether an eastward deflection of the Gulf Stream, connected with elevation of the Great Carolinian Ridge, or some other undetermined cause, offered the opportunity, a colder inshore current seems to have crept southward along the continent, penetrated the strait between Georgia and Florida, and washed the northern shores of the Gulf of Mexico. With it came the cold-water fauna appropriate to its temperature. This fauna began early in the north, nearly the whole mass of the New Jersey, Maryland and Virginia Miocene being of this character. Southward the mass relative to that of the Chipola epoch gradually diminishes, being less in the Carolinas and least in the Floridian region. With this fauna were introduced the conspicuous forms which are known as characteristic of the Miocene of Maryland and Virginia, the large *Pectens* and *Arcas*, *Venus* and *Ecphora*. Profusely developed about Chesapeake Bay, where it is found in those beds to which Darton and the writer, independently, came to apply the name of Chesapeake, the period in which it flourished may appropriately be designated as the *Chesapeake epoch*. The fauna introduced at this time has left lasting traces on the fauna of the Gulf of Mexico even to the present moment, but never reached as far south as the Florida Keys or the southern portion of the peninsula. The faunal change was decidedly the most important mutation which is traceable in the fossil vertebrate faunas of the Gulf and Floridian region during the whole of Post-Eocene time.

“The Chipola epoch here, in general, was a period of very slow and gentle elevation, followed at or near its close by a slight depression equally gentle.

“The Chesapeake epoch in the South was in the main a period of quiescent deposition, and was closed by a very important movement in elevation. In the Central American region (notably Costa Rica), the Miocene rocks were elevated to a height of 12,000 feet above the sea. The Panamic connections between the Caribbean Sea and the Pacific Ocean were definitely terminated, and the connection between the continents of North and South America finally brought about. On the northern shores of the Gulf of Mexico the elevation was more moderate, but considerable, and by it the island of Florida was united to the Georgian mainland and the previously existing strait permanently closed. This event, in the classification proposed by the writer, terminates the Miocene.

"The products of erosion resulting from the rising of the land were probably those laid down as the Grand Gulf beds of Hilgard and the Altamaha Grits of Georgia. The water in which they were deposited was for the most part fresh or brackish, and the littoral subsidence so gradual as to practically exclude the sea and its fauna.

"The Pliocene of Eastern America, as understood by the writer, begins with the culmination of the movement in elevation just described, and ends with the beginning of the Glacial period.

"The elevation on the continent resulted in the immediate increase of fluvial erosion, and the continued and accelerated creation of perezonal formations similar to the above-mentioned Grand Gulf-beds, especially the Lafayette or Appomattox formation of McGee. The discharge of immense quantities of sediment must have rendered the shores less adapted to profuse molluscan life than they had been during the Chesapeake epoch. At all events, the Chesapeake fauna seems to have receded, and to have been gradually followed up by the warm-water fauna which succeeded the Chesapeake and is preserved in the Caloosahatchie beds. As the peninsula of Florida has preserved an unbroken record of this era, it would seem appropriate to apply to it the name of the Floridian epoch, and slightly modifying Prof. Heilprin's use of the term, to refer all deposits of similar paleontologic contents to a single assemblage in the system under the name of the Floridian group.

It is probable that the South American vertebrates, such as *Glyptodon*, which found their way northward after the union of the continents, did not immediately reach the Floridan peninsula; but, whatever their migrations, it is certain that during the Middle Pliocene they made their appearance in that region. Their bones, sandwiched between fossiliferous rocks of Pliocene age, establish this fact beyond controversy.

The invertebrates appear—in Florida, at least—to have flourished peacefully, and the extinction of some of the most conspicuous forms of the fauna appears to have been brought about by a movement in elevation which raised their favorite shallows above the sea—an elevation not necessarily of many feet in altitude. At all events, a majority of those species which live preferably in moderate depths of water, as opposed to littoral forms, still persists in similar situations, unmodified to any notable extent.

The orogenic independence and singular tranquillity of the area which originally formed the island of Florida, contrast strongly with the disturbances in elevation or depression of which both continental and Antillean geology give evidence. It would seem almost as if Florida had rested on the axis of the disturbances, and the tilting northward and southward been minimized at that point.

For the beds exhibited in South Carolina along the Waccamaw, above the Cretaceous marl, as sectionized by Tuomey and Johnson, the name of *Waccamaw beds* may be adopted. For those which are found along the estuary of the Neuse River the local Indian name of *Croatan beds* may be used. Both, as will subsequently appear, may be referred to the Floridian group or epoch. The relations of our later Tertiaries may be broadly summarized as follows:

Later Eocene.

Vicksburg group (Jackson, Vicksburg and Salt Hill formations).
 Ocala group (Nummulitic beds of Florida).

MIOCENE.**Chipola Epoch.**

Chattahoochee group (Hawthorne and Ocheesee beds).
 Tampa group (Shiloh marl, Tampa and Chipola beds).

Chesapeake Epoch.

Chesapeake group (Maryland, Virginia, etc.).
 Grand Gulf group (Grand Gulf beds, Altamaha Grit, etc.—Epoch of elevation begun and in progress).

PLIOCENE.**Floridan Epoch.**

Lafayette group (Lagrange beds, Orange sand, etc.; culmination of elevation).
 Floridan group (Caloosahatchie, De Soto and Waccamaw beds, etc.).

PLEISTOCENE.**Glacial Epoch.**

A FOURTH SUPPLEMENT TO THE FIFTH VOLUME OF THE TERRESTRIAL AIR-BREATHING MOLLUSKS OF THE UNITED STATES, by W. G. Binney. (Bull. Mus. Comp. Zool. xxii, no. 4). Mr. Binney's series of *Supplements* has become one of the established Institutions of our Conchological World. This last number is no less interesting and useful than its predecessors. It contains a resumé of systematic work in this department from the date of the 3d supplement to July 1, 1891. Most of the descriptions of new forms have already appeared or been noticed in the NAUTILUS, except the following: *Glaudina decussata* var. *Singleyana* W. G. B., Central Texas; *Zonites shepardi* Hemphill, Santa Catalina I.; *Z. carolinensis* Ckll., Mts. of N. C.; *Z. diegoensis* Hemphill, Julian City, San Diego Co., Cal.; *Polygyra 7-volva* var. *Floridana* Hemph., Oyster Bay, Fla.; *Pupa coloradoensis* Ckll., and a number of new color-varieties of *Patula* and *Aglaia*.

Mr. Binney gives generic diagnoses of the genera *Pristiloma* and *Punctum*, groups which he had formerly referred to *Microphysa*. Much useful matter has been added to our knowledge of the West Coast Slugs, the figures and anatomical details being especially acceptable. The four plates illustrate the new species and varieties described. There are also numerous figures in the text. We congratulate Mr. Binney on the completion of this supplement, and hope that he will, in due time, give us still another.

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NOTES ON THE COLONIZATION OF FRESH-WATER SHELLS.

BY WM. B. MARSHALL, N. Y. STATE MUSEUM, ALBANY, N. Y.

In the American Journal of Conchology, vol. iv, 1868, p. 245, Dr. James Lewis said:

“With a view to derive useful information for experiments in the colonization of species of mollusca, it may be well to remark that, in continuation of experiments heretofore attempted, in June, 1868, a considerable number of species of mollusca were transported from the Mohawk River to the outlet of Schuyler’s Lake, in Otsego County (about 18 miles south from Mohawk). The species which were deposited there are as follows: *Melantho integra* DeKay, *M. rufa* Hald., *Trypanostoma (Mel). subulare* Lea, *Goniobasis niagarensis* Lea, *Somatogyrus isogonus* Say, *Amnicola cincinnatiensis* Anth. and *Bythinella (?) obtusa* Lea.

“If in future years any of these species should be detected in any portions of the Susquehanna River, it may be presumed they are derived from stock colonized in the outlet of Schuyler’s Lake. Experiments made, having in view the establishment of *Vivipara contectoides* Binney, (*Pal. vivipara* Say), in the Mohawk River and Erie Canal, do not seem to have been successful. It is, however, thought desirable to continue these experiments, as the results of them may possibly be such as, in some instances, to throw light on the causes which influence the production of varieties. Contributions of living molluscs for this purpose are much desired by the writer.”

It would be gratifying to know the results of these experiments. Dr. Lewis' language implies that the species which he deposited in Schuyler's Lake in 1868 did not inhabit the Susquehanna nor any of its tributaries previous to that year. Perhaps some of the readers of the NAUTILUS have specimens of some of these species taken from the Susquehanna. If so they may be able to show that Dr. Lewis was mistaken in supposing that the species did not inhabit the Susquehanna; or that his experiments were successful.

So far as *Vivipara contectoides* is concerned, his attempt to colonize it in the Mohawk River and Erie Canal has been eminently successful. The species is firmly established in both the canal and river, and has spread many miles from the place of its introduction. Beautiful specimens are abundant in the neighborhood of Albany, occurring in the Erie and Champlain Canals and in the Mohawk and Hudson Rivers. The specimens found here do not show any variation from specimens taken in the natural habitat of the species.

Incidentally it may be remarked that Dr. Lewis' experiment emphasizes the importance of carefully prepared local lists of species; and the importance of recording the dates on which specimens are collected. There is no doubt that the geographical distribution of many species of mollusca is being more or less influenced by human agencies. This is especially true of fresh-water species. Canals have been dug in various parts of the country, connecting the waters of streams which differ widely in their faunæ. Other canals are in the course of construction and many others are projected. It is probable that some species of fresh-water shells will thus be afforded the means of extending their habitats.

In future years it will be desirable to know, for a given locality, what species are indigenous and what species have been introduced. In order to obtain this knowledge it is absolutely necessary that there should be exhaustive lists or collections of the species of the given locality made before the operation of man's disturbing influences.

ON AN UNDESCRIBED CYTHEREA FROM THE GULF OF MEXICO.

BY W. H. DALL.

Cytherea texasiana, n. s.

Shell resembling in general features *C. convexa* Say, but larger more elongate in proportion and with a more delicately sculptured

surface. Shell moderately inflated, beaks not very prominent, surface white, the young nearly smooth but gradually becoming finely concentrically wrinkled toward the margin and the wrinkles wavy or more or less interrupted; lunule large, similarly sculptured, bounded by an impressed line but not depressed; there is no defined escutcheon; epidermis thin, pale, closely adherent and smooth; interior chalky white, polished; pallial sinus angular and deep; margins smooth; sockets of the hinge deep, hinge teeth normal, slender; the anterior tooth small but well defined.

Shape of the shell very nearly a true oval, the height greatest about midway between the two ends; base and ends evenly rounded. Lon. of shell 67.0; alt. 49.0 diam. 32.0; beaks behind the anterior end 20.0 mm.

This fine species is No. 291 of my list in Bull. 37, U. S. Nat. Mus., where it was referred with doubt to a fossil species which proved to be of a different character. It was first collected by Wurdeman during the earliest Coast Survey work on the Texan coast (about 1856) and has since been sent to the National Museum from Galveston by R. R. Gurley of the U. S. Fish Commission and later by J. H. Singley of the Texas Geological Survey. It is a *Dione* of the section represented by *D. Sayana* or *convexa* and must, when in really fine condition, be a very elegant species.

A FEW OBSERVATIONS CONCERNING DEATH OF FRESH WATER MOLLUSCA.

BY DR. V. STERKI.

In the last number of the NAUTILUS Dr. Strode reports the death of *Anod. corpulenta* Cpr., in Thompson's Lake, Ill. To his case I would add a few observations of a similar nature, though not so striking, which may, in some way, help to elucidate the question.

A few years ago, at exceptionally low water, I found in the Tuscarawas River, numerous *Unio subrotundus* Lea, dead, in their natural positions, buried in the gravel, the valves slightly gaping. The soft parts were in a more or less advanced state of putrefaction, partly dark colored. This last fall I noticed the same phenomenon in the same place; it was amidst the river bed, around some small low-water banks, in very shallow and comparatively quiet water,

while quite near, in deeper and running water, the mussels were alive and healthy as usual. There is hardly a doubt as to the cause of death in this instance: fish certainly did not kill them, nor any other animal; but evidently it was the sun heating the bottom and the water, probably also changing the latter, and in addition, promoting the development of bacteria, etc., causing disease.

As to the wholesale destruction related by Dr. Strode, the case is somewhat different, since there was a lake 5 miles long, but very shallow, as the doctor says in the April number, and *Anod. corpulenta* lived near the shore. May we not draw the conclusion from these facts, that the long continued heat and evaporation, directly and indirectly, probably were the cause of that terrible dying? On the other hand, we may think that one species is more delicate, more predisposed to and less resistant against certain destructive agents. It is too well known that the past late summer and fall were exceptionally dry, and I presume that not only millions of fish as well as *Najades* and other fresh-water animals fell its victims in a great part of the country—from drying up as well as from deterioration of the water—but also of the minute and delicate land snails a great percentage probably perished.

In October past I visited a few small ponds, sloughs, where the water had dried up for the most part in some, still standing 1–1½ feet deep in others. Most of the aquatic plants, thrifty in spring and early summer, were rotten or in poor condition, a dark, sooty mass covering the bottom, evidently the remnants of decayed organic matter. Of mollusca, there were very few alive, and to my surprise, the *Limnæidæ* were almost all dead, while in one place numerous *Annicola* were living, in another *Valvata tricarinata*: is it not strange that “pulmonata” could not survive where branchiata were doing well?

Again in November I found on Tuscarawas river, a small mud hole, about 5 feet long, the water two feet deep, on the bottom a thick layer of that dark, soot-like mass. There were a number of *Melantho*, evidently in good health, while I could not detect a single specimen of *Limnæa*, *Planorbis*, *Physa* or *Ancylus*.

These observations were made somewhat hastily, and might have been more exact; yet I think they are not without some interest.

THE LAND MOLLUSCA OF THE CAYUGA LAKE VALLEY.

BY NATHAN BANKS.

Cayuga Lake is one of a series of lakes in central New York. The region around its upper end is very interesting, not only on account of its beautiful and varied scenery but also because of its rich flora and fauna. The hills are high, and there are numerous streams which have worn deep gorges in the hillsides. At the head of the lake is a large marsh. Not far from the lake (about ten miles from Ithaca) are several *Sphagnum* bogs. The varied natural conditions favor an augmentation of species; and, I think for a locality in the northern part of the U. S., the following list is moderately large. Some of the smaller species are not represented, perhaps because I did not look sufficiently close for them. Many notes were made on local variation, distribution and the habits of the more common species. The fresh water shells were also collected and made a good showing. In the list I follow nearly the arrangement of Pilsbry's list.

1. *Selenites concava* Say. Common.
2. *Limax maximus* Linn. Uncommon.
3. *Limax flavus* Linn. More common.
4. *Limax campestris* Binn. Quite common.
5. *Vitrina limpida* Gld. Rare.
6. *Zonites fuliginosus* Griff. Common.
7. *Zonites friabilis* Binn. Rare.
8. *Zonites lævigatus* Pfr. Uncommon.
9. *Zonites intertextus* Binn. Frequent.
10. *Zonites ligerus* Say. Uncommon.
11. *Zonites inornatus* Say. Frequent.
12. *Hyalina nitida* Mull. Not uncommon.
13. *Hyalina arborea* Say. Very common.
14. *Hyalina radiatula* Alder. Frequent.
15. *Hyalina indentata* Say. Frequent.
16. *Hyalina limatula* Ward. Uncommon.
17. *Hyalina minuscula* Binn. Frequent.
18. *Hyalina milium* Morse. Rare.
19. *Hyalina binneyana* Morse. Rare.
20. *Conulus fulvus* Drap. Common.
21. *Gastrodonta multidentata* Binn. Frequent.
22. *Tebennophorus carolinensis* Bosc. Common.
23. *Tebennophorus dorsalis* Binn. Frequent.
24. *Patula alternata* Say. Very common.
25. *Patula perspectiva* Say. Uncommon.
26. *Patula striatella* Anth. Frequent.

27. *Helicodiscus lineatus* Say. Common.
28. *Punctum minutissimum* Lea. Common.
29. *Mesodon thyroides* Say. Common.
30. *Mesodon albolabris* Say. Very common.
31. *Mesodon dentiferum* Binn. Rare.
32. *Mesodon sayii* Binn. Uncommon.
33. *Stenotrema hirsuta* Say. Very common.
34. *Stenotrema monodon* Rack. Very common.
35. *Triodopsis tridentata* Say. Very common.
36. *Triodopsis palliata* Say. Frequent.
37. *Vallonia pulchella* Mull. Very common.
38. *Strobila labyrinthica* Say. Uncommon.
39. *Pupa corticaria* Say. Frequent.
40. *Pupa rupicola* Say. Uncommon.
41. *Pupa armifera* Say. Common.
42. *Pupa contracta* Say. Common.
43. *Pupa simplex* Gld. Rare.
44. *Pupa milium* Gld. Uncommon.
45. *Vertigo ovata* Say. Uncommon.
46. *Vertigo gouldii* Binn. Frequent.
47. *Vertigo bollesiana* Morse. Uncommon.
48. *Vertigo pentodon* Say. Frequent.
49. *Ferrussacia subcylindrica* Linn. Frequent.
50. *Succinea avara* Say. Rare.
51. *Succinea obliqua* Say. Common.
52. *Succinea ovalis* Gld. Frequent.
53. *Carychium exiguum* Say. Rare.

I include *Carychium* on the list because I have always found it, though in damp places, quite removed from bodies of water. It was usually found on the roots of various plants that grew in damp places. The *Succinea avara* was found but once, and not far from water; the *S. ovalis* usually near the lake shore. *Ferrussacia* was frequent under leaves in very damp places. *V. pentodon* was the most common *Vertigo*, often on the exposed roots of cedar. *Pupa simplex* was found but once, and in a very wet locality. *P. contracta* and *armifera* were common in various places; but *P. contracta* was found in more places than *P. armifera*. *P. corticaria* was always seen on trees. *Strobila* was found in places where *P. armifera* and *contracta* were common and *E. multidentata* was occasional. *Vallonia pulchella* could be found both in wet places and under dry stones, high up on hills. *Triodopsis tridentata* was everywhere but *T. palliata* was usually found in damp and shady glens. *S. hirsuta* and *monodon* anywhere under stones and pieces of wood. *Mesodon albolabris* was larger on the hillsides than in the valleys. In some small localities *M. thyroides* was more com-

mon than *M. albolabris*. *M. dentifera* was only seen in very dark, cold, wet swamps, in places where *T. palliata* seemed to flourish best. *M. sayii* was found on hills in dry places. I have noticed a curious habit of economy in some specimens of *M. thyroides*. On watching them crawl alternately over very rough and glazed paper, I saw that while moving over the rough paper the whole length of the foot was upon the paper; but on glazed paper the animal would only touch the paper in two or three points, keeping two or three parts of the foot free from the paper. Thus, the track of the snail over the glazed paper consisted of a series of spots of dried slime where the foot had touched, while the intermediate spaces were perfectly clean. *H. lineata* was usually found in wet and rocky places. *P. striatella* was found in similar locations, while *P. perspectiva* was found under logs and chips of wood in dry places far removed from bodies of water. *P. alternata* hibernates in large communities; forty-four specimens, over a year old, were found under a single overturned rotten stump. *T. carolinensis* usually in rotten logs, but sometimes climbing trees. *T. dorsalis* in very wet places. *H. indentata*, *radiatula* and *nitida* were most abundant in damp places. *Z. inornatus* usually in the valley, while *Z. lævigatus* and *intertextus* were most common on hills and rocky places. *Vitrina* was only found on a low island in a pond, almost at the water's edge. *L. maximus* was sometimes seen quite a distance from buildings. *S. concava* was most common in rocky situations.

A FEW QUERIES AND NOTES.

BY T. WAYLAND VAUGHAN.

In the discussion of Messrs. Simpson and Dean, relative to the distinguishing characteristics of *Unio radiatus* Barnes, and *Unio luteolus* Lamarck, one point seems not to be brought out, that would surely interest all lovers of *Najades*. Are there ever any variations that show the gradual vergence of the hard, highly polished epidermis of *luteolus* into the rougher epidermis of *radiatus*?

Of *hydianus*, a close relative of *luteolus*, I can say: to-day, I examined over 250 specimens (I counted the specimens), from four streams in Northwest Louisiana, to see what variation there might be in the character of the epidermis. In nearly every specimen, the epidermis was perfectly smooth, glass-like, throughout. In a few

large somewhat overgrown specimens, towards the margin of the shells, the epidermis was somewhat rough, corresponding to the lines of growth; but then, not in the least presenting any such appearance as shown by *U. radiatus*.

As showing how variable in form *U. hydianus* is, the following measurements from two female specimens may be of interest.

First specimen, length 61·5 mm., height 42 mm., diameter 36 mm.
Second specimen, length 55 mm., height 33 mm., diameter 20 mm.

The great amount of this variation may be made clear to the eye, by laying off on a line the length of the first specimen, on a line perpendicular to the first, lay off the diameter of the first specimen; on the same lines as axes, lay off the corresponding dimensions of the second specimen.

In this day of scientific enlightenment, men have come to look upon *chance* as having no place in *Nature*—but all is the outcome of certain definite causes, which may often act in a complex manner. Accordingly our friends in the botanical world have tried to explain to us the origin and use of the varied beautiful forms and colors that we find among flowers; the entomologists try to explain to us the origin and use of various colors—some sombre, some gaudy—that we find in the insect world. A certain amount of study has been put upon the origin and use of colors among marine molluscs; and dynamical causes have been proposed for structures found among marine molluscs. Has anyone ever tried to account for the radiations in our *Unionidæ*? or for the magnificent purple nacre of the *Uniones purpuratus, graniferus* or *verrucosus*? What is the origin and use of the pustules, found in the many groups of *Unionidæ*? What is the origin and use of the plications in our various plicate *Unionidæ*? Also, have the adult *Unionidæ* been found to have any natural enemies, that feed upon them? Do turtles ever eat *mussels*, might be asked.

These are questions that no one is paying any attention to, seemingly, and surely offer room for much work among students of *Unionidæ*.

WE HAVE LATELY RECEIVED specimens of *Helix vendryesi* n. sp. from Mr. T. D. A. Cockerell, of Kingston, Jamaica. The new form closely resembles *H. sloaneana*, but is more depressed than usual in that species, is more carinated, and of a very handsome dark purple-brown color. It is from Montego Bay, Jamaica.—*H. A. P.*

MORTALITY IN MUSSELS AT ORANGE, VA.

BY W. J. FARRER, ORANGE, VA.

Referring to Mr. Strode's paper in the December number of the NAUTILUS, I, too, have been lately much puzzled at finding dead mussels in large quantities in the ponds about this place; hundreds may be picked up each morning on the edges of one pond, especially that belonging to a grist mill. *U. hyalinus* and *A. williamsii* seem to be the principal sufferers, for although *A. edentata*, *M. undulata* and *U. complanatus* abound in the same pond, only a few empty shells of these latter are found and they seem to have been cleaned, out by raccoons; the other two species are always found with the animal entire and for the most part full of spawn. This, as well as the other ponds about, has been unusually low throughout the last two months and with Mr. Strode I think low water and not catfish, accounts for the bivalve mortality.

I may mention that in the same pond large numbers of catfish have died throughout the summer and autumn; some I took in a dying state had a growth of fungus on the body.

LITTORAL LAND SHELLS OF NEW JERSEY.

BY H. A. PILSBRY.

The Atlantic shore of New Jersey is so sandy that few land snails find suitable conditions there. I have seen specimens of only the following species from the immediate neighborhood of the coast, restricting this to a strip of say one or two miles inland.

Helix (Mesodon) thyroides Say.

All the eastern New Jersey specimens are thin and light, resembling the *bucculenta* form more than the typical *thyroides*.

Those from Asbury Park are toothless, have the umbilicus half covered, and measure from 17 to 19 mm. diameter.

Specimens from Point Pleasant, N. J., collected by Messrs. F. H. Brown and Witmer Stone are even smaller than those collected by myself at Asbury Park. Compared with the typical *thyroides* these specimens are much smaller, generally more globose and conoidal,

although this character is variable. The umbilicus is about half closed. Specimens measure :

a. Alt. 12, diam. $16\frac{1}{2}$ mm.

b. Alt. $10\frac{1}{2}$ diam. 17 mm.

A very small tooth is developed in some examples. The shells correspond more closely to the southern variety *bucculenta* than to the usual *thyroides* of the north. It appears, indeed, as Mr. Stone has suggested to me, that this form is a member of the Carolinian fauna, which extends far to the northward in eastern New Jersey.

Helix (Mesodon) albolabris maritima Pils.

Many specimens from the vicinity of Cape May, N. J., have been examined, collected by Mr. Witmer Stone and Prof. C. LeRoy Wheeler. They exhibit but little variation. I have also seen specimens from a locality in Long Island, N. Y., and a form which Mr. Bryant Walker tells me is quite similar, has been found in Michigan, inhabiting a locality having much the same physical features as the sand hills of Cape May.

Zonites arboreus Say.

The writer has collected this at Asbury Park.

Philomycus carolinensis Bosc.

A small specimen was found at Asbury Park.

PRELIMINARY NOTICES OF NEW FORMS OF FRESH WATER MOLLUSKS.

BY H. A. PILSBRY.

Vivipara georgiana var. *altior* Pilsbry.

Shell pyramidal, *elongated*, composed of $6\frac{1}{2}$ to 7 whorls, separated by deep sutures. The whorls are flattened or sunken around the upper portion, convex below, giving a decidedly cadaverous appearance to the shell. Some specimens have a scaliform appearance. The surface is marked with growth-lines and irregular wrinkles, but some specimens show distinct spiral liræ. All of the specimens seen (30 in number) are bleached, but some show faint traces of reddish bands. The umbilicus is narrow, often a mere chink.

Alt. 46, diam. 25 mm.

Alt. 43, diam. 24 mm.

From an aboriginal shell-heap on the left bank of Hitchen's Creek, near the entrance of the St. John's River into Lake George, Florida. Collected by Mr. C. B. Moore.

The great variability of these shells and their distorted aspect inclines me to place them as a local variety of *V. georgiana*, but they are so very different in appearance from that species, that in the absence of intermediate examples, I am inclined to regard them as an individualized race deserving a name.

Fluminicola merriami Pilsbry and Beecher.

Shell small, globose-turbinata, narrowly but distinctly and deeply umbilicated. Spire low-conic, acute; whorls 4, slightly shouldered below the sutures, the upper-lateral portion rather flattened, periphery and base convex. Surface smooth, horn-colored. Aperture oblique, ovate, angled above, broadly rounded below; upper portion of the inner lip adherent to the body-whorl, lower portion arcuate, without a callous thickening.

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

Collected from a warm spring (temperature 97° F.) in Pahrana-gat Valley, Nevada, by Dr. C. Hart Merriam, and submitted to the writer by Dr. R. E. C. Stearns.

This species differs from *F. fusca* Hald., in the much more distinct umbilicus, thin texture, and the non-thickened inner lip.

Specimens may be seen in the National Museum (no. 123,626) and the Academy of Natural Sciences collections. *F. merriami* will be figured in the monograph of American *Ammicolidæ* now in preparation by Mr. C. E. Beecher and the writer.

GENERAL NOTES.

A CORRECTION. In the March NAUTILUS, p. 127, line 13, instead of *he says* read *Prof. Forbes says*.—C. C. A.

EXCHANGES.—We purpose to devote one of the inside cover pages, hereafter, to offers of exchange, and all subscribers are invited to offer their duplicates and call for their desiderata therein. Exchanges will be inserted free of charge, but they should not exceed five lines in length.—*Eds.*

A NEW GENUS of *Helicinidæ* has been described by Commandant L. MORELET, in the last number of the *Journ. de Conch.* It is like *Helicina* in form, and in absorbing the internal whorl-walls, but differs in having several plicæ or folds upon the parietal wall. This type, which is named *Calybium*, is from Laos, (Indo-China).

The operculum is unguiform, with terminal nucleus. It apparently represents there the *Proserpina* and *Ceres* of tropical America. The type is *C. massiei* n. sp., a form measuring over three-fourths of an inch in diameter.—*H. A. P.*

DR. W. H. DALL, of the Smithsonian Institution, is about to leave Washington for California, where he will engage in field-work for three months.

RECENT LITERATURE.

STUDIES AMONG MOLLUSKS—INSTINCT AND GENERA, by Henry Hemphill. (*Zoe.*, Jan., 1892). The author discusses certain apparent anomalies in the structure of land mollusks, freely criticising the conclusions reached by the anatomical school of investigators. He elaborates the idea formerly advanced by himself, that snails display instinctive impulses in the building and decoration of their shells. "The shell bears the same relation (mechanically) to the animal, that the web does to the spider." While we are obliged to disagree totally with Mr. Hemphill's conclusions, the paper is still in some respects suggestive.

THE AMERICAN NATURALIST for January, 1892, contains an article upon the shell-bearing mollusca of Portage Co., Ohio, by Mr. Geo. W. Dean. An annotated list of the species is given. The proof-reader is not quite as punctilious as we could desire, in the matter of spelling names, and one or two difficult species are probably wrongly identified, such as *Physa ampullacea* Gld.; but the list is generally useful. *Bythinella nickliniana* is reported from Portage Co., a locality west of any we have hitherto noticed.

The *Naturalist* is now published by Messrs. Binder & Kelly, of Philadelphia, the editors being Professors COPE and KINGSLEY, as in the past. The editors and publishers purpose to make this once excellent magazine even better than it has been in the past.—*H. A. P.*

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THE NAUTILUS.

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MAY, 1892.

No. 1.

PATULA STRIGOSA GOULD, IN ARIZONA.

BY ROBERT E. C. STEARNS, WASHINGTON, D. C.

The National Museum has recently received from Mr. Marcus Baker, of the U. S. Geological Survey, numerous specimens (Mus. no. 123,576) of the above snail shell collected by him at Coon Mountain, in Arizona. From Mr. Baker I have learned the following: "Coon Mountain, from which these shells came, is a name locally applied to a possible volcanic crater, situated some ten miles south of Canyon Diablo, Arizona. It is near lat. 35° N., long. 111° W. The crater is some 500 or 600 feet deep, ranging from 5200 feet above sea level at the bottom, to 5700 feet at the crest of the rim. Within the crater is bedded sandstone, limestone (Aubrey) and talus slope. The region is excessively arid. The dead shells are found scattered along the interior slopes of the crater, more especially on the south side. Almost all are dead. I think I found a single living one, in the course of a week's working about, in this vicinity. I do not remember finding any outside of the rim. Many of the specimens were fresh, most of them dead and bleached."

Compared with examples from more northerly regions where this form abounds, and exhibits, as is well-known, extraordinary variability, these Coon Mountain specimens are rather under size or dwarfed. They are also rather flat than elevated, and some of them are more or less angulated at the periphery. The fresher examples are slightly rufous, with two narrow revolving bands on the body whorl.

This species has heretofore been found, I believe, in New Mexico. Mr. Baker's collection carries it farther to the south than before reported.

PRELIMINARY LIST OF NORTH AMERICAN PUPIDÆ.
(NORTH OF MEXICO.)

BY DR. V. STERKI, NEW PHILADELPHIA, OHIO.

It will take several years more before we can attempt a revision and approximately complete a list of this most interesting group of our land mollusca. The past few years have brought us a good number of new forms, and yet we have to expect, not only more such but also a more extensive knowledge of their geographic distribution and local variations. Strange as it may appear, the specimens extant in the many museums and private collections I have examined, represent only a very limited part of our country. There are areas of 100,000 square miles from which none of these minute denizens are known, or only a few from single spots. Very little, in some places nothing, has been collected in the South Atlantic and Gulf States, excepting Florida and Texas; in Kentucky, Wisconsin, Minnesota, the Dakotas, Wyoming, Idaho, Oregon; some more, but still very insufficiently, in a part of the New England States, Pennsylvania, except the southeastern region, Michigan, Maryland, Tennessee, Arkansas up to Iowa and Nebraska, Montana, Washington, Colorado, New Mexico, Arizona, Nevada, not to speak of British North America, a part of whose regions are, however, better known in this regard than some of the oldest states of the Union. Comparatively, most has been done in Maine, Massachusetts, New York, Ohio, Florida, parts of Texas, and California; sufficient to give us a fair knowledge of the distribution of not even a majority of the species, in any one State!

It appears, therefore, advisable to give a preliminary list of the species and forms described and cited as from our continent. In many instances it is impossible, as yet, to say whether a certain form is to be considered a *species* or a *variety*, for want of sufficient material; and future critics will have to decide. In all such cases I prefer, here, leaving the question open, and simply filing the names, and giving localities representing areas of distribution.

There are two groups whose members deserve our special attention and study; that of *P. muscorum* L. and that of *Vertigo decora* Gld. and their allies, and especially of these, any specimens from known localities will be of much value.

A number of forms must be added here, not yet published, as known only from one or few specimens each, most of them, in all probability, being good species. But it must be borne in mind that varieties and local forms very often are of a higher interest than new species for systematic zoology and zoogeography.

The present article has, consequently, two aims: first, to show what is known, at present, of species and varieties and their distribution; second, to point out those parts of the continent where collecting and as far as possible strenuous and careful search is most needed. Any conchologist who has a chance of visiting parts of those "blanks" will be sure to do good work, especially by using expedient methods of collecting: sifting from dead leaves, moss, grass; brushing off rocks, stones, logs, stumps, pieces of bark, old chips, etc. Fine sifted drift on rivers, brooks, etc., should be carefully gathered wherever possible, and the results will, almost everywhere, be richer than expected, not only in Pupidæ but also in Hyalina and other small and minute land shells.

I am indebted to Messrs. H. A. Pilsbry, Edw. S. Morse, Theo. D. A. Cockerell, Henry Hemphill and many other fellow-malacologists all over the country for kindly sending me specimens and valuable notes; to all of them my hearty thanks.

A few notes will be found at the end of the list.

STROBILA Mse.¹

Str. hubbardi Brown. Gulf States.

Str. labyrinthica Say. Eastern Prov.

PUPA Drap.

Subg. Pupilla Leach.

P. muscorum L. (type). Northeastern U. S.
var. —? Nevada.

P. blandi Mse. Rocky Mountains.

P. signata Mouss. Rocky Mountains.

hebes Anc. Rocky Mountains.

sublubrica Anc. Rocky Mountains.

- P. sterri* Voith. (?) Rocky Mountains.
P. sp. Rocky Mountains.
P. sterkiana Pilsb. South (and Lower) California.
P. syngenes Pilsb.² Arizona.

Subg. Leucochila Alb. & Mart.

- P. fallax* Say. All east and S. W. to Arizona.
P. modica Gld. Ga., Fla.

Subg. Columella Mart. (Edentulina Cless.).

- P. edentula* Drp.³ (simplex Gld.). All N. A. except southwest.
 v. *alticola* Ing. Rocky Mts.
 var. —. Wash., Alaska.

Subg. Bifidaria Sterki.⁴

Sect. ———.

- P. arizonensis* (Gabb) W. G. B. Colo., N. M., Ariz.
 v. *saxicola* Ckll. Colo.
P. corticaria Say. E. of Rockies, except extreme south.

Sect. *Albinula* Sterki.

- P. armifera* Say. All N. A.
P. contracta Say. All N. A. East of Rockies.
P. holzingeri Sterki. Ohio to Manitoba, N. M., Kas.
 v. *fordiana* Sterki. Kas.

Sect. *Bifidaria* s. str.

- P. hordeacea* Gabb. Tex. to Ariz.
P. procera Gld. R. I. to Minn., S. C. to Tex.
P. hordeacella Pilsb. Fla. to Ariz.
P. rupicola Say. S. C. and Fla to La.
P. servilis Gld. La. ?
P. (riograndensis) Sterki mss.). Hidalgo, Tex.

Sect. *Vertigopsis* Ckll. mss.

- P. pilsbryana* Sterki. N. M., Ariz.
P. curvidens Gld.⁵ All N. A. east of Rockies.
 v. *gracilis* Sterki. R. I., Ohio, Tenn.
 v. *floridana* Dall. Fla.
P. pentodon Say. All N. A. east of Rockies.

Subg. Isthmia Gray.⁶

- P. calamitosa* Pilsb. South (and Lower) Cal.
P. hemphilli Sterki. South (and Lower) Cal.
P. clementina Sterki. San Clemente Id., Cal.

Subg. Angustula Sterki.⁷

- P. milium* Gld. All eastern N. A.

Subg. ———.

- P. dalliana* Sterki. Lake Co., Cal.

VERTIGO Müll.⁸*Subg.* ———.

- V. variolosa* Gld. Fla.
V. sp. San Diego, Cal.

Subg. Nearctula Sterki.

- V. californica* Row., type. Cal. (near San Francisco).
 var. *elongata* Sterki. San Clemente Id.
 var. *catalinaria* Sterki. San Clem. and Catalina Ids.
 var. *diegoensis* Sterki. San Diego.
 var. *trinotata* Sterki. Monterey.
 var. *cyclops* Sterki. Placer Co.
V. rowelli Newc. Cal.
V. decora Gld. North.
V. corpulenta Mse. Rocky Mountains.
V. castanea Sterki. Lake Co., Cal.
V. borealis Mor. Alaska.
V. ingersolli Anc. (*californica* Ing.). Colo.
 var. *haydeni* Anc. Cunningham Gulch.
 var. *accedens* Anc.
V. coloradensis Ckll. Colo.
V. hoppei Moell. Greenland, Anticosti.
V. columbiana Sterki mss. Wash., different places.
 var. *utahensis* Sterki mss. Utah.

Subg. Vertigo s. str.

- V. binneyana* Sterki. Manitoba to N. M.
V. pygmæa Drp. Northeast.
 var. *callosa* Sterki. Ohio.

- V. rugosula* Sterki. South Atlantic and Gulf coasts, Cal.
 var. *ovulum* Sterki.⁹ Fla.
V. ovata Say. All N. A.
V. ventricosa Mse. Northeast to Ohio.
V. gouldii Binn. Northeast to Mont.
approximans Sterki. Ill.
V. bollesiana Mse. Maine to Ind., Va. and Tenn. (also West
 Indies.
 var. *arthuri* v. Mart. ?
V. sp. Tex.
V. sp. N. Mex.
V. tridentata Wolf. Me. to Ohio and Minn.
parvula Sterki. Ohio.
V. oscariana Sterki. Fla., Tex., Tenn.

HOLOSPIRA Alb. & Mart.

- H. roemeri* Pfr. Tex. (Mex.).
 var. *minor* Ckll. mss.
H. goldfussi Mke. Tex. (Mex.).
H. arizonensis Stearns. Ariz.

STROPHIA Alb.

- Str. incana* Binn. S. Fla.

* * *

- Pupa krausseana* Reinh. ?
Vert. arctica Wall. ?

1. The proposition to place *Strobila* under *Pupidæ* will hardly meet with much opposition; it seems to be its nearest natural position. The soft parts agree with those of *Pupidæ*, and so does the shell, except its more depressed form which, however, can be no objection if we compare it with *Hypselostoma*, etc. *Acanthinula*, too, we might range here, as also Morse did,* for the American species.

2. This species is evidently related to *P. australis* Ad. & Ang.

3. There are, among the common low form, high specimens with narrower penultimate and wider last whorl, found everywhere occasionally in this country as well as in Europe; and thus *P. alti-*

* *Pulmonifera* of Maine, p. 32.

cola Ingersoll is not even a true var. here, just as var. *gredleri* Clessin on the old continent. The most beautiful specimens of this formation I have seen are from Maine, in the collection of Mr. Edw. S. Morse.

4. This subgenus—in mss. for nearly two years—will be characterized in another article in the NAUTILUS.

5. *P. curvidens* is very variable. The two extreme forms, *gracilis* and *floridana*, would unhesitatingly be regarded as widely distinct species, if not connected by intermediate forms; the latter comes nearest *P. pentodon*, the former resembles some forms of *P. hordeacella* Pilsb.

6. These species resemble the European forms so much in outline and general aspect that it seems best to range them in this group or subgenus, although the apertural folds are much more developed.

7. The subgenus has been criticised by my esteemed friend, Mr. Pilsbry* as being identical with *Vertilla* Moq.-Tand. If this were the case, it would of course, be worse than useless. *Vertilla* was established for the European *Vert. pusilla* Müll. and *Venetzii* Charp. (*angustior* Jeffr.), on account of their being sinistral. But the two are quite different in structure, for while the former is simply a *Vertigo* reversed, the latter, together with one similarly built, *P. (Vert.) milium* Gld., constitute a peculiar group, which I have called *Angustula*, mainly characterized by the long and high gular lamella and some other peculiarities.

8. It is difficult to draw a limit between *Pupa* and *Vertigo* and may prove to be impossible; if so we will have to regard and treat the latter as a subgenus of *Pupa*, as many prominent European conchologists do. And it appears more natural standing in a line with *Torquilla*, *Pupilla*, *Bifidaria*, and its groups co-ordinate as sections with those of the subgenera named.

9. This interesting form has been detected in eastern Florida, Volusia Co., by Messrs. Geo. W. and his son Oscar B. Webster, of Lake Helen. These gentlemen spent several weeks in collecting this and other small mollusca, making a trip of over a hundred miles, and they first called my attention to this *Vertigo*. It is decidedly different from *rugosula* in several points, and, as I have seen no intermediate forms so far, it may prove to be distinct.

* NAUTILUS III, p. 84.

Although in shape and apertural parts much like *V. ovata* Say, *ovulum* is quite distinct, but it should be compared carefully with *V. antivertigo* Drap., of Europe.

A NEW AMERICAN HELIX.

BY C. W. JOHNSON AND H. A. PILSBRY.

A collection of shells made during the past winter at Woodville, Jackson Co., Alabama, by Mr. H. E. Sargent, and submitted to us for determination, contains numerous specimens of a large *Helix*, which proves to be undescribed. The species is a member of the section *Triodopsis* but it does not exhibit the characters typical of that group, *i. e.*, a three-toothed aperture, but rather belongs in the neighborhood of the *Helix appressa* of Say, a species which lacks the upper lip tooth of *Triodopsis*. The new species may be described as follows:

H. Sargenti n. sp.

Shell depressed, imperforate, lens-shaped, carinated. Surface strongly rib-striate, the striation disappearing toward the center of the base; under a lens the surface between the rib-like striæ is seen to be finely granulated. The aperture is wide, oblique; lip broadly reflexed, flattened, the basal lip bearing a long lamella, as in *H. appressa*. Upon the parietal wall there is a strong, high curved tooth, like that of *H. elevata* but longer. There are 6 whorls. The color is light russet above, paler or whitish below.

Alt. 11, diam. 24 mm.

Alt. 12, diam. 24 mm.

Alt. 9, diam. 22 mm.

This species differs from *H. appressa* in its larger size, stronger striation, the *granulated* instead of *spirally striate* microscopic sculpture, the strong carination, etc. It is allied in shape and sculpture to *H. carolinensis* Lea, but differs in totally lacking the upper lip tooth, in being flatter, more concave below, etc. The young shells differ markedly from young *H. appressa*, being flatter above, acutely carinated, and broadly umbilicated.

Figures will be published later, illustrating this unusually large and strongly characterized species.

Among other species Mr. Sargent found at Woodville the following interesting forms: *Patula cumberlandiana*, *Helix exoleta*, *H. stenotrema*, *H. spinosa*, *H. major*, *Zonites lævigatus*, *Z. gularis*, *Z. intertextus*, *Z. internus*, etc.

NOTE ON THE GROUP PANDA.

BY H. A. PILSBRY.

During the course of some studies upon certain Australian land shells, sent by the well-known conchologist Dr. J. C. Cox of Sydney, N. S. W., my attention was drawn to specimens of *Bulimus atomatus* Gray. Upon examining these shells under a lens, I at once noticed the minute sculpture and peculiar color-pattern characteristic of the two species hitherto included in the section PANDA,—*H. falconeri* Rve. and *H. maconelli* Rve. A consideration and comparison of the shells impresses me with the belief that *Panda* has heretofore been misunderstood and wrongly grouped. I am disposed to regard it now as a development from the *Bulimoid* branch of the *Helicida*, instead of from the *Helicoid* stem. The diagnosis of *Panda* must be enlarged to include elongated forms, (*Bul. atomatus* and perhaps some other Australian species), but it will not require much change otherwise. The prominent features of the group, as far as the shell goes, are (1) the entirely simple, non-thickened, non-expanded lip, reflexed at the columella, (2) the sculpture of minute, close incised lines, and (3) the painting of fine close wavy brown lines on a yellowish ground. This last character is not invariable, for clear yellow examples of most if not all of the species occur.

The character of the lip and embryonic whorls separate *Panda* from *Helicophanta* and the other sections formerly grouped by me under the generic name Macroön. It will be noted that I formerly included it in that place with doubt, on account of these peculiarities.

OBITUARY.

THE ABBÉ PROVANCHER.

It is our painful duty to record the death, in his 72nd year, of the Abbé Léon Provancher, who for many years, despite great dis-

couragements and disadvantages, labored zealously and assiduously to develop and disseminate a knowledge of the natural history of Canada, and especially of his native province. He was born in 1820, at Becancour, Quebec, and for some years was Curé of Portneuf, and one of his earliest entomological writings was a list of the Coleoptera of that district. Compelled by enfeebled health to relinquish the regular and more active duties of the ministry, he removed to Cap Rouge, near Quebec, and devoted his remaining time and strength almost entirely to the study of the natural sciences. In 1869 he commenced the publication of the *Naturaliste Canadien*, and notwithstanding many discouragements, completed in 1891 the 20th volume, when its issue was reluctantly abandoned, through the Quebec government refusing to continue the scanty annual grant it had received. In 1858 Provancher published an elementary treatise on botany and in 1862 his *Flore du Canada*. Subsequently he devoted his attention chiefly to entomology, and in 1874 commenced his *Faune Entomologique du Canada*, of which he completed three volumes.* Provancher was also, especially latterly, an enthusiastic conchologist, and as such became known by correspondence to many of the principal conchologists of the States. His last publication was a monographic illustrated treatise, *Les Mollusques de la Province de Quebec*, embodying the results of the author's researches in Canadian conchology.

The occasional inaccuracies of Provancher's conchological work will be excused when we consider the great disadvantages under which he labored. His death is a loss that will be felt long by the small band of Canadian Naturalists.

NEWS AND NOTES.

EDITOR OF NAUTILUS, Dear Sir: Thinking that the following extracts from a letter sent me a short time ago by a Western friend, would prove of interest to your readers, I take the liberty of offering them for publication.

The writer says: "I notice that much has been said in the NAUTILUS lately about the recent discovery of *Unios* having a byssus. In reference to this matter it would not be irrelevant for me to state

*See article by W. H. H. in the *Canadian Entomologist*, May, 1892, from which the preceding is taken.

that I found, nearly fifty years ago, *Unio lapillus*, Say, *fabalis* Lea, attached by a white, silk-like byssus to a fragment of an old shell. This fact I mentioned afterwards to John Bartlett, an old collector, whereupon he related to me the following story :

“A., a collector of shells, residing in Cincinnati, Ohio, and K., also a collector, residing in Cleveland, Ohio, were quite intimate. K. found the above mentioned species attached (as I did) by a byssus, whereupon he, K., wrote to A. at Cincinnati, stating the fact, and inviting him up to Cleveland, promising if he came, to go out with him and show him the wonder. A. was not long in responding to the invitation, and the two went out together and saw the shell attached by a byssus, sure enough.

“A. returned to Cincinnati soon afterwards and at once wrote to his London correspondent that he, A., had discovered a *Unio* attached by a byssus, and that he had invited his friend K., of Cleveland, to come down, and had taken him out to see the wonder.

“Soon after this K., being in correspondence, as it happened, with the same London party, wrote to him that he, K., had made this wonderful discovery in Cleveland, and had taken his Cincinnati friend out to see it. A., it seems, was ignorant of the fact that K. was in correspondence with the same London party, and so got himself inextricably trapped.

“My friend informed me that A. went by the name of ‘Old Byssus’ for a long time afterwards.

“So much for a lack of truth and candor. When the byssus was first discovered by myself, I, in my innocence of the facts just related, wrote to A. about it. He at once replied that it was not a new thing. It had been found before. I exchanged with A. quite a number of years after this and received some good things from him. Peace to his ashes! He is gone now, as are also most of the old collectors of Cincinnati.”

These are the extracts and my only regret in sending them is the fact that I do not feel at liberty to give the name of the writer.

Very truly,

J. F.

DR. R. E. C. STEARNS, adjunct curator of the Department of Mollusks at the National Museum, has left Washington for the West Coast, for a season's rest.

MR. HENRY HEMPHILL will spend the summer in Idaho.

A. B. KENDIG, D. D. has changed his residence from 11 Hanson Place, Brooklyn, to 287 *Williams St., East Orange, N. Jersey.*

GEO. T. MARSTON has removed from Dupere, Wis., to Quincy, Illinois.

MR. FREDERICK STEARNS of Detroit, Michigan, who has been spending the winter in the Sandwich Islands, has sailed for Japan, where he will travel during the summer.

FRIEND PILSBRY: Will you not suggest in the NAUTILUS that any conchologist travelling about the country should make it a point to call upon his brother collectors, if he goes near their homes? I hope no member of the A. A. C. who comes to Boston, will fail to visit me at Revere, only six miles away. Surely introductions are unnecessary in our little circle.—*Edward W. Roper.*

We heartily endorse this suggestion, friend Roper!

EXCHANGES.

Exchange notices of moderate length will be inserted free for subscribers.

I HAVE SEVERAL hundred unusually fine specimens of *Limnæa megasoma* Say, to exchange for specimens of *Sphærium* and *Pisidium*.—*George T. Marston, care of State Savings Loan and Trust Co., Quincy, Ill.*

WANTED.—Marine univalves, especially of Mexico, Central and South America. Offered—many specimens, Marine, Land, and Fresh-Water, both U. S. and Foreign.—*C. Browne, Framingham, Mass.*

WANTED.—To Exchange Northern Alabama Land and Fresh-water Shells for shells from any other locality. Send lists and receive mine.—*H. E. Sargent, Woodville, Jackson Co., Ala.*

MARINE, Land and Fresh-water shells to exchange for a pair of good singing Canary birds. I will send my exchange list to any one that has such to exchange, or for shells that are not in my collection.—*Thomas Morgan, P. O. Box 164, Somerville, N. J.*

WANTED.—*Arca* and *Zonites*, from any locality, in exchange for British land and fresh-water shells.—*Robert Walton, Charles St., Lower Roxborough, Philadelphia, Pa.*

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No. 2.

THE SHELL BEARING MOLLUSCA OF MICHIGAN.

BY BRYANT WALKER, DETROIT, MICH.

In the ten years which have elapsed since the last catalogue of Michigan shells was published, many species have been added to the fauna of the State and our knowledge of the distribution of others has been very largely increased. While it is not probable that in the future the number of species will be largely added to, there yet is abundant opportunity for our local collectors to add to what must be admitted to be, on the whole, a meagre knowledge of the exact range of the different species within our borders. Every local list, carefully compiled, has its value; and if the publication of this paper shall, by its incompleteness, serve to provoke the publication of the information already in the possession of the different collectors scattered over the state, it will have accomplished not the least of the purposes of its compilation.

The first catalogue of Michigan shells was published by Dr. Abram Sagar, Zoologist of the Geological Survey, in 1839, and enumerated seventy-six species.

The second, by Dr. Manly Miles, State Zoologist, was published in the "Report of the Geological Survey for 1860."

The third was compiled in 1868 by Mr. A. O. Currier, of Grand Rapids, and was published as one of the "Miscellaneous Publications of the Kent Scientific Institute."

In 1879 the writer published a fourth list in the *Journal of Conchology*, Vol. 2, p. 325.

The fifth and last general catalogue was published in 1881 as "Miscellaneous Publication No. 5 of the Kent Scientific Institute," and was compiled by Dr. W. H. De Camp, of Grand Rapids. Dr. De Camp has very kindly furnished me with a manuscript continuation of his catalogue to December, 1891, and I have made frequent use of it for this paper. Species cited upon his authority and not included in his original paper as published, will be understood to be quoted from this supplement.

In 1859 Mr. Currier published a "List of the shells collected in the Grand River Valley," and in 1865, "A Catalogue of the Mollusca of Grand Rapids, Michigan," (*Am. Jour. of Conch.* I, p. 292.) As Mr. Currier's catalogue of 1868 undoubtedly embodied all his researches up to that time, the few particulars in which these earlier lists differ from it do not require special mention, and references hereafter made are to that publication.

In the "Report of the United States Fish Commission for 1872-3," Mr. Sidney I. Smith, in a "Sketch of the Invertebrate Fauna of Lake Superior," gives a list of the mollusks of that region which, while it is largely a compilation from the publications of Binney and Gould, includes the result of a series of dredgings made under the direction of the United States Lake Survey, and is especially valuable in showing the depths at which the various species were found.

Preliminary reports of the same dredgings are to be found in Vol. 2 of the "Report of the Secretary of War for 1871," and in the "*Am. Jour. of Sci. and Arts*" for December, 1871.

A local list of the species found near Ann Arbor, Washtenaw county, was published by Mr. C. E. Beecher and myself in the "Proceedings of the Ann Arbor Scientific Association for 1875-6."

In addition to these lists many scattered references to Michigan species occur in the *American Journal of Conchology* and in the various writings of Binney, Gould, Lea, Tryon, Prime, Conrad and Call.

In compiling the present catalogue I have endeavored to include every species which has at any time been cited as an inhabitant of the State. Where any such species is not represented in my own collection I have given the authority for the citation.

In addition to my own collections, which have been mostly made in the southeastern and northern portions of the state, I am indebted to Dr. W. H. De Camp and Mr. L. H. Streng, of Grand Rapids,

for many specimens from the western part of the state; to Dr. M. L. Leach, of Wexford, for a great deal of valuable material from the central and northern portions; and to Mr. Jerome Trombly, of Petersburg, for the local species of Monroe County.

Dr. V. Sterki has very kindly examined all the Pupidæ in my possession, so that there can be no question as to the species of this family so far as they are cited from my own collection.

It is greatly to be regretted that so little is known of the shells of the upper peninsula. It is practically a *terra incognita* to the conchologist. With the exception of Gould's citations in Agassiz's "Lake Superior" and S. I. Smith's paper above referred to, I have not been able to find any published information in regard to the fauna of that very important portion of the State. Some very inconsiderable collections from a few points along the St. Mary's river comprise all my personal knowledge in this particular.

As no localities are given as a rule in the earlier catalogues, it is impossible to say what information, if any, their compilers had on this subject.

In view of this condition of affairs it might have been better to have limited the title of this paper to the lower peninsula. As it is, however, it will be understood that unless otherwise specified, all remarks as to distribution are confined in that portion of the state south of the Straits of Mackinac.

Selenites concavus Say. Throughout the lower peninsula and probably further north, as it occurs at Lime Island in the St. Mary's river.

Vitrina limpida Gld. Traverse City and Lime Island in the St. Mary's river are the only localities yet recorded for this species.

Zonites fuliginosus Griff. Southern part of the State.

Z. ligërus Say. Not uncommon in the southern part of the State.

[*Z. inornatus* Say. Cited by Sagar and Miles, but does not appear to have been found by more recent collectors.]

Z. cellarius Mull. A few specimens were found several years ago in a green-house in Detroit.

Z. nitidus Mull. Abundant everywhere.

Z. arboreus Say. Abundant everywhere.

Z. radiatulus Alder. Common but not as abundant as *arboreus*.

Z. indentatus Say. Common everywhere.

Z. limatulus Wd. Cited by De Camp from Traverse City; also by Miles and Currier.

Z. minusculus Binn. Generally distributed through the state.

Z. milium Mse. Islands in the St. Mary's river.

Z. binneyanus Mse. Cited by Binney from Tawas City. I have found it from Traverse City north to Lime Island. It is probably confined to the northern part of the state.

Z. ferreus Mse. Traverse City and Petoskey.

Z. exiguus Stimp. Generally distributed through the northern part of the State.

Z. fulvus Dr. Common everywhere.

Z. suppressus Say. Rare. Cited by Binney but does not appear in any of the catalogues. Dr. M. L. Leach sent me specimens from Fenton, Genessee County, a few years ago.

Z. multidentatus Say. Rare. Petoskey is the only locality known to me. Cited also by Currier and De Camp.

Patula alternata Say. Abundant everywhere.

P. alternata alba. This form occurred quite commonly with the type at Lime Island and Mackinac Island. Specimens from both localities exhibit all gradations from the typical coloring to the pure albino.

P. solitaria Say. An inhabitant of the southern portion of the state; very rare in the southeastern part, where in some localities it is extinct; more common in the western part.

P. perspectiva Say. Throughout the State.

P. striatella Anth. Common everywhere.

P. striatella alba. Mackinac Island is the only locality where I have found this form.

[*P. asteriscus* Mse. This species was cited in my catalogue of 1879 by mistake. I am not aware that it has yet been found in the state.]

P. lineata Say. Common everywhere.

P. harpa Say. Petoskey is the only locality thus far recorded.

Punctum pygmaeum minutissimum Lea. Appears to be generally distributed through the state, but is easily overlooked on account of its small size.

H. clausa Say. Cited by Sagar and Miles but not by any recent collector.

H. multilineata Say. Common in the southern part of the state.

H. multilineata alba. Associated with type but not common.

H. multilineata unicolor. Cited by Currier and De Camp.

H. thyroides Say. Common throughout the state.

H. thyroides bucculenta Gld. Cited by De Camp.

H. albolabris Say. Common everywhere.

H. albolabris dentata. Occurs occasionally with the type.

H. albolabris martima Pils. Traverse City. Specimens of this well marked form were sent to me by Dr. M. L. Leach, which appear to be identical with examples from New Jersey. It has been persistent in its present form for ages, as it is found unchanged in the marl-beds upon which the living specimens were found. Dr. Leach thus describes the habitat of the species: "The locality is limited, containing only a few acres on and around the marl-bed where their remains in connection with fluviatile shells are found in a fossil condition. I find only now and then one of the same variety anywhere else and that always not far away."

A single specimen collected by Dr. Leach at Black Lake, Presque Isle county, is probably referable to the same variety. This would indicate a range across the entire northern part of the lower peninsula.

H. exoleta Binn. Common in the southern part of the state.

H. elevata Say. Rare, if found at all in the state. The Grand Rapids collectors have not found it, nor have I. Cited by Sagar and Miles whose citations are followed in later catalogues. It occurs in recent deposits near Ann Arbor, but is now extinct there.

H. profunda Say. Occurs commonly through the southern part of the state.

H. profunda alba. Occasionally associated with the type.

H. sayii Binn. Cited in most of the catalogues but appears to be rare and confined to the northern part of the state. Black Lake, Presque Isle County, where it was collected by Dr. Leach, is the only locality I know of.

H. hirsuta Say. Common everywhere.

H. monodon Rack. Common everywhere.

H. monodon fraterna Say. Not as common as the type.

H. leaii Ward. Southern part of the state, common.

H. tridentata Say. Appears to be generally distributed through the state as it is cited in all catalogues.

H. fallax Say. More abundant than *tridentata*, judging from my own experience.

H. palliata Say. Probably throughout the state although I have seen no specimens from localities north of Gratiot County.

H. palliata alba. Cited by Currier.

H. inflecta Say. Southern part of the state.

H. pulchella Mull. Common in the southern part of the state. The costate form does not appear to have been found in the state as yet. It occurs on Put-in-Bay Island, Lake Erie, and no doubt will eventually be found within our borders.

H. labyrinthica Say. Everywhere in greater or less abundance.

Pupa fallax Say. Cited by Miles. Ann Arbor is the only locality from which I have it.

P. corticaria Say. Cited by De Camp from Kent County.

P. armifera Say. Southern part of the state.

P. contracta Say. Everywhere. Common.

Vertigo decora Gld. Cited by De Camp from Kent County.

V. ovata Say. Generally distributed over the state.

[*V. gouldii* Binn. Cited by Miles and De Camp. My own citation of 1879 was an error based on a specimen now referred to *tridentata*.]

V. bollesiana Mse. Very generally distributed through the state.

V. ventricosa Mse. Cited by De Camp from Kent County.

V. tridentata Wolf. Ann Arbor.

V. pentodon Say. Common.

V. curvidens Gld. Oakland and Macomb Counties.

V. edentula simplex Gld. Not common but ranges generally over the state.

V. milium Gld. Southern part of the state.

Ferussacia subcylindrica L. Generally distributed over the state.

Succinea aurea Lea. Cited by De Camp from Kent county.

S. avara Say. Abundant everywhere. Also cited as *S. vermata* Say, by Miles, Currier and De Camp.

[*S. campestris* Say. Cited by Sagar, but evidently a mistake for *S. obliqua* which does not occur in his list. Miles gives *obliqua* but also gives *campestris*, probably quoting blindly from Sagar in this as in other instances.]

S. obliqua Say. Common all over the state.

S. ovalis Gld. Abundant everywhere. This species is occasionally infested by a species of *Leucochloridium* similar to the *L. paradoxum* Carus, found in the *S. putris* L. of Europe and figured by Baudon in Jour. de Conch. V. 27, pl. X, fig. 6. In the same

journal (V. 28, p. 205) is published a note from the late Thomas Bland, recording a similar occurrence in a specimen of *S. obliqua* Say.

S. ovalis decampii Tryon. Described originally from Marshall in this state.

S. ovalis peoriensis Wolf. A number of years ago, at the suggestion of Dr. James Lewis, I sent examples of a *Succinea*, common in this vicinity, to Mr. John Wolf, of Canton, Illinois, who identified them as a form he had named as above. I am not aware that a formal description has ever been published. It is a well marked form, easily separated from *ovalis*, and occurs abundantly in all parts of the state. It is closely allied to *S. decampii* Tryon and may be identical, but differs in color and lacks the black margin said to be characteristic of that species.

S. ovalis higginsii Bld. Specimens from Alpena received from Dr. W. A. Nason and said to have been identified by Dr. James Lewis, are the only ones I have seen from this state. The specimens referred to lack the parietal tooth supposed to be characteristic of the form.

(To be continued.)

LITTORAL LAND SHELLS OF NEW JERSEY.

BY WM. B. MARSHALL.

H. A. Pilsbry's list of shells, published under the above title, in the April NAUTILUS, is deficient by at least one species. In August, 1890, I collected one specimen of *Succinea avara* Say at Cape May, N. J. The exact locality was on the ocean front, at 8th Avenue, Mt. Vernon, between Cape May City and Cape May Point, and was not more than 200 feet from the line of high tide.

Mr. Pilsbry says, "The Atlantic shore of New Jersey is so sandy that few land snails find suitable conditions there." It is very true that land snails are very uncommon along the shore, but, in my opinion, their rarity is due to some cause other than the nature of the soil. The chalky dead shells of mollusks and crustaceans, which are abundant in the vicinity of the shore, furnish the snails a ready supply of lime; and the wild pea vines which grow in tangled masses, covering large areas of ground, afford a succulent article of diet.

PHYSA HETEROSTROPHA.

BY O. A. CRANDALL, SEDALIA, MO.

Is there such a species as that described by Say? If so, what is it? I am led to make this inquiry after a study of this genus for several years. The first question will of course be answered unanimously in the affirmative, but how many will agree as to the main characteristics of the species? I have examined during the last year many lots labelled *P. heterostropha* Say, and have not found two lots alike. They include all forms from the cylindrical *P. gyrina* Say, to the shouldered *P. ancillaria* Say, and have any number of whorls from *three* to *six*. Most of them were labelled by amateurs, who have no means of identifying the species except by following a rather meagre printed description; and it can hardly be expected that all should agree. Very few collectors have opportunity to see type specimens, and it is very annoying to have to send every "find" to some noted conchologist for identification. Besides, I find about as much diversity of opinion regarding Physæ amongst our professors as amongst amateurs, hence, I write this article for the purpose of procuring a correct description of this species. Say describes the shell as "subovate, having *four* whorls, the first large, the others terminating rather abruptly in an acute apex; aperture large, somewhat oval, three-fourths the length of the shell, or rather more." These are the only characteristics given that are not common to many other shells. Binney, in "Land and Fresh Water Shells of N. A.," part 2, page 84, gives two figures: Fig. 144 from Say's type and Fig. 145 from Say's figure, which are about as near alike as a bean and a pea. Which shall we follow? The description is silent as to the form of the spire whorls and sutures, but from the fact that Fig. 144 shows convex whorls and impressed sutures, and from the other fact that Binney, after having seen the type specimen, placed in its synonymy *P. philippii* Kuster, *P. cylindrica* Newcomb, *P. fontana* Hald. and *P. plicata* De Kay, all of which have somewhat convex whorls and impressed sutures, it is fair to presume that these characters belong to the shell under consideration.

Add this presumption to the description given by Say, and we have a very fair description of what is generally considered one of our most common shells, and which ought to be easily identified by

any person who will hold strictly to the distinctive characters mentioned. But unfortunately Mr. Binney has placed *P. fontana*, having only *three* whorls, *P. plicata*, having *four to five* whorls, and two other species having *five* whorls each, and two species having flattened whorls, in the synonymy of this species, which has *four convex* whorls. There never can be a systematic classification of species until we cease to mix forms in this manner. The *number* and *form* of the whorls are the most reliable characters upon which a species can be based. It is one of the laws of nature that every animal, every bird and every insect, of the same species, builds its house in the same form. So the structures of every snail shell of the same species must be substantially the same as to texture, and number, and form of whorls. They may vary in color, height of spire, form of aperture and other characters that may be affected by accident or environment, but as to the structural form of its own skeleton it must follow its progenitors. So I conclude that every adult member of the same species must have the same number of whorls.

Coming back again to the main question. What is *Physa heterostropha* Say? It is a shell subovate in form, having *four* whorls, spire whorls *somewhat convex*, sutures *impressed*, spire elevated, terminating in an *acute* apex, aperture large and oval, but not inflated. The spire whorls are more convex than in *P. gyrina* Say and not so much as in *P. showalteri* Lea or *P. halei* Lea. It holds an intermediate place between the flattened and most convex whorls. It is never cylindrical, and the type is not inflated nor ventricose. Varieties may be slightly inflated but never so much as to resemble *P. vinosa* Gld. or *P. sayii* Tappan, which are frequently taken for this species.

If I am not correct, will some person who has seen the type specimen, revise and correct the description herein given?

NOTES ON THE NORTH AMERICAN SPECIES OF SUCCINEA.

BY T. D. A. COCKERELL.

For some time past I have been accumulating notes on the North American *Succineæ*, hoping to be able to classify them more pre-

cisely than has hitherto been done. As I have no longer time or opportunity for this work, I venture to put together the following notes, on the chance of their proving useful to other students. The genus is a most difficult one, and until someone will elaborately monograph the American species as Baudon has the French ones, we seem hardly likely to arrive at any satisfactory arrangement. With regard to the opinions given below, it is to be understood that they are nothing better than *opinions*, founded on the material examined. Further study with more abundant material would very likely cause some of them to be altered.

The American species of *Succinea* may be divided into four sections, three of which have received subgeneric names.

Sect. 1. *Amphibina*.

= *Amphibina* (Htm.) Mörch.

- (1.) *Succinea pfeifferi* Rossm. Many of the American forms of *ovalis* Gould are not to be separated from the European *pfeifferi*, while others, also hardly distinct from *ovalis*, might in the absence of intermediates be supposed to represent a peculiarly American species. The American forms of *Succinea*, both in this and other groups, are very closely allied, but at the same time seem more constant in their slight peculiarities than those of Europe. In *Ann. and Mag. of Nat. Hist.*, March, 1887, I referred *ovalis* to *pfeifferi*, and nothing since has appeared to prove otherwise.
- (1a.) *S. pfeifferi* var. *brevis* Pascal. This variety was originally called *brevis*, but afterwards unnecessarily changed by Baudon to *brevispirata*, because there is a *S. brevis* in Central America. I received a characteristic specimen, collected by Mr. D. B. Cockerell at Toronto, Canada. In shape, this variety is very like *S. higginsi*, and probably the two will be found to intergrade.
- (2.) *S. higginsi* Bland. Probably a variety or subspecies of *pfeifferi*, but a specimen marked *higginsi*, which I saw in the Binney and Bland Collection, at the American Museum of Natural History,¹ seemed to have affinity with *S. elegans*, while another in the same collection resembled *pfeifferi* very closely.

¹ I was much indebted to Mr. Sanderson Smith for his kindness in showing me this collection when I was in New York.

- (3.) *S. haleana* Lea. A specimen in the Binney and Bland Collection, from Alexandria, La., marked "*halei* Lea, type," seems to me to be specifically identical with *ovalis* Gould.
- (4.) *S. retusa* Lea. Said to be a variety or subspecies of *ovalis*, but so far as I was able to judge from a specimen in the Binney and Bland Collection, it is a valid species allied to *S. elegans*.
- (5.) *S. concordialis* Gould. Mr. J. A. Singley sent me this from Lee Co., Texas. It is allied to *pfeifferi*, but more pellucid and shiny; thin but rather strong; color, very pale horn. I have also seen a specimen in the Binney and Bland Collection.
- (6.) *S. forsheyi* Lea. A specimen in the Binney and Bland Collection is from Rutersville, Texas, the original locality. It is shiny and very near to *pfeifferi*.
- (7.) *S. nuttalliana* Lea. Mr. J. H. Thomson sent me five specimens collected in Wyoming in 1877, which no doubt belong to *nuttalliana*. They are shiny, with lines of growth well marked; in shape, like *pfeifferi*, varying towards *avara*; color, like *avara*. A specimen in the Binney and Bland Collection, from Portland, Oregon, is similar.
- (8.) *S. elegans* Risso. Mr. D. B. Cockerell sent me specimens found by rivers and streams at Toronto, which I could not distinguish specifically from the European *elegans*. At the same time, they are equally close to *S. haydeni* which may, I think, be considered a variety or subspecies of *elegans*. A specimen of *haydeni* in the Binney and Bland Collection tends to confirm this opinion.
- (9.) *S. hawkinsi* Baird. This I have not seen, but it is apparently very close to *elegans*.

(To be continued.)

GENERAL NOTES.

In the July number of the NAUTILUS it is proposed to begin a series of articles upon the *collection* and *preservation* of shells. Notes bearing upon these subjects will be welcome.

"* * * While at Maldonado, Uruguay, I succeeded in finding *Helix costellata* D'Orb, under dead leaves in damp localities. While in the bay I procured about twenty dredgings with very good results, having at least three species of *Corbula*, and about fifty other

species of various genera. As we are to return to that place from time to time I will be enabled to add to them. The next few days I shall try to hunt up the *H. elevata* D'Orb, and the fresh-water species surrounding Montevideo.—*Dr. William H. Rush, in letter to Ed.*

HELICINA OCCULTA Say, has been re-discovered *living* in western Pennsylvania at Wildwood and at Cayuga, on the Allegheny River, Allegheny Co., by Mr. S. H. Stupakoff of Swissvale, Pa.

THE OLD, OLD STORY!—A number of fine pearls, some of them of considerable value, were found recently in mussel shells on the shoals in White river, near Seymour, Ind. One man realized \$75 from his find in a few weeks.—*Phila. Public Ledger.*

EXCHANGES.

(Exchange notices of moderate length will be inserted free for subscribers.)

CRETACEOUS AND EOCENE FOSSILS, minerals, agates, marine and fresh-water shells, to exchange for rare marine shells, cloth-bound books or agatés.—*Homer Squyer, Mingusville, Mont.*

HERKIMER COUNTY LAND AND FRESH-WATER SHELLS to exchange for desirable species from other localities. Send lists and receive mine.—*Albert Bailey, Chepachet, N. Y.*

I HAVE SEVERAL hundred unusually fine specimens of *Limnæa megasoma* Say, to exchange for specimens of *Sphærium* and *Pisidium*.—*George T. Marston, care of State Savings Loan and Trust Co., Quincy, Ill.*

WANTED.—Marine univalves, especially of Mexico, Central and South America. Offered—many specimens, Marine, Land, and Fresh-Water, both U. S. and Foreign.—*C. Browne, Framingham, Mass.*

WANTED.—To Exchange Northern Alabama Land and Fresh-water Shells for shells from any other locality. Send lists and receive mine.—*H. E. Sargent, Woodville, Jackson Co., Ala.*

MARINE, Land and Fresh-water shells to exchange for a pair of good singing Canary birds. I will send my exchange list to any one that has such to exchange, or for shells that are not in my collection.—*Thomas Morgan, P. O. Box 164, Somerville, N. J.*

WANTED.—*Arca* and *Zonites*, from any locality, in exchange for British land and fresh-water shells.—*Robert Walton, Charles St., Lower Roxborough, Philadelphia, Pa.*



WALKER, MOLLUSCA OF MICHIGAN.

THE NAUTILUS.

VOL. VI.

JULY, 1892.

No. 3.

SOME REMARKS ON NEW JERSEY COAST SHELLS.

BY JOHN FORD.*

Of the thousands of visitors to Atlantic City, Cape May and adjacent seaside towns, perhaps not one-tenth part give a thought to the myriads of living creatures other than human that sport in the surf, dally in the pools or hide in the sheltering sands. Yet it is not unlikely that the most superficial examination of these lowly forms would convince the observer that even seaside resorts may yield nobler pleasures than those of a physical nature only.

How many of these persons, I wonder, know that the despised Sea Nettles (*Medusæ*) often exhibit forms of surpassing beauty, rivaling in structure the most delicate of laces! And who of all the vast crowd think it worth while to note the wonderful variations in structure of the many species of crabs, shrimp, sandhoppers and other crustaceans dwelling between tides, and in some instances, in sands above the surf? Yet few if any phases of animal life, not even the transformation of a caterpillar to a butterfly, are as

* Editor of NAUTILUS,

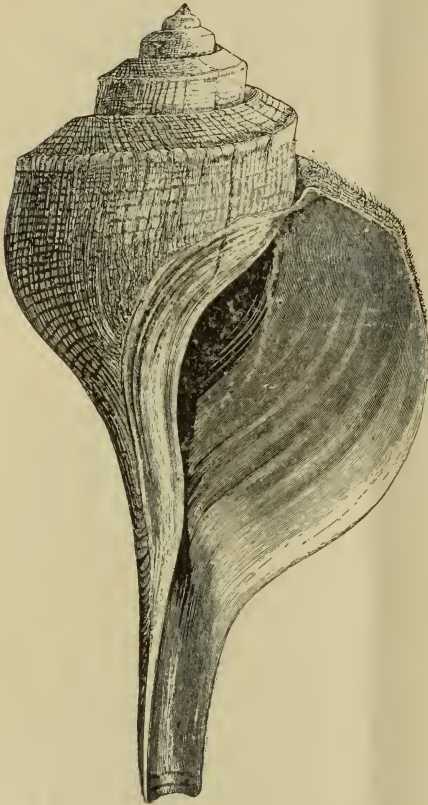
Dear Sir:

The thought has occurred to me that many of the NAUTILUS readers would be interested, now and then, in articles less technical and scientific than those usually presented in its columns. In order to test the matter I take the liberty of offering for insertion the subjoined chat regarding New Jersey Coast Mollusks and a few of their neighbors.

Very truly,

JOHN FORD.

remarkable as the periodic metamorphoses of certain species belonging to this order. Near the water's edge, when the tide is low, many other interesting creatures may be seen, including the sea anemones with their parti-colored crowns of tentacles; and pretty plant-like forms (Corallines) whose chief representative on the New



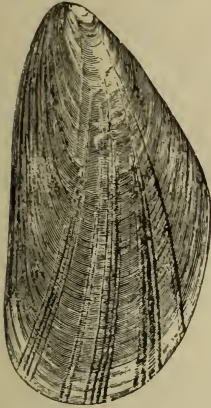
Fulgur canaliculata.

their unfortunate occupants beyond the reach of succeeding tides. It is not unusual for hundreds of tons of mollusks to be thus forced from their homes and left to die of starvation and exposure. Quite a number of the native species are edible. The first of these in the order of demand is, of course, the oyster, *Ostrea virginica*; next, the hard shell clam, *Venus mercenaria*; third, that precious favorite of all New York aldermen, the soft shell clam, *Mya arenaria*. He who has not eaten a dish of these on Coney Island beach

Jersey coast is the so-called fox or squirrel-tail *Sertularia argentea* Johnson. To most persons this appears to be an ordinary sea plant, but the careful student knows that in each of the tiny cells adorning the undried specimen, dwells one of the little architects and builders of the whole graceful structure.

None of these creatures, however, are more worthy of observation or study than are the native mollusks, reference to which is the chief purpose of this article. These dwell on the entire coast in countless numbers, but they are seldom exposed in quantity except by southeastern storms or gales which, striking the beach breast on, often tear up and carry large masses of sand with

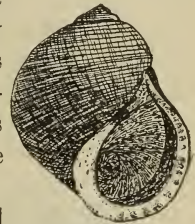
would be deemed by the said New York magnates a "very unfortunate man" indeed. Less delicate in flavor than the latter species are the common sea clams, *Mactra solidissima*, when not more than half grown. Sea mussels, *Mytilus edulis*, are also considered palatable though they are not very highly relished in this vicinity. In New York and New England, however, they are much esteemed by epicures.



Mytilus edulis var.
pellucidus.

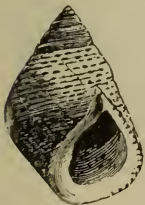
Among the fishermen of Long Island Sound the large Conch, *Fulgur carica*, is often utilized for soup. But the writer knows by experience that this is not the kind of food a delicate palate will long for.

Another edible species, and one far more toothsome, is the little periwinkle, *Litorina litorea*, a species probably introduced from Europe. Until recently they were quite rare south of Raritan Bay, but at present a fine colony may be seen on the flats a little west of the Inlet House at Atlantic City. The pretty species, *Litorina irrorata*, a more southern form, also edible, appeared in large numbers on the bay side, near Longport, N. J., about three years ago, but the conditions surrounding them changed shortly afterward and the colony disappeared quite as quickly and mysteriously as it came. A few specimens may still be secured on the adjacent flats but they are much less perfect than were those of the colony referred to.



Litorina litorea.

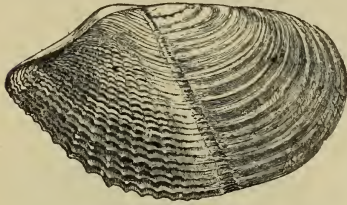
Many of the shells produced by the several species mentioned are well worthy of a niche in the collector's cabinet, especially so if taken alive and *in situ*. Otherwise the more recent additions to the lip-edges are apt to be injured by the action of the surf.



Litorina irrorata.

But there are hosts of other native shells besides those referred to, that may be profitably utilized by lovers of Nature's handiwork. Among the most prominent of these are the large pear-shaped Conch, *Fulgur canaliculata*; the several species of Pholades, including the largest known form, *Pholas costata*, which often secretes itself in the hardest limestone;

the canoe shells, *Modiola plicatula*; the razors, *Solen americanus* and *S. viridis*; the arks, *Arca pexata* and *A. transversa*; the boat shells, *Natica heros* and *N. duplicata*; the cup and saucer shells, *Crepidula plana*, *C. fornicata* and *C. glauca*; the ladder shells, *Scala humphreysii* and (rarely) *S. lineata*;



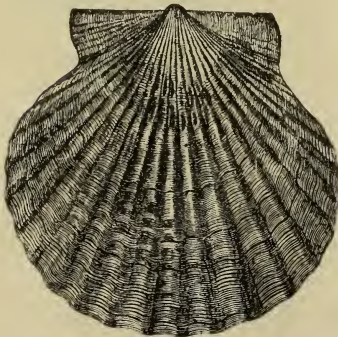
Pholas (Zirphæa) crispata.

the scallops, *Pecten irradians*, the adductor muscles of which are largely used for food, thousands of gallons being sold annually by the coast fishermen. In addition to these there are several small species belonging to the genera *Columbella*, *Nassa* and others, making the entire number living between Brigantine Inlet and Cape May about fifty species. At no special point, even on the most favorable occasions, can all of these be obtained. A large share, however, may at times be secured on the sea and bay shores near Longport, at Townsend's Inlet, Five Mile Beach and the Inlet two or three miles northeast of Cape May. But there is no locality known to the writer where species are so plentiful as at Anglesea; here, during a short visit last summer, thirty-nine species were secured by him.

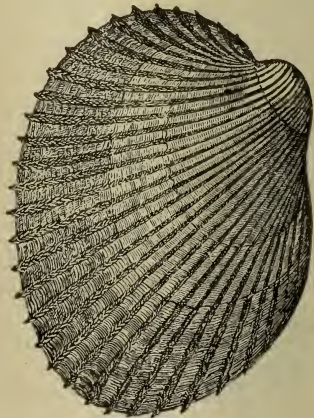
Nearly all of these were found living on a small peninsula about a half mile south of the Anglesea Hotel. *Fulgur carica*, the largest of our coast shells, were unusu-



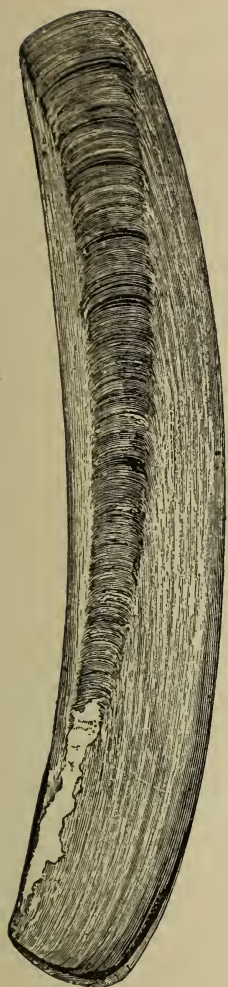
Scala Humphreysii.



Pecten irradians.



Arca pexata.



Solen americanus.

ally abundant, many of them being perfect in form, and exhibiting in the apertures the rarest shades of crimson, purple and orange. Excellent specimens of *Natica duplicata* were also found here *in situ*, these offering a new revelation to the collector as he saw, when lifting them from their beds, fine jets of water spouting in every direction from the edges of each large saucer-shaped foot. Both of these species were carried to the hotel and boiled—the former about ten minutes the latter two or three minutes. This made the removal of the animals an easy matter, leaving the lustre of the shells and color of the apertures uninjured. It should be remembered that the peninsula referred to is only free from water when the tide is nearing its lowest stage; also that the tide is low there at about the same hour it is high in Philadelphia.

In conclusion it may be well to inform the young collector that in the search for sea shells at least three adjuncts are necessary—a trowel for digging purposes, a water-tight jar for preserving living specimens and a good sized basket for large shells. With these in hand, and a taste for the work, there is no reason in the world why he shouldn't be both successful and happy.

NOTES ON THE NORTH AMERICAN SPECIES OF SUCCINEA.

BY T. D. A. COCKERELL.

(Continued from last number.)

- (10.) *S. sillimani* Bland. This also may have to be united with *elegans*. Mr. L. B. Elliott sent me a specimen, pale horn

color, fragile and thin, collected at Denver, Colorado. There is a similar specimen in the Binney and Bland Collection.

- (11.) *S. salleana* Pfr. A specimen in the Binney and Bland Collection, from Alexandria, La., is white, and allied to *S. elegans*.
- (12.) *S. wilsoni* Lea. Mr. Singley sent me this from Brevard Co., Florida, and I make the following note: *pfeifferi* group; may be a good species; amber color, rather shiny, more obtuse and swollen than most *pfeifferi*. Agrees with Lea's description, but spire shorter than in his figure.
- (13.) *S. effusa* Shutt. A specimen in the Binney and Bland Collection is from Spring Garden Lake, Fla. A good species, allied to *pfeifferi*.

Sect. II. *Neritostomæ*.

= *Neritostoma* (Klein) Mörch.

- (14.) *S. putris* L. *S. obliqua* is generally not to be distinguished in anything from this. I found *putris* in 1887 close to the Cave of the Winds, at Niagara Falls. There is also a specimen from Niagara in the Binney and Bland Collection, marked *obliqua*. Mr. Singley sent me specimens of *obliqua*, collected in Carleton Co., Ontario, Canada. They approach *S. virescens* Jeffreys (non Morel.) rather than *putris*, the color being pale greenish-horn. One form, which may be considered typical, was 16 mill. long, spire 5½ mill. long, texture like *putris*. The other, which represented a variety, was 15 mill. long, spire 3½ mill. long—a more globose shell, which can probably not be separated from *S. virescens* Jeff., of Europe. Say's var. *ovalis* is very near to this.
- (15.) *S. totteniana* Lea. I received this from Mr. Singley, collected by Mr. E. W. Roper at Revere, Mass. It is, I think, a good species—an extreme form allied to *virescens*. Shell yellowish-green, inflated and thin, whorls rounded, mouth broad, spire short.
- (16.) *S. grosvenorii* Lea. Specimens from Lee Co., Texas, were kindly submitted to me by Mr. Singley. They comprised two forms, one greenish and the other, which may be called var. *rufescens*, reddish and more globose. The species is a good

deal like *putris*, but smallish and spire longer; whorls convex. It seems to be a good species. I have also seen it from Alexandria, La., in the Binney and Bland Collection.

- (17.) *S. stretchiana* Bland. I have seen this from San Francisco, Cal. (G. W. Michael), sent by Mr. Singley. It seems to be a small species of the *putris* group, allied to *S. parvula* Drouët, of Europe. Reddish-horn, not very shiny, striate, spire rather large. In the Binney and Bland Collection, one from Washoe Co., Nevada, looks rather like *avara*, at least in color; but another from Oregon is brown and resembles the *putris* group. There is a form *major* Ancey, ms. (sine descr.), nearly twice the size of the type, recorded by Yarrow, from Pagosa, Colo.

THE SHELL BEARING MOLLUSCA OF MICHIGAN.

BY BRYANT WALKER, DETROIT, MICH.

Carychium exiguum Say. Common everywhere.

C. exile H. C. Lea. Although not as common as *C. exiguum*, the localities where this form has been found indicate that it will be found generally distributed over the state.

Limnæa stagnalis L. Pl. I, fig. 6.

Occurs all over the State, often in great abundance. An extreme form, in which the body whorl is obtusely angulated, and the aperture much enlarged, from Houghton Lake, Roscommon County, is shown in fig. 6.

L. stagnalis jugularis Say. Pl. I, figs. 1, 2, 3.

I think this form is entitled to varietal rank. It is not as common as the typical form and seems to occur usually by itself. Figures 1, 2 and 3 from Black Lake, Presque Isle County, may be referred here; but the expansion of the lip, especially of fig. 1, is not typical, and is probably due to some peculiar local conditions. All the specimens from this locality are a pure translucent white. The *Physa fragilis* of Mighels is probably a similar case in another genus.

L. stagnalis sanctæmarie. Pl. I, figs. 4 and 5.

This form from the Neebish Rapids of the St. Mary's River is well characterized by its small size, and the flattening of the upper part of the body whorl, which gives a mammilliform appearance to the short, rapidly acuminate spire. The relative size of this variety and the typical *L. stagnalis* is shown by comparing figs. 4 and 5 with fig. 6.

L. ampla Migh. Houghton Lake, Roscommon County, is the only locality I know of for this species. Specimens from there, submitted to the late Dr. James Lewis, were so named by him. In the form in which it is found in Michigan, it seems doubtfully distinct from *L. emarginata* Say.

L. decollata Migh. Cited by Currier and DeCamp. I have with some hesitation referred specimens from Mullet Lake, Sheboygan County, to this form.

L. megasoma Say. Occurs in great abundance in the Higgins River, Roscommon County; also found at different localities in the St. Mary's River. It seems to be confined to the northern part of the state.

L. reflexa Say. Pl. I, fig. 8.

Generally distributed over the state, and as usual in the genus, exhibits a considerable degree of variability. In some forms it is difficult to distinguish from *L. palustris* Mull. *L. umbrosa* Say is cited by De Camp as distinct. Fig. 8 is a specimen with a remarkably expanded lip, from the River Rouge, Wayne County.

L. reflexa zebra Tryon. Occurs frequently, associated with the type, and is easily connected with it in any considerable number of specimens.

L. reflexa exilis Lea. The specimens on which the citation of this form in the catalogue of 1879 was based, are referred to the type by Mr. Pilsbry. They differ sufficiently from the large form usually found, as figured by Haldeman (Monograph pl. 8), although the whorls are not as flattened as the typical *exilis* from the Western States requires.

L. reflexa kirtlandiana Lea. This form is not entitled to more than varietal rank. Specimens from the original locality in Ohio agree very closely with examples from southern Michigan. Specimens from the St. Mary's River are more slender and more fragile, and are nearer to Utah examples received under this name from Mr. Hemphill.

L. reflexa scalaris. Pl. I, fig. 7.

Spire elongated, whorls rounded and suture deeply impressed. This form, which occurs occasionally, associated with the type, in the marshes at the mouth of the Rouge River, Wayne County, I cited without sufficient consideration, in my catalogue of 1879 as *var. distortus* Rossm.

L. columella Say. Southern part of the state but not abundant.

L. lanceata Gld. This may prove to be a form of *L. reflexa*. It is cited in all the catalogues, but I believe wholly because the original specimens came from the north shore of Lake Superior. Specimens from Belle Isle, Detroit River, are said by Pilsbry to be close to Gould's types in the Academy's collection.

L. palustris Mull. Found everywhere in great abundance and variety. A striped form similar to *L. reflexa zebra* is sometimes found. *Limnophysa fragilis* Linn., cited by De Camp, would seem to belong here. Dr. De Camp informs me that the *L. intertexta* of Currier, cited in his catalogue but never described, is a form of this species.

L. palustris michiganensis. Pl. I, figs. 9 and 10.

This form is similar to variety D, as figured by Haldeman in his Monograph pl. 6, fig. 7, but is much smaller, the length being but half an inch. It is very delicately striate and under the glass shows many very fine spiral lines cutting the striæ. The aperture is just one-half the length of the shell. The lip is thickened by a rib within the inner margin, which shows itself as a white band on the outer surface. Spire acute, suture impressed, umbilicus small.

Haldeman's figure above cited, if reduced nearly one-half, would be an excellent representation of this variety; except that the whorls are more rounded and suture more deeply impressed than in this form. Figure 9 is from Ecorse and figure 10 from Greenfield, Wayne County. I am indebted for examples from Oregon to Mr. Pilsbry, who informs me that it ranges west from Michigan to Washington.

L. binneyi Tryon. Cited by De Camp from Houghton Lake.

L. haydeni Lea. Cited by De Camp from Houghton Lake.

L. traskii Tryon. Cited by De Camp from Newaygo County.

L. contracta Currier. Higgins Lake, Roscommon County is the only locality known for this curious form. It is either a semi-fossil, extinct species or an inhabitant of deep water, as only dead specimens have ever been found as I have been informed.

L. emarginata Say. A very abundant species through the northern part of the state and of great variety. Its most characteristic feature being a thick heavy shell, usually pure white and usually quite opaque, sometimes translucent. Specimens from Higgins Lake, Roscommon County, exhibit great variety in the form of the aperture which is frequently much expanded. Specimens from Sault St. Marie approach very close to Haldeman's figures of his *L. ser-rata* (Mon. pl. 2, fig. 6-8).

L. catascopium Say. An abundant and characteristic species of the Great Lakes, and their connecting rivers. Specimens from the north acquire the thick solid shell so common in *emarginata*.

L. caperata Say. Cited by Miles, Currier, Smith and De Camp.

L. cubensis Pfr. This form, hitherto known as *L. umbilicata* Ads., has a range over the whole of the State.

L. pallida Ad. Cited by Miles, Currier and De Camp.

L. desidiosa Say. Very common everywhere.

L. humilis Say. Very common and variable.

L. galbana Say (?) The form thus doubtfully designated, if not the living representative of Say's fossil species, has never been described. It has been found in Emmet, Grand Traverse, Alpena and Oakland Counties, and would thus seem to have a wide range through the state. It is a well marked form and seems to be subject to less variation than is usual in this genus.

L. bulimoides Lea. Cited by De Camp, "found in greenhouse, probably introduced by plants."

L. gracilis Jay. Reed's Lake, Kent County, is the only Michigan locality known for this species.

Physa lordi Baird. Northern part of the state. *P. parkeri* Currier, from Houghton Lake, is generally considered a synonym.

P. ancillaria Say. Generally distributed over the State, and exhibits a great degree of variability.

P. sayi Tapp. Very common. Cited by Currier and De Camp as *var. Warreniana* Lea. Specimens from a small pond near Traverse City, collected by Dr. Leach, are remarkable for the tenacity of the shell and the expansion of the outer lip. In some instances the newly formed lip was so thin as to be completely reflected back on the outside of the shell. Whether the local influences in this case were similar to those which, according to Prof. E. S. Morse, produced the *Physa fragilis* Mighels I cannot tell; but the two forms would seem to be identical.

P. vinosa Gld. Originally described from specimens collected on the north shore of Lake Superior, this species has been cited by Miles, Currier, Smith and De Camp without further knowledge of its occurrence. Recently, however, specimens from the Detroit River and St. Clair Flats have been referred to this form by Mr. R. E. C. Stearns, of the U. S. Nat. Museum.

P. anatina Lea. Although not cited from the western part of the state, its occurrence in Washtenaw, Macomb, Lapeer and Grand Traverse Counties show that it has a general distribution through the eastern and northern part of the state. Mr. R. E. C. Stearns, speaking of specimens from the Clinton River, Macomb County says: "Your specimens are the brightest and handsomest I have seen."

P. pomilia Con. Cited by De Camp as *var. Showalteri* Lea. I am indebted to Mr. Streng for specimens from Grand Rapids.

P. gyrina Say. Very abundant and in great variety of form.

P. gyrina hildrethiana Lea. Very common everywhere.

P. elliptica Lea. Cited by De Camp, as are also *P. oleacea* Tryon and *Febigeri* Lea, which are considered as synonyms by Tryon.

P. heterostropha Say. Common everywhere and in almost infinite variety.

P. brevispira Lea. Specimens from the Detroit River have been identified as this species by Mr. Pilsbry.

P. deformis Currier. This species, originally described from Grand Rapids, is cited also by De Camp in his catalogue. Dr. De Camp writes: "I do not believe that this is a distinct species."

Aplexa hypnorum L. Common everywhere.

A. hypnorum tryoni Currier. Distinguished by its larger size and deeper coloring.

A. integra Hald. Generally distributed through the state and quite common. I follow Tryon in including Lea's *P. niagarensis* as a synonym. Mr. R. E. C. Stearns, however, informs me that our Michigan species is *niagarensis* and that Haldeman's *integra* is a southern species not extending further north than Indiana. The Michigan form agrees, however, with specimens received as *P. integra* from the late Dr. Jas. Lewis.

To be concluded.

GENERAL NOTES.

GONIOBASIS VIRGINICA IN CONN. The collection of the American Asso. of Conchologists has received specimens of the above species collected by Rev. Geo. D. Reid, from the Connecticut River, at Deep River, Conn. This is not far from the mouth of the river, and is, we believe, the earliermost locality reported for any species of this family in the United States. The specimens are large and well-developed, averaging over an inch in length. Both the smooth form and the spirally lirated var. *multilineata* occur.

MR. WILLIARD M. WOOD, of San Francisco, California, has gone on a collecting trip to Monterey Bay, where some new and rare species have recently been found. He will remain there during the month of July.

PLANORBIS MULTIVOLVIS.—I have lately received several specimens of *Planorbis multivolvis* Case, collected in the Island of Newfoundland, by a friend engaged on a surveying staff. They were found in the neighborhood of Brathurst Lake. I have not seen the Michigan form, but Mr. Bryant Walker, to whom I submitted my shells, tells me the Newfoundland specimens are "rather smaller and thinner but identical in form."—*W. J. Farrer, Orange, Va.*

EXCHANGES.

COLLECTORS who desire to dispose of North American Land, Fresh-water and Marine shells for those of *California*, will do well by sending their exchange lists to *Williard M. Wood, 2817 Clay Street, San Francisco, Cal.*

PACIFIC COAST, marine, land and fresh water shells, for land and fresh water shells of the West Indies and South America, *G. W. Lichtenthaler, Bloomington, Ills.*

FOSSILS from the Silurian, Devonian Sub-carboniferous and Carboniferous, to exchange for other fossils, especially of the Cretaceous and Tertiary; send lists and receive mine. *C. S. Hodgson, Albion, Ill.*

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No. 4

COLLECTING NOTES.

BY CHAS. T. SIMPSON.

During a brief vacation last Christmas, Mr. John B. Henderson, Jr., of Washington, and the writer made a flying visit to the west coast of Florida, in the vicinity of Tampa Bay, for the purpose of collecting shells; and I have thought that perhaps a few notes on our work might be of interest to the readers of the NAUTILUS. The country throughout this region consists of ordinary sandy pine land, interspersed here and there with ponds and hammock or hardwood tracts of from an acre or so to several miles in extent. This region in general is one of the flattest on the globe, and as a consequence the sea is in most places quite shallow and thousands of acres of mud flats are often laid bare at very low tides or during "Northers," affording wonderfully rich collecting grounds for the naturalist. We fitted ourselves out with a five or six ton sail-boat accompanied by a skipper and a good-natured cook, and with two weeks provisions, a gallon of alcohol, a dredge, and several large note books which were to be filled with original observations and discoveries, we sailed away as eager for adventures as Lord Bate-

man. I want to say to anyone who attempts to collect marine shells or animals, that first and foremost it is all important to use the dredge. This implement is so simple, so easily constructed, and is so efficient that the merest tyro never ought to try to get along without it. A full description of one and its mode of working can be found in Wood-

ward's Manual of Conchology, and one that brings the matter down to date will soon appear in a forthcoming paper by Dr. Dall on collecting. We threw overboard our dredge in the warm bright waters of Tampa Bay as the boat was brought up into the wind, and awaited results. There is a certain kind of excitement about the operation; the jar and tremble of the rope as the implement—far down out of sight—scrapes over the bottom, gathering in the treasures of the deep, produces a sensation akin to that which an angler feels when he gets a bite, or a sportsman when he sights game and "draws a bead." And this feeling reaches a fever heat when the dredge is hoisted slowly, leaving a cloudy wake in the water, and its contents are dumped into the screen.

Starfishes, echini, perhaps a big horseshoe crab or two, and mingled with living mollusks and fishes there may probably be dead shells inhabited by various forms of hermit crabs, fish, sea-worms and a dozen other kinds of life, many of which may be puzzling even to an experienced naturalist. There is something wonderful about all this, and entirely different from shore collecting; the animals are taken in their homes, caught in the very act of carrying on their ordinary avocations, and it is not to be wondered at that they seem to have a kind of surprised appearance when they are tumbled out indiscriminately on deck. There is always an element of uncertainty about dredging that furnishes a mild excitement akin to that of gambling. One throw, or a half dozen in succession, may turn out to be "water hauls," bringing up nothing but mud or possibly sea urchins, and the "just once more before we go away" may bring up half a hundred species, some of them rare, and all desirable.

The vicinity of Tampa Bay is rich in marine species and is classic ground to the conchologist and the collector, it having been worked over by Agassiz, Conrad, Stimpson, Spinner, and other noted men who have passed on, and Drs. Stearns and Dall, Velie, Calkins, and others who are still with us; and often a run along the shores of some of the outer keys, or about the muddy, sandy bays, will reveal shells enough to turn the head of even a steady-going experienced conchologist. And at such times it always happens that when the collector gets every bucket, and sack, and basket, and both bands loaded down to the last limit with things that are good enough in all conscience, and is miles away from his boat, he begins to run upon numbers of such marvelously rare and beautiful things that

he is tempted to throw away every thing he already has and begin entirely anew.

Prof. Hornaday spoke the truth when he said that "the collector's life is a constant race for specimens." In the few brief days we had at our command we felt that we must "make hay while the sun shone." But dredging, though very delightful at first, when followed up for eight or ten hours consecutively gets to be a good deal like work, and hard, heavy, wet work too. So we did what I should advise all collectors in similar circumstances to do; we went ashore during low tides and searched sometimes the sandy bays, the limited areas of rocky shore to be found about that region, or the open beaches; and during high tide we dredged. One rocky bed laid bare at low tide in Terracina Bay was marvelously rich in *Tritonidea tinctoria*, *Cerithium floridanum*, *Semele reticulata*, *Murex nuculus*, *Cumingia tellinoidea*, *Nassa consensa*, *Muricidea multangula*, *Urosalpinx perrugatus*, and some other forms not often found on the sand.

Mrs. Mean's injunction "while yer a gittin' git a plenty" especially applies to the collector. One is prone when he sees anything in great abundance to feel as though it was very common and was hardly worth taking. Even the sight of a very rare mollusk in quantities somehow lowers its value in one's estimation. But the old collector who has let such chances go a few times, and afterwards where his entire stock of the same thing has run out, regrets his folly, learns to take all he can get of anything that is good. One may find a species thrown up to-day by millions on a certain shore, in excellent condition, and the next week, and for years afterwards, he may not run across a dozen individuals of the same. I had lived near Tampa Bay for four years and collected industriously, but throughout my whole residence I never found a hundred specimens of *Olivella mutica*, dead or alive. During our visit the dredge brought them up living, glittering like dew drops, by the handfuls. We dredged over and over the ground on which I once obtained in quantities of *Venericardia tridentata* and *flabella*, *Parastarte triquetra*, and *Pandora trilineata*, and scarcely found a specimen, while on the same ground we got a great many *Tubonillas*, an abundance of *Conus peali*, and a half bushel or more *Arca transversa*, not a specimen of which I had ever found there before; and on a sand flat that used to gladden my eyes with *Conus floridanus* not a single one could we find.

The shell mounds—the *Kitchen middens* of prehistoric tribes—are usually overgrown with tropical scrub, and are rich in land shells as well as mosquitoes and sand flies; and on one of these at Shaw's Point I rediscovered *Zonites dallianus* which I first found there three years ago, and, at the time, supposed to be the very different *Zonites minusculus*. In places the brackish water was swarming with *Cerithium minimum*, and *muscarium*, *Melampus coffea*, *Macoma constricta*, *Natica duplicata* and its companion *Melongena corona*, *Lucina Jamaicensis*, *Cerithidea scalariformis*, *Modiola plicatula*, var. *semicostata*, *Mytilus hamatus*, and the two *Cyrenas*, *floridana* and *carolinensis*. The ponds were alive with *Physa heterostropta* var. *pomilia*, *Succinea luteola*, which seems about as completely aquatic as any of the pond snails, *Planorbis tumidus*, which is a form of the protean and widely distributed *trivolis*; and on the keys several of the *Polygyras* were abundant.

Our ten days of collecting came to an end all too soon, for although we had worked very hard and gathered in some 200 species and perhaps 25,000 specimens, we had not had time to write a half dozen notes, and we had only made a beginning at what we wanted to accomplish. We packed our material and bid good-by reluctantly to the land of palmettoes, warm breezes and sparkling waters, carrying with us bright, happy memories that will only grow pleasanter as time passes away.

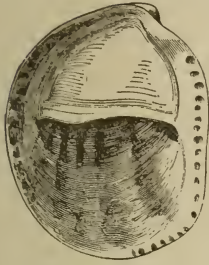
ON ATLANTIC CREPIDULAS.

BY WITMER STONE, PHILADELPHIA, PA.

During the summer of 1891 while at Cape May, N. J., I made a considerable collection of *Crepidulas* of all ages and varieties with a view to studying the relationship of the several species found on the New Jersey coast; and some of the possibilities suggested by an examination of this material may prove of interest.

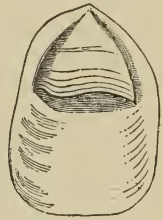
We have on this portion of the Atlantic seaboard four nominal species, of which three, *C. fornicata*, *convexa* and *glauca*, grow upon the outside or convex surfaces of the shells upon which they occur,

while one, *C. plana*, grows upon the inside or concave surface. "The curvature of the surface upon which the *Crepidulas* grow has naturally produced a similar curvature in their own shells as it would otherwise be impossible for them to retain their hold. We therefore find that the three species first mentioned are convex in shape, while *C. plana* is concave.



Crepidula fornicata.

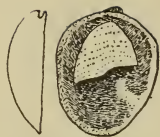
With this fact before us the question naturally arises: why is not *C. plana* a mere form of *C. fornicata* produced from eggs of the latter species which happened to be deposited on the inside of the host shell? A series of specimens collected with their hosts, however, shows that young *fornicata* is sometimes found on the inner or concave surface of *Natica* and *Fulgur* and retains all the characters of the species, being easily separated from the young of *plana*. The fact, however, that none but very small *fornicatas* are found in such positions, seems to show that the tendency to a convex form makes it impossible for them to retain their hold for any length of time on a concave surface. In other words, the tendency towards *convex* and *concave* shells has now become a fixed specific character.



Crepidula plana.

As to the original ancestry of *C. plana* there does not seem to me any doubt but that either this species has descended from a shell of the *C. fornicata* style or better perhaps that both species have developed from a free snail which formed the habit of attaching itself to other shells and whose characters have been gradually altered to suit its habits. Some of the individuals have thus adapted themselves to the convex and some to the concave surfaces of their hosts, and so eventually produced two distinct species. This theory is strengthened by studying the *Crepidulas* from other parts of the world, for my friend Mr. Pilsbry, tells me that on nearly every coast where a convex *Crepidula* is found there is also a concave species corresponding to our *C. plana*.

As regards our three convex *Crepidulas*, *C. glauca* and *C. convexa* are undoubtedly much more closely related to each other than either



Crepidula glauca.

is to *C. fornicata*, as has been already noticed by Mr. Pilsbry. In both of them the beak projects almost directly forward and stands clear above the margin, while in *C. fornicata* it is very much to one side and rests directly on the margin. This seems to be caused by the concentric additions to the shell being very unequal—*i. e.* wider on one side than on the other—in the latter species. The outline of the posterior margin of the “deck” or septum in *C. fornicata* is also different.

The difference between *C. glauca* and *convexa* is entirely one of shape and is apparently due primarily to the character of the surface on which they live, as *C. glauca* occurs on large shells where the curvature is slight and *C. convexa* on small, very convex shells such as *Nassa obsoleta*, where considerable curvature is necessary to enable the *Crepidula* to bring the entire margin of its shell in contact with the surface of its host.

Whether this difference of shape is to be regarded as a specific or subspecific character is a question dependent entirely upon the extent to which this adaptation to two styles of surface has proceeded. If shells of intermediate form occur, then *C. convexa* is merely a subspecies. Among those which I have thus far examined I have seen no intermediates.



The fact that we have at least two distinct convex *C. convexa*. *Crepidulas* upon the New Jersey coast naturally suggests the possibility that we may have had at one time, two concave species; one developed from the same stock as *C. fornicata*, as already described, and the other in a similar manner from the *C. glauca* stock. The similar environment and degenerate nature of “inside growers” would tend to obliterate the original specific differences, so that the two might easily have become merged into what we know as *C. plana*.

Anatomical investigations might throw additional light upon these questions, and a careful study of the genus will well repay anyone who has the requisite material at hand.

THE SHELL BEARING MOLLUSCA OF MICHIGAN.*

BY BRYANT WALKER.

U. anodontoides Lea. Cited by De Camp from Monroe County. Also by Call.

* The first installment (land mollusks) of Mr. Walker's catalogue of Michigan mollusks will be found in the June NAUTILUS; the second, aquatic gastropods, in the July number.

U. asperimus Lea. Cited by Miles, Currier and De Camp. The latter in a recent letter says: "I do not believe that it belongs to the State."

U. canadensis Lea. Three Mile Lake, Oakland County, identified by the late Dr. James Lewis.

U. cariosus Say. Cited by Sager and Miles; evidently an error, as the species does not occur so far west. The citation is probably based on some form of *U. occidentis* Lea.

U. calatus Con. Cited by Sager and Miles. In all probability a case of mistaken identity.

U. circulus Lea. Common in southern part of the State. Specimens from the River Rouge are referred to *U. lens* Lea by Dr. De Camp.

U. coccineus Hild. Apparently quite common. A specimen from the Detroit River has a pink nacre.

U. complanatus Say. Northern part of the State. For an account of the re-discovery of this species in this State, see the NAUTILUS III, p. 16 and V, p. 93.

U. cornutus Bar. Cited by Currier and De Camp. Dr. De Camp writes me that this species, formerly common in the Grand River, has entirely disappeared.

U. cuneolus Lea. Cited by De Camp from Monroe County.

U. donaciformis Lea. Mouth of Otter Creek, Monroe County, collected by Jerome Trombly. Cited also by Call.

U. elegans Lea. Southern part of the State. Monroe and Kent counties.

U. ellipsis Lea. Detroit River and Grand Rapids.

U. ellipsiformis Con. The type specimens are stated by Conrad to have been received from Michigan. Were it not for the explicit statement that the beaks were simple, the figure and description would apply to *U. spatulatus* Lea. It would seem possible that it was described from specimens of that form in which the undulations of the beaks, usually quite light, had so nearly disappeared as to escape attention. The species has not been found by recent collectors.

U. fabalis Lea. The River Rouge near Detroit. Cited also by Sager and Miles.

U. gibbosus Bar. Abundant all over the State. A small variety is found in the Detroit river, in which the nacre varies from a deep purple to pure white. There is almost always, however, a trace of purple along the hinge.

U. glans Lea. The Clinton river at Pontiac, where it was first found many years ago, is the only locality known for this species in the State. Its occurrence there I have been successful in verifying.

U. gracilis Bar. Common. Specimens from the River Rouge, Wayne County, are the largest I have ever seen. Those from the Detroit River are much smaller, showing the unfavorable character of their surroundings.

U. iris Say. Cited by Sager, Miles, Currier and De Camp. The latter, however, in a recent letter queries whether the Michigan specimens can be distinguished from *U. novi-eboraci*. Call (Cat. Unionidæ Miss. Valley) credits the species to Michigan.

U. kirtlandianus Lea. Cited by Call from the Grande River (loc. cit.).

U. levissimus Lea. Cited by Miles, Currier and De Camp.

U. Leibii Lea. Detroit River, identified by Dr. Jas. Lewis; mouth of Otter Creek, Monroe County, collected by Jerome Trombly.

U. latecostatus Lea. Cited by De Camp from the Grand River, Kent County. A specimen received from him agrees in form and in arrangement of the folds with Lea's figure and description. It does not, however, seem to differ from *U. undulatus* except in the more highly developed character of the folds.

U. ligamentinus Lam. Southern part of the State. Cited also by De Camp as *U. crassus* Say. A form with pink nacre occurs on the Grand River (see Lewis, Am. Jour. of Con. IV, 81).

U. luteolus Lam. Very abundant everywhere and exceedingly variable in size, color and shape. De Camp cites *U. siliquoides* Bar., from Grand River as distinct. The nacre is occasionally more or less tinged with pink toward posterior portion.

U. multiradiatus Lea. Appears to occur generally through the southern part of the State. It is very abundant in the Huron River at Ann Arbor, Mich. A dwarfed form occurs in the Detroit River. The female has the edge of the mantle prolonged in long feelers, similar to those figured by Lea (Observations II, pl. xv, fig. 49) in the female of *U. radiatus* Lam.

U. nasutus Say. Occurs all over the State. Specimens from the Detroit River are small and quite thin.

U. negatus Lea. Sheawasse River, Genesee Co., where it was discovered by Dr. M. L. Leach, who writes that the only specimen he found was sent to the Philadelphia Academy of Natural Sciences and was there identified as this species. It is now in the museum

at Bay View, Petoskey, Michigan. Among a large lot of *U. rubiginosus* sent to me by Dr. Leach from the same locality was another specimen, which in the sulcate or rather heavily imbricated character of the surface resembles Lea's description of this species. It is, however, more inflated, and although somewhat eroded, lacks the peculiar beaks described by Lea. If not distinct, it certainly is a very peculiar form of *U. rubiginosus*.

U. novi-eboraci Lea. Abundant everywhere. A form without rays from this state was described as *U. opalinus* by Anthony, but is not considered as distinct by Lea in his last synopsis. Dr. De Camp sends me the following note on Anthony's species. "McNeil found the only specimen of this and sent it to Anthony. It was from Ottawa county, and McNeil says he thought it was a malformed *U. gibbosus* Bar. I have hunted the same stream and never found one."

U. occidentalis Lea. Generally distributed through the southern part of the State.

U. parvus Bar. River Rouge, Wayne county.

U. penitus Con. Cited by Sager and Miles, probably a mistake as the species is a southern one.

U. perplexus Lea. Cited by Sager and Miles.

U. phaseolus Hild. Cited in most of the catalogues. Sheboygan County is the most northern locality known to me. Specimens from the Detroit river are smaller than usual, very strongly arcuate and darker colored without spots.

U. plicatus Les. Western part of the State, extending as far north as Muskegon. I have not found this form in the eastern part of the State. Michigan specimens seem to be smaller than those from more southern localities.

U. pressus Lea. Common all over the State.

U. pustulatus Lea. River Rouge, Wayne county.

U. pustulosus Lea. Cited by Sager, Miles and Call.

U. radiatus Lam. Cited by De Camp from Grayling, Crawford County, and as *U. distans* Anth. by Currier and De Camp. Were it not for the occurrence of *U. complantus* Sol., in the northern part of the State, (a species which is usually considered as confined to the Atlantic drainage), I should question whether there was not some mistake in the above citations. Gould in Agassiz "Lake Superior" however, cites this species from the north shore of that lake, and it is quite possible that it has extended from Canada into our northern

borders. I notice that in the NAUTILUS for November, 1891, p. 78, Mr. G. W. Dean says that Anthony's *distans* is the female form of *U. luteolus* Lam. Call (loc. cit.) also refers *U. distans* to *luteolus*. Lea, however, refers it to *radiatus*.

U. rangianus Lea. Fighting Island, Detroit river, and the River Raisin, Monroe Counties, are the only localities where this species has yet been found to my knowledge. Credited to Michigan by Call (loc. cit.)

U. rectus Lam. Not uncommon in the southern part of the State. A form from the Detroit river was described as *U. Sageri* by Conrad and another variety from the Huron river, Livingstone county, as *U. leprosus* by Miles. Specimens from the River Rouge, Wayne county, are fully as wide as any from the Ohio river, but longer, more compressed and not so heavy, the nacre being either white or purple. Detroit river specimens are only about half as large as Rouge river examples, with the nacre tinged with purple toward the hinge, or occasionally of a beautiful salmon color.

U. rubiginosus Lea. Common in the southern part of the State.

U. Schoolcraftii Lea. Not a common species, but cited in nearly all the lists.

U. spatulatus Lea. Very abundant in many localities.

U. subovatus Lea. Cited by Miles, Currier and De Camp. Specimens sent to correspondents as *U. ventricosus* Bar., have been referred by them to this form.

U. subrotundus Lea. Cited by Sager and Miles only. As it has not been found by later collectors it is to be considered a doubtful inhabitant of the state.

U. sulcatus Lea. Detroit river. Specimens from that locality were described as *U. perobliquus* by Conrad.

U. Tappanianus Lea. "Have this from Monroe County, Michigan, that agrees well with Lea's figure and description; but think it the same as *siliquoides*, only a variety of *luteolus*. The beaks are eroded on the specimens I have, so that I cannot decide well on the undulations"—De Camp. I know nothing of the occurrence of this species in the State, beyond the above note from Dr. De Camp, which seems to leave the identification somewhat in doubt.

U. tenuissimus Lea. Cited by De Camp from the Grande river. Also by Miles and Currier.

U. trigonus Lea. Cited by De Camp from Black Lake, Ottawa county; also by Miles and Currier.

U. triangularis Lea. Southern part of the State.

U. undulatus Bar. An abundant species in suitable localities in the southern part of the State. Dr. De Camp sends me a specimen which I think should be referred to this species, labelled *U. atrocostatus* with the following note: "This I found in Black Lake, Ottawa county, I think *plicatus* and *latecostatus* distinct; but would hardly say this of *atrocostatus* were it not for finding it only in the still water of the lake, while the other almost universally inhabits rivers with current."

U. ventricosus Bar. Very abundant all over the State and extremely variable. In many localities it attains a large size. Detroit river specimens are small and with comparatively thin shells.

U. verrucosus Bar. Southern part of the State.

(To be concluded.)

GOULD'S TYPES OF *NASSA* AND *COLUMBELLA*.

BY W. B. MARSHALL.

Tryon has expressed the belief that the types of several species of *Nassa* and *Columbella* described by Dr. A. A. Gould were destroyed in the Chicago fire.

Among others he mentions the following:—*Nassa beata*, Loo Choo Is.; *Nassa optata*, Sydney, N. S. W.; *Nassa spurca*, St. Simon's Bay; *Columbella minuscula*, Ousima; *Columbella zonata*, Kagosima.

Referring to the types of *Nassa*, Tryon said "Most of the above are from the collections of the North Pacific (U. S.) Exploring Expedition; they have not been figured and the type specimens were destroyed in the great Chicago fire. Some of them might be identified with other described species, but it is better not to do so. I think, under the circumstances."¹

In a note under his description of *Columbella (Seminella) minuscula*, Tryon said "Unknown to me. The types of this, the preceding and following species described by Gould are believed to have been destroyed at Chicago by fire."²

The types of the five species mentioned above were not destroyed. They are now in the collection of the New York State Museum at Albany and are represented as follows:—

¹ Manual of Conchology, (I) iv, p. 63.

² Ibid. v, p. 171.

Nassa beata by six specimens.

Nassa optata by one specimen.

Nassa spurca by four specimens.

Columbella minuscula by three specimens.

Columbella zonata by two specimens.

GENERAL NOTES.

ERRATA. For "*Helix sargenti*" in the May NAUTILUS, p. 8, read "H. SARGENTIANA J. & P."; the former name having been used for a species from the Bahamas, belonging to the section *Plagiptycha*.

Those familiar with the life work of the late Dr. Joseph Leidy will be interested to know that the two microscopes which he used for years and from which he obtained such valuable results have been placed in the hands of Messrs. Williams, Brown and Earle, Philadelphia, to sell, by Mrs. Joseph Leidy, and they will be pleased to show them to anyone desiring to see them. They were brought in 1875 and were in almost constant use down to the date of his death, and they show how careful a student he was, in that they are in perfect order and very little soiled or scratched.

The following extract from a letter to the Editor from Dr. W. H. Dall, written upon his recent return from the West Coast, will be of interest to our readers. * * * "My work this time was chiefly stratigraphical. I was able to determine the position of the Wallala beds as continuously conformable with, and below the upper Cretaceous Chico beds. Also to discover that earlier collectors have been mixing the genuine Pliocene and Postpliocene faunas in their collections, the two being often conformable, closely adjacent, and in similar mostly unconsolidated beds.

In mollusks I found that the *Periploma discus* and *Trophon triangulatus* have been found near San Pedro on several occasions lately. At Monterey I got several specimens of *Pedicularia californica* Newcomb, which lives on a red Gorgonian. Monterey as a collecting ground is already greatly injured, and will probably be nearly ruined before long, on account of the Hotel del Monte, the new town of Pacific Grove and the increased population of old Monterey, all the sewage of which is turned into the bay in front of the town. Beaches which formerly would afford several hundred species are now nearly bare, or offensive with stinking black mud. Old collectors will learn this with regret. The San Pedro collectors are very active and enthusiastic and doing good work."

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SHELL COLLECTING AT EASTPORT.

EDWARD W. ROPER.

The August number of the NAUTILUS was awaiting me on my return from a collecting trip to Eastport, Maine, with Messrs. B. H. Van Vleck and R. T. Jackson, of Boston, and I could fully appreciate Mr. Simpson's excellent article on dredging at Tampa Bay. Eastport is likewise "classic ground" to naturalists, and seldom a year passes that boatman Jerry Sullivan does not have an opportunity to take some ardent collector in his trim sloop. "Uncle" Jerry has been a resident of Eastport over forty years, and has coiled the dredge rope for Agassiz, Verrill, Fewkes and other well-known scientists. He knows the fluctuations of the strong tides, the depth of water, and what is of most consequence, the character of the bottom, which enables him to keep away from rocks which might cause the loss of the dredge.

While not equal to subtropical Florida as a collecting ground, Eastport, for a northern locality, is rich in species and individuals. Our dredgings were in water from fourteen to eighteen fathoms deep, and Mr. Simpson's statement that it was "hard, heavy, wet work," was certainly not overdrawn. Sometimes the dredge came up full of stones and gravel, with which were huge starfishes ten inches across the rays, curious leathery *Boltenias*, large red shrimps, sponges, such beautiful shells as *Trochus occidentalis*, *Margarita undulata* and *Admete viridula*, and perhaps the long-named

brachiopod, *Terebratulina septentrionalis*. The best brachiopod ground, however, has been ruined, by the dumping upon it of blue clay dredged from Luber Narrows.

The best hauls were made on a moderately soft bottom of mingled mud and sand, which was literally filled with dead and living shells of *Cyclocardia borealis*, *Astarte undata*, *Astarte crebricostata*, *Cardium pinnulatum*, *Sipho pygmæus*, *Dentalium striolatum* and many others. Here also were obtained numerous brittle stars, *Ophiopholis*, and the *Astrophyton Agassizii*, which came up clinging to the outside of the net, nearly as often as inside. When the dredge landed in soft mud it brought up such shells as *Leda tenuisulcata*, *Nucula tenuis*, *Crenella glandula*, *Yoldia sapotilla* and *Cryptodon Gouldii*.

Shore collecting at Eastport is sure to prove successful. Ordinary tides rise and fall eighteen feet, and at low tide a large area of shore is uncovered. *Purpura lapillus*, *Acmæa testudinalis* and the various *Littorinas*, common all along the New England shore, are here of much larger size than in Massachusetts. *Buccinum undatum* is everywhere seen at low water mark, and bunches of its yellow egg cases are fastened to the rocks in abundance. Underneath stones are myraids of crawling things not well known to a conchologist, but nevertheless interesting. In the larger rock pools every stone hides specimens of *Chiton marmoreus* and *Chiton albus*, *Saxicava rugosa* and *Margarita helicina* are common and the bottom may fairly bristle with the spiny sea urchins.

The enthusiastic collector will understand my pleasure when a critical examination of my gathered treasures revealed about seventy-five species of shells, fifteen of which had not previously been represented in my cabinet. My companions, more interested in other invertebrate forms, were also quite successful. Add to this, the fact that we were in the coolest place in the country, wearing light overcoats many evenings while everybody at home was sweltering in torrid heat, and we may look back to our Eastport trip as favored by fortune and replete with pleasure.

AN IMPORTANT DISCOVERY—A NEW FOSSIL CYPRÆA.

JOHN H. CAMPBELL.

Mr. Homer Squyer of Mingsville, Montana, in collecting during the present summer, additional specimens of cretaceous mollusca in

the Fox Hills Group (upper Missouri) made an exceedingly important "find." Among the species found by him, was a *Cypræa* absolutely new to science, and which may turn out to be the oldest *Cypræa* known to be in existence. The two fossil cypræas from California (*Bayerquei* and *Matthewsonii*) and the *Cypræa* (Mortoni) from the New Jersey marl beds are the only species of the family published as belonging to the cretaceous period; and Prof. Whitfield of New York some time since found a cast of another species (to be described by him) in New Jersey, which he considers to be cretaceous. The stratum (*Tejon group*) in which the two California species were found, is now considered to be tertiary, and the two New Jersey species may possibly turn out to be tertiary also, and in that case, the species just found by Mr. Squyer would be the earliest species of the genus *Cypræa* known. Next month we will describe and figure it more particularly, as we have this month only space enough to note the fact of its discovery, and assign it provisionally a name which we suggest should be *Cypræa Squyeri*.

The type shell of the species (only perfect one found) has been forwarded by Mr. Squyer to the Collection of the American Association of Conchologists.

APPEARANCE OF AN ASIATIC ANODONTA IN THE CHINESE
MARKETS OF SAN FRANCISCO.

BY WILLARD M. WOOD.

Several weeks ago, I was invited to take lunch at a Chinese restaurant, with Mr. Sue Locke, an interpreter.

While on the way, this gentleman, who knew I was greatly interested in the study of conchology, informed me that before going to the restaurant, he would show me a new shell which had just been brought from China. Upon this information, I questioned him, and found that it was a fresh-water species.

After passing through a number of narrow streets, we reached a very small Chinese merchandise store. The first object that attracted my attention, was a medium sized fresh-water aquarium containing a number of gold and silver fish.

Upon close examination, I found the bottom to be thickly lined with the species *Paludina Japonica* Mart., and two varieties of

same; and also a species of *Anodonta*, of which I have not, as yet, learned the name.

By my friend acting as interpréter, I discovered that but very few have been sent here. Upon the last steamer from China, several dozen were brought by the sailors, who disposed of them to Chinese merchandise dealers, in Chinatown.

I purchased a few at the price of fifteen cents apiece, and started for the restaurant; but we stopped on the way, once again, as my friend desired to take me to the home of one of his acquaintances to show me another species of *Anodonta*. I was very much astonished upon observing this specimen.

The shells I had been looking at were all less than three inches in length, while this specimen of another species, was almost six inches. I tried to secure it but failed. The Chinaman would not part with it. He said, "Me keepee. Him livee heep long time. No die."

As these shells may be bought exceedingly cheap in China, as I was informed, I shall try and have a number sent me.

NOTE ON *CYTHEREA CONVEXA* SAY.

BY W. H. DALL.

Quite a number of conchologists have referred to Conrad's statement (Medial Tert. Form.) that the well known name of our east coast species is preoccupied by Brongniart, but have hesitated to accept the name *Sayana* proposed by Conrad since no reference to chapter and verse was made by him to substantiate his observation. Having long sought the reference and at last found it, it seems well to put it on record. In Cuvier's "Ossemens fossiles" volume II, pt. 2 contains an essay by Cuvier and Alex. Brongniart entitled "Essai sur la géographie minéralogique des environs de Paris." It contains 278 pages, 4to, with maps and copper plates and was published in 1811. A number of species are figured from the Paris basin, among them *Cytherea convexa*, pl. 8, fig. 7. This shell long remained doubtful but has been practically identified by Renevier and Deshayes with the *Cyrena semistrata* of Deshayes, described in 1831. Say's *C. convexa* was described early in 1824 (Journ. Acad. Nat. Sci. iv, 140). Another *Cytherea convexa* was described by

Hoffmann (Karsten, Arch. 1831, t. 3, p. 385) subsequent to that of Say. Owing to the slight tinge of doubt which still remained, Deshayes' specific has been universally retained for the *Cyrena* except by Herbert and Renevier (Foss. nummul. suppl. p. 59, 1854). All things considered it would seem best to adopt Conrad's name *Sayana* for the well known shell to which it has been applied and which extends its range from Prince Edward's Island to Indianola, Texas, and has existed unchanged since the Miocene.

HYALINIA LÆVIUSCULA N. SP.

BY DR. V. STERKI, NEW PHILADELPHIA, OHIO.

A few years ago while looking over a parcel of fine drift from the Guadalupe river, gathered at New Braunfels, Texas, I found a small *Hyalinia* which was evidently new; but upon the few specimens at hand I did not like to publish it. Now, a few weeks ago, Mr. J. A. Singley had the kindness of forwarding me several thousand small shells picked out of a lot of the same drift materials.¹ Among them there are several dozen specimens of this form, besides nearly as many *Hy. singleyana* Pils., hundreds of *Hy. minuscula* Binn. and a few *Hy. milium* Mse.

Our species is of the size and general appearance of *Hy. minuscula*, for which it doubtless has been taken, but differs from that species in being more depressed. The spire is entirely flat or very little elevated. The whorls are markedly wider, from the nucleus, in specimens of the same size $\frac{1}{2}$ –1 less in number, very gradually increasing, and flatter above and below. The surface appears smooth and polished, and only with a strong magnifier radiating lines are seen, much like those of *Hy. radiatula* Gray, but also proportionately much finer. The umbilicus is rather wider in the adult, and the curvature of the whorl to the umbilicus is quite abrupt, appearing almost angular. The shell is colorless, glossy while fresh, and when weathered, appears more milky white, while *minuscula* then is more chalky.

This form is certainly not a variety of *Hy. minuscula* which may be regarded as a "species" at the arbitration of a systematist, but

¹ They are so interesting that a list of them with some notes will be worth publishing in the "NAUTILUS."

entirely distinct. Although the differences from that species seem not striking at first sight, they are well marked after careful comparison, as anyone will be convinced by close examination of the two forms. *Hy. texana* resembles more *Hy. singleyana* Pils., which however is sufficiently different by its much smaller size. The two evidently represent a natural group, and doubtless will show peculiar anatomical characters. It is to be hoped that Mr. Singley or another Texan conchologist will succeed in securing fresh specimens for examination.

Since writing the above, specimens have been received from Hidalgo, Texas, and from Henry County, Indiana. It will probably be found at intermediate localities also.

OBSERVATIONS ON THE HELICES OF NEW ZEALAND.

BY HENRY A. PILSBRY.

The first species of New Zealand land snails made known to science were described many years ago, by Dr. J. E. Gray of the British Museum. A number of forms were described later by Pfeiffer; and most of these were illustrated by Reeve in his big volume on *Helix* in the *Conchologia Iconica*. Reeve took the liberty of renaming the species to which Pfeiffer had given the names of letters of the Greek alphabet. These changes have been adopted by some authors, but as they were wholly unwarranted the propriety of returning to the original Pfeifferian designation is now conceded by most students. The most elaborate contributions to our knowledge of the New Zealand land snails have been made by Prof. Hutton, whose work upon this fauna will only become the more highly valued and appreciated as the subject is more widely known and studied.

Mr. H. Suter has lately made very valuable and substantial additions to New Zealand Malacology. I am indebted to him for numerous specimens and drawings and much useful information still unpublished.

The most prominent element in the New Zealand *Helix* fauna is the ancient and widely distributed genus *PATULA*; this is represented by numerous small species belonging to the section *Charopa* of Albers. The world-wide distribution of this type of snail causes us to regard it

as a heritage from so early a fauna that the place of its origin and the paths of its distribution will probably never be known with certainty. There is a peculiar modification of *Patula* found only in New Zealand, to which Hutton has given the sectional name *Thera*.¹ New Zealand has also received Paluloid snails from the *Endodonta* stock, this group being a special development of *Patula* confined to Polynesia. The New Zealand members of the subgenus *Endodonta* belong to two groups of species, one of which contains *P. cryptobidens*, *P. timandra*, *P. jessica*; to the other group Mr. Suter has given the name *Maoriana*; these are minute discoidal forms having numerous folds within the aperture. This group can only be considered a mere section of *Endodonta*, the species being closely allied to minute forms of *Endodonta* found in New Caledonia, etc.

Another Helicoid genus represented by numerous species is *LAOMA* of Gray. This group is characterized by the small, thin, conical or depressed shell with thin simple lip. The jaw is composed of numerous separate squarish plates, being very much like that of our northern genus *Punctum*. The teeth also are peculiar; these composite jawed Helices are probably to be regarded as an excessively ancient and primitive type but their affinities are with *Patula* rather than with the so-called *Goniognatha*. No species known to belong to *Laoma* has been discovered outside of New Zealand. Hutton's genus *Phrixgnathus* must of course be united to *Laoma* but the name may be retained as a section to contain species without teeth in the aperture.

A third genus of New Zealand Helices is also, as far as we now know, confined to those Islands; this is the genus *GERONTIA* of Hutton. I use that name to comprise snails having the animal and dentition of *Patula* except that the tail is provided with a mucus gland. The jaw is thin and delicate and varies from striated to ribbed. The shell is thin, somewhat translucent and its surface is striated or ribbed, sometimes hairy or occasionally smooth. The spire varies from low conical to nearly flat; and it is a notable fact which has hitherto escaped observation that whatever be the sculpture of the mature shell, the apical or embryonic whorls are spirally striated. This is an unusual feature and recalls to my mind that strange Tasmanian Helix, *Anoglypta launcestonensis*. The snails

¹ The name *Thera* is already in use for a recognized genus of Geometric moths, dating from 1831. As a substitute, *Aeschrodomus* may be used. This section of *Patula* includes *H. alpha* Pfr. and *H. beta* Pfr., the first being the type.

of the genus thus defined have been distributed by New Zealand authors into the following groups which they regard as genera: *Gerontia* Hutt., *Therasia* Hutt., *Thalassia* Alb., *Pysra* Hutt., *Pyrrha* Hutt., *Phenacohelix* Suter, *Patulopsis* Suter, *Amphidoxa* Alb. and *Calymna* Hutt. These sections or subgenera are founded upon various modifications of the shell or jaw, but they have not sufficient distinctness to rank as genera, unless we understand that term in a much more restricted sense than it has been used by the majority of conchologists or zoologists generally. These minor divisions are however natural groups and they are useful if we do not overestimate their importance. The sections or subgenera of this genus may stand as follows, the sequence of names being chronological.¹

Gerontia Hutt., 1883 (Type *G. pantherina* Hutton.)

Therasia Hutt., 1884, (Type *C. celinde* Gray.)

Calymna Hutt., 1884, + *Amphidoxa* Hutt. not Alb. (Type *C. costulata* Hutt.)

Pyrrha Hutt., 1884, (Type *P. cressida* Hutt.)

Phenacohelix Suter, 1891 (Type *H. pilula* Rve.)

Allodiscus Pils., 1892 (Type *H. dimorpha* Pfr.)=*Pysra* Hutt., 1884, non Stal, 1876.

Suteria Pils. 1892 (Type *H. ide* Gray):=*Patulopsis* Suter, 1891, non Strebel, 1879.

Thalassohelix Pils. 1892 (Type *H. zelandiæ* Gray.)=*Thalassia* Hutton (? and of Albers,) not *Thalassia* Chevrolat, 1834. (Coleopt.)

It will be noticed that *Amphidoxa* has been dropped or rather united to *Calymna*. The true *Amphidoxa* has not been found elsewhere than upon the island Juan Fernandez and the neighboring South American Coast. I have compared specimens with the New Zealand shells and find that there is not the slightest ground for supposing them congeneric. I am disposed to believe that the New Zealand *Thalassias* do not belong to the same genus as the Australian *subrugata* Pfr., the type of *Thalassia* Albers. The other departures from the usage of New Zealand authors are sufficiently explained in the above list.

¹ The genus *Phacussa* of Hutton is included by Suter. It may prove that the Zonitoid aspect of the dentition of that form is a secondary modification and not truly Zonitoid. In this case the group will be included among the present forms; otherwise it must remain in Zonitidæ, where Hutton placed it.

I will not comment here upon the genus *Carthæa* of Hutton; its affinities may be with the oriental *Bulimuli*, but certainly not with the South American group *Rhabdotus* where it has lately been placed.

In conclusion we find that the faunal relations of New Zealand as far as they are shown by the groups above considered are as follows: (1) with the primitive fauna of Australia still surviving in South Australia and Tasmania it is strongly allied by the predominance of *Patula* as well as of *Paryphanta*, *Rhytida*, etc., and also by the absence of the later elements of the Australian fauna, *Hadra*, *Chloritis*, *Papuina*, *Helicina*, etc., which are, as Mr. Hedley has shown, a recent influx from the Papua-Moluccan region. (2) from Polynesia it has received the Endodonta-like groups as well as probably *Tornatellina* and *Pupa*. The presence of *Placostylus* shows a third relationship to New Caledonia, Lord Howe Island and more anciently with the Solomon group, but this *Bulimoid* genus also extends eastward to the Vitian group.

With all deference to the opinions of such eminent zoologists as Prof. Hutton and Dr. von Ihering, I am unable to see that the New Zealand fauna is in any way allied to that of South America, except that in both the Old and the New worlds certain archaic forms have been preserved in these most southern extensions of land.

[COMMUNICATED.]

AMERICAN ASSOCIATION OF CONCHOLOGISTS.

The Association has recently issued a new and revised list of members, under date of July 18, 1892. It contains the names of 175 persons, located in various points of the United States, Canada and Cuba and it is expected before a great while that the conchologists of Mexico, Central and South America, will also be enrolled.

The growth of the Association has been very gratifying and now that the officers have resumed active work, it will no doubt forge ahead very rapidly. The rule requiring the choice of some special subject or branch of conchology, has been a valuable one and a large body of trained specialists will shortly be the result.

It is suggested that it would be an interesting event, if the members would hold a convention at Chicago next summer during the

World's Fair. Doubtless most of the members will visit the Fair and if they could time their visits so as to meet their fellow members and hold a convention, it would enable them to become personally acquainted with each other, besides learning much from the eminent scientists among their number, through the medium of papers prepared for the occasion. The president would be glad to hear from the members upon the subject and if the idea is favorably received, a committee could be appointed to arrange a program. Send in your suggestions, ladies and gentlemen!

Another suggestion is made that a Committee be appointed to classify and revise the nomenclature of the American Unionidæ. Every one, who has paid any attention to this great family, is annoyed at the great number of synonyms that encumber the literature of the subject and as we have several members who are students of the Unionidæ, it would be a good idea to enlist their service in the work. What say you, Messrs. Simpson, Hargrave, Fry, Mead, Lebman, Monell, Nell, Strode, Trombley, the two Wrights, Whittemore, Wheeler, Shepherd, Marshall, Marsh, Gorby, Brady, Vaughan and Witter?

A word about naming shells. Some members like Prof. Dall, Ford, Simpson and Pilsbry are overworked, while others have little opportunity to help their fellow members. The trouble is that the gentlemen named and others like them are all amiable and would like to oblige everybody, but they have an enormous amount of work on hand, and it taxes their time too much to name large lots of miscellaneous shells, which could be distributed around among the members. The writer knows that they would protest against this, if they knew what we are saying about them, for they are too good natured to complain, but nevertheless we would make a suggestion to members, who desire their shells to be named properly. When you get a miscellaneous lot of shells, divide them first into univalves and bivalves. Then, if you can, separate them into land, fresh-water and marine, or as near as you can come to such a division:

Then take your list of members and turn to your index of subjects and find out who are studying the different branches. Then write and ask such specialists, if you will send your shells to them for naming and we venture to say, that they will gladly respond as that is one of the objects of the Association. Let us take a few instances.

1. If you are a beginner and do not know the genera, pick out one

of each genus as near as observation will permit and drop a postal card to the president and he will tell you to whom to send them.

2. If you are further advanced and want the species in any special families named, say *Strombidae* send to Mr. Ritchie, of Boston; say *Nassidae* to Mr. Browne, of Framingham, Mass; say *Pupidae* to Dr. Sterki, of Ohio; say *Olividae* to Mr. Ford, of Philadelphia; and so on to the end of your list and you can have your whole collection named in a few weeks. The only charge to you will be postage or expressage both ways.

3. If you have any advanced questions to solve, or names to discuss, or other knotty points, then write to men like Prof. Dall, Simpson, Stearns, Pilsbry, Binney, Cooper, Whitfield, Claypole, Schuchert, Sterki, Johnson, Lee, Keep, Yates, Marsh and many others. The Association has enough of trained specialists to answer almost any questions relating to conchology.

The collection of American shells being made by the members of the Association is already a wonderful success. The Academy of Natural Sciences of Philadelphia has given us every facility for caring for the specimens and there are already eight large museum cases almost filled by specimens sent by the members. There are about 1000 species already mounted and labelled and the specimens in most instances are superb, the senders generally taking a pride in sending only the finest shells that can be obtained. The placing of fossil species along with the recent ones adds especial value to the collection and makes it, so far as we know, the only zoological collection of the mollusca in America. It is already one of the finest special exhibits of natural history in America, and with the continued zeal and enthusiasm of the members, it is certain to be in a few years, the finest special exhibit in the world.

In sending shells for the collection, members should bear in mind. 1st. That none but members of the Association can contribute specimens. 2nd. None but fine specimens from definite localities will be accepted. 3rd. The exhibit is kept separate and apart from the general collection of the Academy of Natural Sciences. 4th, Every species is labelled with the name and locality of the shells, the name and exact address of the member sending it and the date when it is placed in the collection. 5th. Send all specimens intended for the collection addressed to the president of the Association, care of Academy of Natural Sciences, 19th and Race Sts.,

Philadelphia. He and his brother officers and some of the members assemble there once a week, open the packages, verify the names, label and mount the specimens and place them in the cases.

In the next issue of the NAUTILUS we will begin again the work of acknowledging the receipt of all shells sent during the month by the members.

EXCHANGES.

(Exchange notices of moderate length will be inserted free for subscribers.)

WANTED to exchange British and Tropical Mollusca for U. S. Mollusca of all kinds. Please send lists first and receive mine. None of the commonest species required.—*B. Tomlin, 59 Liverpool Road, Chester, Eng.*

WANTED, *Helices*, in exchange for land and fresh-water shells.—*Edw. G. Vanatta, 1608 N. 12th St., Philadelphia, Pa.*

WANTED.—Marine univalves, especially of Mexico, Central and South America. Offered—many specimens, Marine, Land, and Fresh-Water, both U. S. and Foreign.—*F. C. Browne, Framingham, Mass.*

COLLECTORS who desire to dispose of North American Land, Fresh-water and Marine shells for those of *California*, will do well by sending their exchange lists to *Williard M. Wood, 2817 Clay Street, San Francisco, Cal.*

PACIFIC COAST, marine, land and fresh water shells, for land and fresh water shells of the West Indies and South America, *G. W. Lichtenthaler, Bloomington, Ills.*

FOSSILS from the Silurian, Devonian Subcarboniferous and Carboniferous, to exchange for other fossils, especially of the Cretaceous and Tertiary; send lists and receive mine. *C. S. Hodgson, Albion, Ill.*

CRETACEOUS AND EOCENE FOSSILS, minerals, agates, marine and fresh water shells, to exchange for rare marine shells, cloth-bound books or agates. *Homer Squyer, Mingusville, Mont.*

HERKIMER COUNTY LAND AND FRESH-WATER SHELLS to exchange for desirable species from other localities. Send lists and receive mine. *Albert Baily, Chepachet, N. Y.*

THE NAUTILUS.

VOL. VI.

OCTOBER, 1892.

No. 6

ON THE AMNICOLOID GENUS *LYOGYRUS*, WITH THE DESCRIPTION OF
A NEW SPECIES.

BY HENRY A. PILSBRY.

Some years ago the writer had occasion to examine the dentition of the type species of Gill's genus *Lyogyrus*¹, and to show that it is not allied to *Valvata* as supposed by all earlier systematists, as well as by TRYON² and by FISCHER³; but that it is undoubtedly a member of the family *Amnicolidæ* (Hydrobiidæ of Fischer), and in fact, is not far removed from the genus *Amnicola*. The same results have been independently obtained and fully confirmed by Mr. Charles E. Beecher⁴ whose preparations and unpublished drawings of the radula of *Lyogyrus pupoides* show conclusively the true systematic position of this interesting genus.

Lyogyrus may be shortly described as a fresh-water Rissoid having the shell of *Amnicola*⁵, the operculum of *Valvata* and the denti-

¹ Pilsbry, in the Conchologists Exchange, vol. ii, p. 113, 1888.

² Structural and Systematic Conchology, vol. ii, p. 274, 1883.

³ Manuel de Conchyliologie, p. 735, 1885.

⁴ Beecher in *MS. et litt.*

⁵ In some localities *L. pupoides* has the entire latter half of the body whorl free from the preceding whorl; but in the great majority of specimens this character is less marked than in the form originally described by Gould; and very often the peristome is actually in contact with the body-whorl for a short distance, as in a normal *Valvata*. The original *V. pupoidea* is an exaggerated and extreme phase of a species varying much in degree of compactness. It is therefore obvious that the character of having the last whorl free from the preceding whorl is not a generic or even a constant specific characteristic.

tion of *Bythinella*. To the one species hitherto known we now add the following:

Lyogyrus dalli Pilsbry & Beecher, n. sp.

The shell is umbilicated, smooth, nearly lusterless, of a somewhat transparent horn color. In contour it is globose-turbinate with a short spire and decidedly obtuse apex. The $3\frac{1}{2}$ whorls are quite convex, separated by deep sutures; last whorl ventricose, being well rounded in every part. The aperture is somewhat oblique, almost circular, its posterior angle being indistinct and obtuse. The peristome is continuous and thin, not sinuous, not thickened nor expanded; but the inner lip is a trifle dilated, and adheres to the body-whorl above the umbilicus; the latter being a deep and rather widely open perforation.

Alt. 2.6, diam. 2.5 mm.

The operculum is usually retracted about the quarter of a revolution within the mouth; it is a shining, yellowish, thin and corneous circular disk composed of many close whorls, the nucleus being subcentral.

The dentition is practically the same as in *L. pupoides*. The basal denticles are situated higher on the tooth than in *Amnicola*, and only one on each side is well developed, the outer denticle being more or less obsolete, but rather stronger in *L. dalli* than in *pupoides*.

Locality, Wekiva River, Fla. (C. E. Beecher).

This species was obtained in considerable numbers by Mr. Beecher in Wekiva River. It may be recognized by its globose contour, resembling the typical *Amnicola porata* of Say on a small scale; but it is more globose and has a wider umbilicus than any of our other Amnicolas. Of course a glance at the operculum (which is retained in the shell, as usual in this family), tells one at once that the shell is no *Amnicola*; for it is multispiral like the operculum of *Lyogyrus pupoides* Gld., the only species of the genus hitherto known. It will be remembered that Ancy described a *Lyogyrus lehnerti* some years ago, but this turns out to be a monstrosity of *Amnicola limosa* Say.

This species is named in honor of Dr. W. H. Dall, of the Smithsonian Institution, who has contributed so largely to our knowledge of the mollusks of Florida.

Illustrations of shell, operculum and dentition will be given in the Monograph of American Amnicolidæ, now in preparation by Mr. Beecher and the writer.

A FEW ADDITIONAL NOTES ON CREPIDULA.

BY REV. HENRY W. WINKLEY, SACO, ME.

In the August NAUTILUS Mr. Witmer Stone makes the statement concerning *C. fornicata* and *C. plana* that "the tendency towards convex and concave shells has now become a fixed specific character" and the general description of *C. plana* grants to that species an existence on the interiors of other shells and a consequent concave form.

There is a colony of warm water shells in the waters of Northumberland Strait, between Prince Edward's Island and the province of New Brunswick, and this colony is of interest not only for the species which are so cut off from their fellows in the south, but also for a series of interesting Crepidulas. The writer has gathered many specimens of both *C. plana* and *C. fornicata*, but in no case was *C. plana* on the interior, and I recall no concave specimen of either. The specimens of *C. plana* were in some cases far more convex than the average *C. fornicata*. To one who has examined this colony the distinction between these species can have no help from convex or concave characters, yet both species are distinct, and while I have no doubt that they are from a common ancestor, it is impossible to count the dwelling place as responsible for the difference. May I also add that there is in my collection from the region named a specimen of *C. fornicata* which is white, yet bears undoubted characteristics of *C. fornicata*.

THE SHELL BEARING MOLLUSCA OF MICHIGAN.

BY BRYANT WALKER, DETROIT, MICH.

Margaritana complanata Bar. Quite abundant and of large size in the Rouge river. Cited also by Currier and De Camp and no doubt occurs generally over the southern part of the State.

M. deltoidea Lea. Common all over the State. The small size, peculiar as usual to Detroit river specimens, is also characteristic of specimens from Put-in-Bay, Lake Erie.

M. Hildrethiana Lea. River Rouge, Wayne county. Cited also by De Camp from Monroe county, and without locality by Sager and Miles.

M. marginata Say. Common in the southern part of the State. The range toward the north of many of the species commonly met with in the lower portion of the State is quite unknown, and to be determined with any degree of accuracy will require a large amount of extensive and careful field work.

M. rugosa Bar. Common all over the lower peninsula, and sometimes attains considerable size. Detroit river specimens are smaller and thicker than those from the warmer waters of the interior of the State.

M. undulata Say. Cited by Sager, and, no doubt, erroneously.

Anodonta Benedictii Lea. Generally distributed. In the southern part of the State it often attains considerable size. Detroit river specimens as usual are smaller than the average.

A. corpulenta Coop. Cited by De Camp from Berlin, Ottawa county. Immature specimens from the Canal, at Grand Rapids, are referred to this species by Mr. W. B. Marshall.

A. decora Lea. *A. inornata* Anth., described from specimens from Slawson's Lake, Michigan, is referred to this species by Dr. Lea. Cited as *A. inornata* by Currier and De Camp; otherwise does not appear to have been found in the State.

A. edentula Say. Common everywhere and exceedingly variable in size, shape and color.

A. edentula rhombica Anth. This form, described by Anthony, is entitled to varietal rank; but can be too easily connected with the typical form to be considered specifically distinct.

A. ferruginea Lea. Cited by De Camp from the upper peninsula.

A. Ferussaciana Lea. Cited by Sager, Miles, Currier and De Camp.

A. Footiana Lea. Abundant everywhere and in great variety of form. *A. McNielii* of Anthony is considered synonymous by Lea.

A. fluviatilis Dillw. Cited by Miles; also by Sager and Miles, as *A. cataracta* Say. Cited by De Camp from Pentwater, and as *A. cataracta* Say, from the Grand river.

A. Footiana opalina Anth. A most beautiful form, well entitled to distinction as a color variety.

A. fragilis Lam. A very common species and in some of its many varieties one of our most beautiful ones. *A. flava, glandulosa, imbricata, irisans* and *pallida* of Anthony and *A. subcarinata* of Currier are considered as synonyms by Lea. I have no doubt but that some, at least, of these forms are entitled to varietal rank; but

have not sufficient authentic material to justify making such distinction at present.

A. imbecilis Say. Southern part of the State.

A. lacustris Lea. Cited by De Camp from the Grand River.

A. maryatana Lea. Cited as such by De Camp from Pentwater.

A. subinflata Anth., described from Michigan specimens and *A. Houghtonensis* Currier, from Houghton Lake, Roscommon County, where it still is found in abundance, are referred here as synonyms by Lea.

A. modesta Lea. Originally described from a specimen collected near Kalamazoo; this species has been found in other localities in the southern part of the State. It is closely related to *A. subcylindracea* Lea.

A. ovata Lea. Specimens referred to this species indicate a general range over the State. *A. subangulata* Anth. is considered synonymous by Lea.

A. pepiniana Lea. Cited by Miles. Also by Gould from the north shore of Lake Superior. I am indebted to Dr. De Camp for two specimens from Crooked Lake, Emmet County, which he refers to this species and which agree fairly with Lea's figure. They may, however, be young *A. Footiana*. Another specimen received from him, collected in Houghton Lake, Roscommon County, is probably a half-grown *A. Houghtonensis* Currier.

A. plana Lea. Southern part of the State. This is the largest Anodon we have, and attains considerable magnitude in favorable localities.

A. salmonia Lea. Southern part of the State. Specimens from Maple River, Clinton County, are much larger and heavier than those from Ohio.

A. Schafferia Lea. Cited by Miles, Currier and De Camp.

A. subcylindracea Lea. Common everywhere and very variable. Some forms seem to exhibit sufficiently persistent peculiarities to justify giving them varietal rank.

A. subgibbosa Anth. Originally described from Black Lake, Holland, Michigan. It also occurs in Mono and Muskegon Lakes at Muskegon, where it is not uncommon.

Sphaerium simile Say. Common all over the State.

S. aureum Prime. The types are supposed to have been brought from Lake Superior by the Agassiz expedition. Cited by De Camp from Charlevoix County.

S. solidulum Prime. Houghton Lake, Roscommon County; identified by Dr. James Lewis.

S. striatinum Lam. Very abundant everywhere and equally variable.

S. rhomboideum Say. Appears to be generally but not abundantly distributed through the southern part of the State.

S. fabale Prime. Not common but ranges over the State.

S. occidentale Prime. Quite common.

S. emarginatum Prime. The types are said to have come from the region of Lake Superior. Cited by Currier and De Camp; but apparently on the strength of Prime's statement.

S. flavum Prime. Types from Sault Ste. Marie. Cited by Currier ("Lake Superior") and De Camp.

S. partumeium Prime. Cited by Currier and De Camp from Lake Superior, apparently from the statement given by Prime in his original description. The citation from Houghton Lake in my catalogue of 1879, is erroneous, as the specimen does not agree with examples, supposed to be authentic, received from other localities.

S. sphaericum Anth. Grand Traverse County and Fenton, Michigan, identified by H. A. Pilsbry. Other examples from the latter locality are referred to *S. secure* by E. W. Roper (NAUTILUS, iv, p. 40).

S. transversum Say. Rouge River, Wayne County. Cited by De Camp from Grand River, Kent County.

S. secure Prime. Generally distributed through the State.

S. secure crocea Lewis. Traverse City; see Roper, NAUTILUS, iv, p. 40.

S. truncatum Lind. Generally distributed through the State.

S. vermontanum Prime. Cited by De Camp.

S. rosaceum Prime. Cited by De Camp.

S. stamineum Con. Western part of the State.

S. tenue Prime. Cited by De Camp.

Pisidium virginicum Bgt. Cited in all the lists and apparently distributed over the State.

P. adamsi Prime. Cited by Prime from Holly. Cited also by Currier and De Camp.

P. compressum Prime. Abundant everywhere.

P. abditum Hald. Common everywhere.

P. abditum abyssorum Stimp. Common in Lake Superior at a depth of from 4 to 159 fathoms according to Smith. Originally described from Lake Michigan specimens.

P. rotundatum Prime. "Lake Superior," Prime and Currier; cited also by De Camp.

P. variabile Prime. Apparently ranges over the State as I have it from Wayne, Washtenaw and Roscommon Counties. Cited also by De Camp.

P. ventricosum Prime. Cited by Miles and De Camp.

P. noveboracense Prime. Cited by De Camp from Cass County.

P. æquilaterale Prime. Detroit and Rouge Rivers, Wayne County.

OBSERVATIONS ON THE HELICOID GROUP CHAROPA AND ALLIED FORMS.

BY HENRY A. PILSBRY.

A striking illustration of the vast breadth of the intellectual horizon open before the zoologist is the fact that notwithstanding the large number of scientists, only comparatively rarely do two or several workers publish simultaneously and independently upon absolutely the same aspect or branch of the same special subject. When such a coincidence happened in the times of our predecessors it often gave rise to jealous rivalry, as in the case of Conrad and Lea, and earlier, Say, Rafinesque and Hildreth. In these newer days, cases of simultaneous discoveries in science should, and usually do, lead to an opposite result—to the most helpful and happy friendship and sympathy between naturalists, even though half the globe separates them.

These thoughts are brought to my mind by receiving, in the last Australian mail, proof-sheets of an article by my friend, Charles Hedley, of the Australian Museum, Sydney, N. S. W., entitled "Observations upon the Charopidæ." In this article Mr. Hedley discusses many of the points considered in my "Observations on the Helices of New Zealand," published in the September NAUTILUS; and also extends his notes to the Australian and Polynesian forms. I cannot refrain from quoting from his paper these passages:

"Widespread throughout Australia and Polynesia is a group of land shells which, varying greatly among its members, yet appears clearly distinguishable from other orders by the small size of its species, their cancellated sculpture, in which stout ribs are a promi-

nent feature, flame painting, straight sharp peristome, which describes a convex then a concave sweep on approaching the right insertion, and a projecting semitransparent callus, which buries the sculpture of the whorl on which it encroaches. For this group I provisionally accept the title *Charopidae*, assigned by Hutton, 1884 (Trans. N. Zealand Inst. xvi, p. 199), extending, however, the limits indicated by that writer. His vague diagnosis runs as follows: 'Animal heliciform with an external shell; tail with a mucus gland.' No type is nominated by the author of the family, and I therefore suggest that the type of *Charopidae* would naturally be the genus *Charopa* Albers, whose type species is *C. coma* Gray."

Mr. Hedley proceeds to quote the original descriptions of the groups *Charopa* Alb., *Pitys* Beck, *Endodonta* Alb., *Libera* Garr., *Gerontia* Hutt., *Pyrrha* Hutt., *Psyra* Hutt., *Therasia* Hutt., *Thera* Hutt., *Phacussa* Hutt.; mentioning also *Laoma* Gray, *Maoriana* Suter, *Simplicaria* Mouss.; concluding that "From the above review of the genera proposed, it will be seen that the student of the *Charopidae* is better supplied with divisional names than with definitions." And finally: "To summarise: I would consider that *Patula* has no existence in the Pacific; that the southern species usually referred to that genus are not even of the *Helicidae* family; that these species can most conveniently be referred to one or other of the genera enumerated above, which genera may be grouped under the subfamily *Charopidae*, a division of the family *Zonitidae*."

It will be noticed that Hedley includes in *Charopidae* most of the forms which in my article were placed as sections under *Patula* and *Gerontia*. The similarity of the shells of these two groups is remarkable, but the information furnished by Hutton upon the animals denied to the New Zealand *Patulæ*=*Charopa*, a mucus gland upon the tail, and therefore I did not feel justified in uniting the two groups, as I could see no reason for sundering *Charopa* from the genus *Patula*. If, however, *Charopa* and its allies, *Pitys*, *Endodonta*, etc., possess a mucus tail gland, I would unhesitatingly follow Hedley in his separation of *Charopa* from *Patula*, and in grouping it with *Gerontia* (*s. lat.*). Unfortunately only dried specimens are accessible to me, and the evidence furnished by authors is so conflicting that we may well suspend judgment. In the rank given to the group by Hedley I find myself unable to fully concur. The presence of a caudal gland and furrows along the foot margin are rarely if ever of more than generic importance.

Very closely allied genera vary in this respect, as in the case of *Arion*, *Ariolimax*, *Prophysaon*, *Anadenus*, *Anadenulus*, etc.; or in the case of *Cionella*, which has no mucus pore, and *Ferussacia*, which possesses this gland. It is hardly needful to multiply instances—the *Zonitidæ* and *Helicidæ* are full of such cases, although many of them are not yet to be found in the conchological text books. The fact seems to be that this caudal gland is simply a local exaggerated development, in a convenient place, of the mucus secreting, glandular structure to be found over nearly the whole upper surface of the foot; and it is likely to be developed independently in different groups. Its presence in different groups is, in my opinion, no proof of genetic connection. I would therefore retain *Charopa*, as well as the forms grouping around *Gerontia*, in the *Helicidæ*, on account of their dentition, which is not, it seems to me, in any respect *Zonitoid*.¹

The connecting links between *Charopa*, *Simplicaria*, *Pitys*, *Mao-riana*, *Endodonta* and *Libera* seem to be too numerous to allow us to regard these as separate genera; indeed, they are scarcely of subgeneric rank, unless the examination of the animal reveals differences more fundamental than those now known.

JAPANESE LIMPETS.

BY GEO. W. TAYLOR, VICTORIA, B. C.

The Japanese *Patellidæ* were tabulated by Mr. Pilsbry in the November number of the *NAUTILUS* and the table was reproduced with one slight alteration in the *Manual of Conchology*, vol. 13, p. 131, issued a couple of months later. Strangely enough, Mr. Pilsbry omits from his table in both instances one of the commonest species, namely, *Helcioniscus encosmius* Pilsbry.

A very fine series of this limpet was sent to me a short time since by the Rev. H. Loomis, of Yokohama, and I have also received it from Japan through Messrs W. H. Harrington and Frederick Stearns. The specimens sent by the last named gentlemen were

¹ Some recent authors speak of the "families" *Patulidæ*, *Trochomorphidæ*, *Cochlostylidæ*, etc. It would be well for them to attempt to give a family definition before using such terms.

labelled *amussitata* while genuine *amussitata* came as *toreuma*. I am by no means satisfied in my own mind, however, that the two last named are not one and the same species.

H. encosmius is a very distinct and easily recognized species and varies very little compared with other species of the genus. The figures in Reeve (Conch. Icon. pl. xvi, p. 36) are good and so are all those in the Manual of Conchology (vol. xiii, plate 71).

Mr. Pilsbry in the Manual points out that Reeve applied the name *P. variegata* to two different species. The first described in Conchologia Systematica which appears to equal *rota* of Gmelin and the other in Conchologia Iconica twelve years later, this last being the species Mr. Pilsbry now names *H. encosmius* on the ground that the name *variegata* is preoccupied by Blainville for an unidentified species from Botany Bay.

So far, so good, but Mr. Pilsbry next proceeds to quote as a synonym for his *encosmius*, *H. variegatus* Dall, Amer. Jour. of Conch., vi, p. 277, but this was Reeve's *first variegatus* = *rota* Gmel., as Dall himself surmised. Consequently Dall's localities (which Pilsbry has copied) are clearly incorrect when applied to *encosmius*.

My own impression is that the true *H. encosmius* Pilsbry (= *variegatus* Rve., Conch. Icon., pl. xvi, f. 36) is a species restricted to Japanese and Chinese waters, while the localities "Suez (Fischer) and Red Sea and Gulf of Akaba (Smithsonian Cabinet)," given by Dall and copied into the Manual are correct for *rota* Gmel. (= *variegatus* Rve., Conch. Syst. ii, pl. 136, p. 1).

The remaining locality given in the Manual, viz., "Australia" (Rve.), is also, I think, an error, although I have received from dealers specimens of *encosmius* which they assured me had come from there.

I should have mentioned above that although Dr. Dall in his paper in the American Journal of Conchology is writing evidently of *rota*, not of *encosmius*, he quotes *both* of Reeve's figures as though referring to the same species.

[COMMUNICATED.]

AMERICAN ASSOCIATION OF CONCHOLOGISTS.

PHILADELPHIA, Sept. 28, 1892.

Since the publication of the list of members, there have been admitted to the Association, the following new members:

Mrs. Anita F. Douredoure, 2203 Spring Garden St., Philadelphia, Pa. Subject—*Cyprida*.

Miss E. H. Pitman, Box 295, Bristol, R. I. Subject—*Mollusca of New England*.

John W. Palmer, Union League Club, Chicago, Ill. Subject—(not chosen yet).

Warren W. Herman, 149 Emerson St., Boston, Mass. Subject—(not chosen yet).

Wm. H. Weeks, Jr., of Brooklyn, N. Y. has chosen for his subject of special study, the genus *Bulimus*.

In reference to the suggestion of a Convention of the members to be held at Chicago next summer, there have been but few responses as yet. The idea, however, will probably grow, and the members may become interested in it. It is merely a suggestion as yet and of course, will amount to nothing unless the majority of members think it a good thing. Let us hear from the members.

John H. Thomson of New Bedford, Mass., writes: "I like the suggestion of a Congress of Conchologists at the World's Fair next year."

Dr. W. S. Strode is in full accord with the idea as may be seen from the following letter:

LEWISTOWN, Ill., Sept. 7, 1892.

JOHN H. CAMPBELL, ESQ.

Dear Sir.—Your idea suggested in last NAUTILUS to have a Convention during the World's Fair of the "Amer. Asso. Conchologists" is just the thing. I am heartily in favor of it and think it would double the pleasure of a visit to Chicago, at least in my case, to meet the Conchologists face to face, and form an acquaintance that has been hithert only on paper. Let's have it by all means and then thoroughly discuss, review and possibly revise our loved shells. If this can be done, I would not miss going to the World's Fair, for anything.

Yours truly,

W. S. STRODE.

Mrs. M. Burton Williamson, of University P. O., Cal., has prepared and published (by Smithsonian Institution) "An Annotated List of the Shells of San Pedro Bay and Vicinity." It is a valuable list and highly creditable to the author. We have had occasion already, to use it in connection with the collection of the Amer. Association and find it of the greatest value. Several new species of Prof. Dall's are described and figured.

Want of space in this issue of the NAUTILUS will postpone the publication until next month of the acknowledgment of shells received for the "American Collection."

The officers of the Association would like to hear from the members in reference to the purposes, objects and workings of the Association. Suggestions are always received with much pleasure as it aids them in their work. A short resumé of work performed during the past summer by each member would make an interesting article in next NAUTILUS, and we have no doubt that Messrs. Pilsbry and Johnson will gladly throw open its columns for that purpose, as they have already done for this series of articles on the Association.

J. H. C.

NOTES AND NEWS.

ERRATA. In the September NAUTILUS, p. 54, in fourth line from top, read "*leviuscula*" in place of "*texana*." There is no *H. texana*.

THE UNIONIDE of Spoon River, Fulton Co., Ia., are enumerated and intelligently discussed by Dr. W. S. Strode in the *American Naturalist* for June.

EDITOR NAUTILUS:—I see that in Mr. Cockerell's article in the July number, page 31, "Notes on the North American Species of Succinea," he says, "(17) *S. stretchiana* Bland. I have seen this from *San Francisco, Cal.* (G. W. Michael), sent by Mr. Singley. It seems to be a small species, etc."

During the seven years that I have been collecting in this county I have never found nor have I heard of the above species being found here. The only Succinea to be found in this county, to my knowledge, is *S. oregonensis*. If Mr. Michael or Mr. Singley have any of the said species to spare, will they kindly send to my address a few of them for examination and comparison as also the exact locality whence they were obtained and oblige. I doubt whether Dr. J. G. Cooper and Wm. J. Raymond, two gentlemen who have collected species from this county during the past fifteen years or so have ever found *S. stretchiana* Bld. here.

Yours truly,

Williard M. Wood.

THE NAUTILUS.

VOL. VI.

NOVEMBER, 1892.

No. 7

CATALOGUE OF THE GENUS *PARTULA*.

BY W. D. HARTMAN, M. D.

In the following pages is offered an arrangement of the species of the genus *Partula* into groups according to their natural affinities. The number now known is nearly a hundred species. Specimens of nearly all of which I have personally examined, either in my own collection, in the magnificent collection of HARPER PEASE, or in the museums of Paris, Geneva, etc. A description of the animal is also given.

In the next paper the geographical distribution of the leading forms will be discussed.

The animal is terrestrial and viviparous, the body covered by a mantle as in *Helix*, blunt before, tail long and gradually tapering. Tentacles four, retractile, the upper having the eyes at their tips, collar and labial processes largely developed, no mucous pore, distinct locomotive disc, or parallel furrows alongside of the foot; anal and respiratory orifices in the collar opening on the exterior angle of the shell; organs of generation united, the orifice behind and below the right eye peduncle, matrix ample and occupying much space in the body cavity, often containing several shells of two or three whorls, beside eggs arranged in succession as developed. The embryo shells exhibit spiral rows of fovea beginning at the apex, which after extrusion are continued as spiral striæ. The jaw is very transparent and of a light horn color, slightly arcuate, and more or less attenuated at the ends; the whole anterior surface of the jaw is furnished

with delicate narrow, separated ribs which break the continuity of either margin and run obliquely to the median line where they form a triangular space of ribs of unequal length, which do not reach the lower margin; the number of ribs on each side of the median line, vary in the same species, as well as in the different species, the whole number in each jaw varying from fifty-five to ninety-six; the lingual membrane is broad and the denticles vary in size in the different species some being narrower than others. Shell dextral or sinistral, varying from oblong ovate, to conic ovate, and from solid to thin and translucent or hyaline. Labium often flat, and widely reflected, occasionally revolute or concave, aperture ovate, or auriform, more or less contracted by the wide and often dentate columella. Surface with minute spiral striae which are punctulate at the apex.

This genus may conveniently be divided into two subgenera: *Partula* (in the restricted sense) and *Diplomorpha*. The species of true *Partula* I divide into two divisions and thirteen groups, each of which is named for a characteristic species.

I. AURIFORM DIVISION.

1. Faba Group.



P. faba.

P. faba Martyn.
P. citrina Pse.
P. vittata Pse.
P. radiata Pse.

P. navigatoria Pfr.
P. planilabra Pse.
P. fusca Pse.

2. Auriculata Group.



P. auriculata.

P. auriculata Brod.
P. compacta Pse.
P. thala Garrett.
P. bilineata Pease.

3. Dentifera Group.



P. dentifera.

P. dentifera Pfr.
P. formosa Pse.
P. califera Pfr.
P. imperforata Pse., MS.
P. virginea Pse., MS.

4. Lutea Group.



P. lutea.

P. lutea Lesson.

5. Umbilicata Group.



P. umbilicata.

P. umbilicata Pse.

P. gibba Pfr.

P. bicolor Pse.



P. gibba.



P. hebe.

P. crassilabris Pse.

P. hebe Pfr.

6. Otaheitana Group.



P. otaheitana.

P. otaheitana Brug.

P. vanikorensis Q. & G.

P. mooreana Hartm.

P. lineata Less.

P. suturalis Pfr.

P. garrettii Pse.

P. lignaria Pse.

P. producta Pse.

P. nodosa Pfr.

P. stolidia Pse.

P. filosa Pfr.

7. Tæniate Group.



P. carteriensis.

P. tæniata Mörch.

P. micans Pfr.

P. carteriensis Q. & G.

P. attenuata Pse.

P. cinerea Albers.

P. minima Hartm.

P. regularis Hartm.

P. micans Hartm.

P. corneola Hartm.

P. woodlarkiana Hartm.

P. hastula Hartm.

P. clara Pfr.

P. hyalina Mod.

P. Hartmani Smith.

P. flexuosa Hartm.

P. lyrata Mouss.*P. concinna* Pse.*P. lævigata* Pfr.*P. Coxi* Angas.*P. pellucida* Pse.*P. kubaryi* Hartm.*P. simulans* Hartm.*P. pellucida* Pse.*(To be concluded.)*

ANNOTATED LIST OF ALABAMA LAND MOLLUSCA.

BY F. E. SARGENT, WOODVILLE, ALA.

Those familiar with the scarcity of land mollusca in the northern prairie States will appreciate the pleasure which one experiences in coming from Minnesota to Northern Alabama.

With headquarters upon the top of Cumberland Mountain in Jackson Co., it has been my pleasure during the past five months to do some collecting of land mollusca, the result of which may be of interest. The topography of the region is quite varied. The summit of the mountain is comparatively level, rather sandy and covered with timber. About half way down we come to the "benches" which are covered with lime-rocks. In most cases the flat rocks are piled one upon another forming excellent retreats for the smaller forms. At the foot of the mountain the "coves" are level and in places covered with heavy open timber.

The following list is doubtless far from complete, as but a small portion of the region outside of a radius of two miles from Woodville has been searched.

1. *Selenites concava* Say. Large form. Common, mostly on benches.
2. *Zonites fuliginosus* Griff. Frequent on benches.
3. *Z. lævigatus* Pfr. Common on benches.
4. *Z. ligerus* Say. Large form. Few very fine.
5. *Z. intertextus* Binn. Few on top.
6. *Z. arboreus* Say. Common on top. A peculiar form with strong striation above.
7. *Z. radiatulus* Gray. One example.
8. *Z. indentatus* Say. Few on benches.
9. *Z. wheatleyi* Bld. Few on benches.
10. *Z. milium* Morse. Few between rocks.
11. *Z. capsella* Gld. Three specimens.
12. *Z. Sterkii* Dall. Few between rocks.

13. *Z. fulvus* Drap. Very few on benches.
14. *Z. gularis* Say. Common on top.
15. *Z. internus* Say. Very common on top and benches.
16. *Z. sp. (?)* possibly a new species.
- 16a. *Zonites suppressus* Say.
17. *Patula alternata mordax* Shutt. Frequent on benches.
18. *P. Cumberlandiana* Lea. Very common on benches.
19. *P. perspectiva* Say. Common on benches among dead leaves.
20. *Helicodiscus lineata* Say. Very few on benches.
21. *Punctum pygmæum* Drap. Few.
22. *Helix clausa* Say. Few.
23. *H. thyroides* Say. Common in coves.
24. *H. albolabris major* Binn. Common on top.
25. *H. exoleta* Binn. Very common. Large with thick shell, (specimens from Chattanooga, Tenn. have very thin shell.)
26. *H. elevata* Say. One example. (Beautiful purple-banded var. taken at Chattanooga, Tenn.)
27. *H. hirsuta* Say. Common on top and benches.
28. *H. stenotrema* Fér. Common on benches.
29. *H. stenotrema* var. *globosa*, n. var. Very common between rocks.
30. *H. spinosa* Say. Few on benches.
31. *H. tridentata* Say. Frequent.
32. *H. fallax* Say. Frequent.
33. *H. inflecta* Say. Common on top.
34. *H. Rugeli* Shutt. Scarce on sides under rocks.
35. *H. appressa* Say. Very large and fine. Common on top and benches.
36. *H. Sargentiana* J. & P. (sp. nov.) common on rocks.
37. *H. obstricta* Say. Few on benches and in coves.
38. *H. pustuloides* Bld. Scarce, only six specimens taken.
39. *H. dorfeuilliana* Lea. Few in valley.
40. *Vallonia perspectiva* Sterki. Quite common.
41. *Strobila labyrinthica* Say. Common under bark.
42. *Pupa corticaria* Say. Very common.
43. *Pupa armifera* Say. Two examples in drift.
44. *Pupa contracta* Say. Common.
45. *Pupa curvidens* Gld. Common.
46. *Pupa curvidens* var. *gracilis* Sterki. Few.
47. *Succinea avara (?)* Say. Few young.

48. *Pomatiopsis lapidaria* Say. Common.
 49. *Carychium exiguum* Say var. *exile* Ad. Few.
 50. *Helicina orbiculata* Say. Common.

ON A REVISION OF THE AMERICAN UNIONIDÆ.

CHAS. T. SIMPSON, WASHINGTON, D. C.

In looking over the September NAUTILUS I was greatly interested in the article on American Association of Conchologists, and heartily agree with the suggestion that the nomenclature of our American Unionidæ needs revising. But to do this properly will be an herculean labor, one that will require time, hard study, and infinite patience, as well as a love for the work.

In the first place most of the literature on the subject is out of print, and much of it, such as the New Harmony Disseminator, Nicholson's Encyclopedia and the like, is so rare as to be practically out of the reach of the average student. It is scattered in a very large number of publications and it will take a considerable amount of careful research to hunt up what has been written on the subject.

Much of this literature is in a terribly confused condition, and there are many disputed points which will require the nicest judgment to satisfactorily settle. Lea read the descriptions of most of his species before scientific societies, claiming that such reading was a bona fide publication, and dated them from that time; Conrad held that no species could be considered published until a description had been printed and circulated. There was a further dispute between them as to dates, Lea holding that of publication of the part or separata in which his descriptions were printed was valid, while Conrad claimed that the date should be given when the whole volume was issued. There are many disputed points between Say and Lea as to their species. Lamarck described his Unionidæ in Animaux sans Vertèbres, in Latin, giving each species from ten to fifteen words, without figures, and their identification largely rests on the fact that Dr. Lea afterwards examined the types.

Rafinesque, in his Monograph of the Bivalve Shells of the Ohio River, described and figured a large number of Unionidæ, but the descriptions are brief and unsatisfactory, and the figures are unrecognizable. Certain conchologists have considered his work valid, and

have attempted to identify his shells, others reckon him a quack and claim that he should not be recognized. So far as I know, few or none of his types are in existence, and those that have attempted to identify his species have not been able to agree among themselves. His work, like a tax-title deed, will always leave a cloud on what it was intended to cover.¹

The material itself forms an exceedingly difficult study, even if the literature was in a satisfactory shape. In North America alone there are in the neighborhood of 800 commonly recognized species of this family, very many of which are extremely close, and nearly all are quite variable. Only a small part of this territory has been at all carefully worked; even in New York, Mr. Wm. Marshall is making the most commendable efforts to record their distribution and find out what species belong to the State, a work which has never yet been done.

In the belt of country in the south known as the "Pine Region," extending from Virginia to beyond the Mississippi, and from the Atlantic and Gulf to the "Hill Country" specific lines among the Unionidæ seem to be almost obliterated, owing largely, perhaps, to the sameness of configuration of the surface, and the uniformity of soil and climate. The British Possessions outside of Canada are for the most part a *terra incognita*, and of the eighty or more nominal species found in Mexico and Central America for the most part we know almost nothing.

We ought to have a knowledge of the anatomy of each species, but that is impossible at present, as few local collections are found over wide areas of our country, and of many forms only the type shell is known. It is enough to thrill the blood of a conchologist to read over the list of those earnest collectors who gathered in the treasures of our streams for Lea, and caught from him his grand enthusiasm; it reminds one of the roll call of some glorious company of soldiers who perished in battle. Anthony, Barrett, Boykin, Buckley, Budd, Clark, Downie, Edgar, Elliott, Emmons, Estabrook, Forshey, Hallenbeck, Jewett, Kirtland, Law, Leconte, Lewis, Lindsley, Lyon, Moores, Neisler, Pybas, Ravenel, Showalter, Spillman, Tait, Tuomey, Vanuxem, White and others of whom I believe not a soul remains living. There is no such corps of collectors of Unionidæ to-day, and it will probably be a long time before there is again.

¹ Rafinesque's types are in the collection of the Academy of Natural Sciences of Philadelphia.—ED.

I think it is recognized by all who have at all carefully studied the family that Dr. Lea's arrangement, classifying by the presence or absence of a dorsal wing, by sculpture and form, is largely artificial and that some more natural system should be adopted. I believe that the subgenera of Rafinesque, Swainson, Agassiz and others are of little value; it seems to me that an arrangement into groups around certain characteristic and fairly typical species is the most natural that can be made. But while there are large numbers of species among which the strongest relationship is at once apparent there are many others which seem to stand on the border land, and which may as well be placed in one section as another; others, by the characters of certain specimens, appear to have an affinity in one direction and by those of others to belong elsewhere, while there are some nondescripts that do not fit anywhere.

It is my intention to publish some time in the future a Geographic and Systematic Catalogue of the Unionidæ of North America, but it will require years of patient study to prepare it. I also hope at some time to be able to monograph our species.

So far as the South American forms are concerned our material and knowledge are so limited it seems to me it would be almost unwise to attempt at present to do anything with them. Dr. von Ihering is doing excellent work with the Unionidæ of this region and probably has a better understanding of the subject than any man living.

ON THE REVISION OF THE UNIONIDÆ.

BY S. HART WRIGHT AND BERLIN H. WRIGHT, PENN YAN, N. Y.

EDITOR NAUTILUS:—In the September number of THE NAUTILUS, the specialists in Unionidæ are asked to reply to a suggestion that a Committee be appointed to classify and revise the nomenclature of the American Unionidæ.

It is well known that the history of this branch of Conchology is somewhat tainted with personal bitterness and rivalry. The nomenclature is in consequence slightly chaotic; and the synonymy though not more extensive than in the Helices, or in Botany or Ornithology and many other sciences, still needs sifting out. A classification too, still better than Lea's if possible, should be brought for-

ward. The determination of priority of names is a delicate matter in many of our Unionidæ, and it should be settled *officially* by a Committee on lines of equity, rather than by an individual. The same is true also, in discarding a so-called species, and in elevating a synonym to take the first rank.

We have so many species of Unionidæ in North America, that *extremists*, both at home and abroad, look upon the list as one that is over-loaded. A revision by Committee should command general acquiescence. It is not true that *our* nomenclature is burdened like that of Europe.

NOTES AND NEWS.

THE address of Mr. John Ford will be in future *Holmes Station, B. & O. R. R., Delaware Co., Pa.*

DR. W. S. STRODE has removed from Bernadotte to Lewistown, Ill., where he will hereafter be permanently located.

EXTRACTS from a letter to the Editor from DR. WM. H. RUSH, dated *U. S. S. Yantic, Montevideo, Uruguay, March 11, 1892.*—“Since being here I have been able to do very little and have not seen a native land shell. One trip out to the suburbs of Montevideo only yielded some *Helix lactea*. At Buenos Ayres I found the British Cemetery overloaded with *Helix pomatia*. In the swamps around Buenos Ayres I found an *Ampullaria* very common, which is, I think, *australis*, and while up at Palermo Park I found another which I took to be *canaliculata*. Further collecting around the swamps led me to believe that they are the same species. The coloration of the animal varies from a very dark brown to a light mahogany brown; the coloring of the animal also leads to corresponding variation in the color of the shell. Both forms are banded. I saw many in the act of copulation, a light with a dark individual, etc. I tried to preserve a lot of their eggs, but so far I have not met with any success. *Planorbis perigrinus* is also very common; also a species of *Paludestrina*. While walking down the Boca one Sunday afternoon I observed quite a crowd collected around a man standing on the curbstone. Upon approaching I saw that he was opening a bivalve which was being eaten by the people,

just as we eat oysters at home, excepting that he had scalded them first. Before I left I had secured fifty nice specimens, and learned the locality, which is Mar del Plata, a summer resort on the coast of Argentina. I can find no figure of it in d'Orbigny, and from Tryon's Structural and Systematic Conchology I judge it to be a *Lutraria*.

"*Helix lactea* is extremely common in the markets at Buenos Ayres, and I suppose it can be accounted for by the numerous Italians there.

"I want to mention that while coming down here we were boarded when three hundred miles off the coast of Brazil (lat. 30° 09' 07" S., long. 45° 36' 39" W.) by a swarm of decapods, they flying from the water and landing on our deck and in the chains. Our deck is at least twelve feet above the water, and to get upon it they had to go over the hammock nettings. I secured fifteen specimens of various sizes. There were hundreds more but they were injured so much by their fall as to be of no value. I enclose a hasty tracing from a water-color sketch I made from the largest one."

THE UNIONIDÆ of Spoon River, Fulton Co., Ill., are enumerated and intelligently discussed by Dr. W. S. Strode in the *American Naturalist* for June.

THE RECORDS of progress in American zoology which the *American Naturalist* publishes from time to time are a total failure as far as mollusks are concerned. The most prominent feature of the record is the omission of important papers. Our contemporary should not judge American malacology by the handful of papers that chance to fall upon his desk.

AT THE MONTHLY meeting of the Linnean Society of New South Wales, Australia, June 30, 1892, a paper was read entitled "On the Genus *Perrieria*," by C. Hedley, F. L. S. This paper deals with the rectification of nomenclature; it points out (1) that the type of *Coelaxis* is and must remain, not *exigua* Ad. & Ang., as misquoted by Fischer and Tryon, but *layardi* Ad. & Ang., as instituted by the founders; (2) that *exigua* was based in error upon specimens of *australis*; (3) that *australis* and *layardi* are generically incompatible; and (4) that *australis* (= *exigua*) is rightfully comprehended under the genus *Perrieria* Tapparone-Canefri.

An apropos addition to this "clearing up" may be made here. Ancey, in the *Conchologist's Exchange*, September 1887, p. 39,

proposed the name *Bathyxaxis* for *Coeliaxis layardi* Ad. & Ang., which is, as Mr. Hedley has stated, the type of the genus *Coeliaxis*!

SPECIES IDENTIFIED. From L'Abbé P. A. Bégin, Sherbrooke, Prov. Quebec, Canada. 1, *Goniobasis livescens* Mke, var. 2, *Physa ancillaria* Say. 3, *Limnæa catascopium* Say. 4, *Sphærium striatinum* Lam. 5, *Aplexa hypnorum* Linn. 6, *Planorbis bicarinatus* Say. 7, *Campeloma integra* Say, young specimens. 8, *Physa heterostropha* Say. 9, *Ferussacia subcylindrica* Linn. 10, *Helix albolabris* Say.—H. A. P.

CONCHOLOGISTS who do not already possess a copy of Tryon's "STRUCTURAL AND SYSTEMATIC CONCHOLOGY" should procure it now. This work is indispensable to the collector who wishes to gain an intelligent idea of the affinities or structure of shells, or to classify a collection. The plates illustrate thousands of species representing all of the genera and subgenera, and the text contains interesting chapters on geographical and geological distribution, structure, classification, etc. It is the most complete text book on the subject in the English language.

NOTE ON LYOGYRUS. In our article upon this genus in the October NAUTILUS, we *intended* to mention all of the described species. Mr. Ford has called our attention to the fact that *Lyogyrus Brownii* Carpenter was omitted,—an oversight naturally very annoying to the author, and of course purely unintentional. This form was described some years ago by Mr. H. F. Carpenter, the well-known writer upon New England and especially Rhode Island shells. It is allied to *L. pupoides* Gld., differing from that species in having the body-whorl *not* free from the preceding, or only slightly so, whilst in the typical *pupoides* it is decidedly separated. The two should be carefully compared with a large mass of material, in order to ascertain whether they intergrade. In both, the spire is very much higher and more conical than in the *L. Dallii*.—H. A. P.

INSTRUCTIONS FOR COLLECTING MOLLUSKS AND OTHER USEFUL HINTS FOR THE CONCHOLOGIST, is the title of a pamphlet of fifty-six pages, issued by the U. S. National Museum, and which can be obtained by application to the Director of that Institution. The author, Dr. Wm. H. Dall, has embodied in it a large amount of most useful information on methods of collecting mollusks of all sorts, land, fresh-water and marine, the chapter on dredging and the con-

struction of dredges and other apparatus being especially full and timely. More space should have been given to the methods of preservation of the soft parts and naked mollusks, those in vogue among collectors being very crude and by no means up to the times. Altogether the brochure will be found very useful to active collectors.

GOULD'S 'NORTH PACIFIC EXPLORING EXPÉDITION' TYPES.—“Apropos of Mr. Marshall's note in the August NAUTILUS it may be as well to state that practically all Gould's type specimens of the “Wilkes” and “Ringgold and Rodgers” exploring expeditions are to be found in the National collection. They were of course Government property, but Dr. Gould who described them, for the most part gratuitously, was permitted to retain as remuneration, duplicate specimens for his own collection now at Albany. So of those species of which there were duplicates there may be said to be two sets of types. The uniques are in the National Museum. How Mr. Tryon came to confuse these specimens with those illustrating the mollusk-fauna of the eastern coast of the United States, which, with sundry alcoholic specimens, were destroyed while loaned to Dr. Stimpson at Chicago, I do not know; but that they did not go to Chicago and are at present in my official custody is indubitable.—*Dr. Wm. H. Dall, Curator Dept. Moll., U. S. Nat. Museum, in letter to Ed.*”

EXCHANGES.

WANTED. Fine specimens of Lobsters, Crabs, Fiddler crabs, Prawns, Shrimps, Marine, Land and Fresh-water shells. Offered specimens of Marine, Land and Fresh-water shells. Please send list and I will do the same in return.—*Thomas Morgan, P. O. Box 164, Somerville, N. J.*

OFFERED. Land and Fresh-water shell from East Indies and Ceylon, in exchange for Land and Fresh-water shells, from West Indies, California, and Central America.—*Miss Linter, Arragon Close, Twickenham, Middlesex, Eng.*

WANTED, Land Shells. Offer, twenty species of Kansas Fresh-water Shells, including the rare *Unio Aberti* and *Physa solida* Lea, and Land Shells and Cretaceous fossils.—*Frank J. Ford, 314 Wabash Ave., Wichita, Kansas.*

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No. 8

PRELIMINARY DESCRIPTIONS OF NEW MOLLUSCAN FORMS FROM
WEST AMERICAN REGIONS, ETC.

BY ROBERT E. C. STEARNS, U. S. NATIONAL MUSEUM.

Uvanilla regina Stearns.

Shell conical, imperforate, black or purplish-black; whorls six to seven, concave, longitudinally somewhat obliquely plicated, the plicæ more or less projecting at the suture, and on the edge of the basal whorl, producing an undulating or crenulated effect. Otherwise sculptured by incremental striæ which traverse the surface and cross the plicæ at right angles. Base concave, radiately, closely and prominently striated, more conspicuous, flattened, coalescing, and sinuously curving at the edge. Commencing at the point where the outer lip joins the body whorl, a shallow groove follows parallel to the periphery and extends toward the aperture, without interrupting the basal sculpture. Aperture obliquely subangulate, black-rimmed and crenulated on the thin edge of the outer lip; nacreous, silvery white toward the edge, bright lustrous golden yellow within and around the umbilical region which latter though deeply pitted is not open. Columella white, calloused, arcuated with a moderately developed rib bounding the umbilical depression, and terminating in a single tubercle. This rib is paralleled by a shallow furrow terminating in a notch just below the tubercle, and by an exterior or outer ridge, part of the way double, of a brilliant orange color; this orange-colored rib is also exteriorly bounded by a shallow

furrow which becomes obsolete toward the aperture. The base of the shell otherwise exhibits faint revolving sculpture.

Dimensions: Altitude, 36 mm., diameter maximum, 34 mm.

The above combines the sculptural features of the Japanese *Chlorostomas* and West Mexican *Uvanillas*, more particularly *U. olivacea*. It is a much handsomer shell than the latter and the most northerly form of the group yet detected on the West Coast.

***Chlorostoma gallina* Forbes var. *multifilosa* Stearns.**

Shell imperforate, large, solid, turbinate globosely conical, elevated; whorls five-and-a-half to six-and-a-half, rounded; suture simple not channeled; apex obtusely pointed, eroded and yellowish; color nearly black; sculpture consisting of numerous spiral or revolving closely set narrow rounded ridges or costæ, alternating with fine incised whitish lines or grooves. Aperture rounded oblique, interior pearly, outer edge rimmed with black and finely crenulated by the projecting ends of the modified whitish grooving. Columella arcuated with two blunt tubercles near the base and a shallow umbilical pit above; base convex.

Dimensions: Altitude, 36 mm., diameter maximum, 34 mm.

The above differs from the typical *gallina* in the absence throughout of any longitudinal markings or sculpture and from Hemphill's var. *tincta* by the lack of the "streak of yellow on the base just below the columellar teeth," also by the conspicuous ribbing and grooving of the entire surface, while in *tincta* as described, "the spiral grooves" are "generally scarcely visible above."

While strongly characterized, the example before me can hardly be assigned to a higher than varietal rank.

The two forms above described were collected by Captain George D. Porter at Guadalupe Island off the coast of Lower California.

***Bulimulus* (*Pleuropyrgus*) *Habeli* Stearns.**

Shell slender, elongated, thin, smooth and shiny, slightly umbilicated, with thirteen to fourteen gradually increasing whorls; whorls slightly convex and longitudinally obtusely plicated; suture distinct; aperture ovate and slightly reflected at the base of the columella. Color ashen white, slightly rufous, with hints of a narrow reddish band beneath the surface glaze.

Dimensions (of largest example): Long, 17.5 mm., diameter, 3.5 mm.

This form is much more slender than *P. chemnitzoides* Fbs., which is well represented by the figures 6a, 6b, plate IX, Proc. Zool. Soc. London, 1850. Aside from the differences in color and sculpture, the surface of Forbes's species is dull in fresh, unrubbed, perfect specimens; the ribs in the latter species are comparatively sharp, thread-like, regular, and somewhat distant, the interspaces being perceptibly wider than the ribs are thick.

Two perfect examples, U. S. Steamer Albatross. The U. S. National Museum also contains specimen collected by Dr. S. Habel several years ago, as well as examples of Forbes' species.

Chatham Island, April 4th, 1888.

A brief description of the foregoing was included in Mr. Dall's paper, "On some types new to the fauna of the Galapagos Islands" in THE NAUTILUS, January, 1892, which also contained descriptions of *Helicina (Idesa) nesiotica*, *Leptinaria Chathamensis*, *Zonites (Hyalinia) Baueri*. Reibisch¹ who has recently published a paper on the Fauna of the Galapagos Islands, was probably not aware of Dall's article, as he has apparently redescribed the same forms.

Orchidium Lesliei Stearns.

Form rounded ovate, nearly as broad as long. Dorsum coriaceous, nearly black, shiny, closely irregularly reticulated, with finely incised lineation, and otherwise characterized by somewhat distant flatly rounded papillæ. Underside, dingy yellowish white; margin of mantle wide, nearly smooth; edge of same simple. Anal opening posterior, near edge of mantle and somewhat produced. Respiratory orifice smaller, in median line with and in front of anus. Sexual orifice anterior on the right side, under the edge of the large oval hood or collar. Labial palpi thin, largely expanded.

Charles Island, April 8th, one example; Albemarle Island, April 10th, 1888, two specimens between tide-marks. United States Steamer Albatross.

Littorina (Tectarius) Galapagensis Stearns.

Shell small, rather solid, ovate-conic, angulated in outline; five to six and a half whorls. Whorls covered with obtusely rounded rather coarse nodules; of these the peripheral series is the strongest, the next preceding less prominent, while the other girdles of nodes are less conspicuous. The peripheral is closely followed by a

¹ Die Conchologische Fauna der Galapagos-Inseln, von Paul Reibisch, Ges. Isis in Dresden, 1892, Abh. 3, 20, pp. 2 plates.

parallel series just below, and the basis is marked by succeeding rows of less prominence. Aperture rounded, ovate, and of a dark chocolate color; columella broad, excavated and produced below. Exterior dull chocolate, brown above, paler below, with still paler nodules.

Dimensions: Altitude, 7.50 mm.; latitude, 5 mm.

While in its general faciēs it much resembles both Antillean and Indo-Pacific forms hitherto described, a comparison with such as most nearly approach it, indicate its non-identity.

James Island, one example, Albatross collection.

Nitidella incerta Stearns.

Shell small, rather solid, acutely ovate, spire elevated, pointed; whorls six to seven, moderately convex, with inconspicuous revolving grooves; upper whorls delicately sculptured with close set rounded longitudinal ribs. Apex obtuse. Aperture nearly half the length of the shell. Outer lip somewhat thickened with five to seven denticles on the inner side. Columella with a single rather prominent plait or tubercle just below the middle. Surface colored by five to six brownish-red bands, alternating with as many white ones on the body whorl.

Dimensions: Length, 6.02; length of aperture, 3; breadth, 2.75 mm.

The above is based on a single perfect example collected by Dr. Habel. It is nearer to Carpenter's *millepunctata* than to any other west coast form, but exhibits color and other differences when placed side by side with that species for comparison.

Galapagos Islands (special island not stated), Dr. Simeon Habel.

Littorina (Tectarius) atyphus Stearns.

Shell small, ovate subturritid, with five whorls; the basal traversed spirally by five principal obtuse keels or ribs, broken into nodules; of these the peripheral are the strongest. Between these and below the lower of the stronger keels, fainter keels are perceptible; the penultimate whorl shows three rows of nodules; of these the two upper are the more prominent, and the lower one is sutural and inconspicuous. Color dull ashen chocolate above, lighter below the periphery of the basal whorl, and mottled below the lowest keel. Aperture rounded ovate, dark colored; columella somewhat excavated and of a pale chocolate tint. Near the base of the columella

the hint of a lightish band may be seen from the edge of the outer lip, inward.

Dimensions: Altitude, 6.25 mm.; latitude, 4 mm.

Manta, Ecuador; collected by Dr. W. H. Jones, United States Navy. This is the first example of the genus detected on the west coast of the American Continent. Published by name only in my list as below.²

NOTE ON *ACMÆA SACCHARINA* (LINNE.)

BY REV. GEO. W. TAYLOR.

I have lately had an opportunity of examining several hundred specimens of *Acmaea saccharina* (Linne) and have come to the conclusion that it is a species that varies comparatively little, and that Mr. Pilsbry is wrong in supposing (see Manual of Conchology, vol. XIII, p. 50) that *A. stellaria* Rve. or *A. octoradiata* Hutton or his own *A. perplexa* are forms of it.

A. saccharina is nearly always distinctly seven rayed. It is common on the Chinese and Japanese coasts but has not been noticed by me in collections from the South Pacific Islands.

A. stellaria Rve. is an eight rayed species. It was described I think from New Holland; my own specimens are from Raratonga and I suppose it to be a species of the South Pacific fauna. Reeve's figures are very good and are copied by Pilsbry, pl. 36. The shell figured by the same author on pl. 61, fig. 65 is also of this species as Mr. Pilsbry surmised (Manual of Conchology, XIII, 99).

Acmaea perplexa Pilsbry seems to me to be abundantly distinct from either of the above named species. It is described as with seven rays but figured with eight which is the correct number.³ It is a well marked species quite unlike any other *Acmaea* known to me. My specimens were collected in New South Wales from which locality, by the way, I have shells which I refer to *Acmaea marmorata* T.-Woods, which much more nearly resembles *saccharina* than does any specimen of *perplexa* I have seen.

²Vide Proc. U. S. Natural Museum, Vol. XIV., p. 326. "List of shells collected on the west coast of South America, principally between latitudes 7° 30' S., and 8° 49' N," etc., 1891.

³Mr. Taylor is correct in stating that *A. perplexa* is always 8 rayed. The statement that it had but seven was an error.—ED.

If my views are correct the synonymy of the above mentioned species will stand thus:

Acmaea saccharina (Linne). Habitat. China and Japan.

= *lanx* Rve.

= *stellaris* Q. & G. (non Rve.)

= *stella* Lesson.

Acmaea stellaris Rve. (non Q. & G.). Habitat. South Pacific Islands.

= ? *octoradiata* Hutton.

Acmaea perplexa Pilsbry. Habitat. Australia.

A NEW LAND SHELL FROM SUMATRA.¹

BY T. H. ALDRICH.

Nanina (*Ariophanta*) *Dohertyi* n. sp. Pl. I, fig. 1, 2.

Shell thin, waxy pellucid, light green, corneous, subimperforate, whorls six, suture slightly margined, impressed, bordered below with a narrow white line, body whorl acutely carinated and ridged, produced at aperture into a flattened spade-like terminal; spire high. Aperture subtriangular, lip reflected strongly, almost completely covering the umbilicus.

Locality, Marang, on Southwest coast of Sumatra.

NOTE. This shell is doubtfully placed in *Ariophanta*. It resembles *Nanina nasuta* Metcalfe described from Borneo but is much higher, lacks the band of that species, and is differently produced. Received from Wm. Doherty, Esq. who states that when alive it is green with a singularly delicate epidermis, and is arboreal in its habit. Its color makes it almost invisible. Six specimens received.

MESODON ANDREWSI IN MISSOURI.

BY F. A. SAMPSON, SEDALIA, MO.

I send for inspection a shell found by me in St. Francois County in southeast Missouri. While arranging my "Missouri collection"

¹The illustrations of this species will appear in our next number.

I was struck with the very evident differences between it and the *albolabris* among which I had placed it. The latter all have but little over five whorls, with aperture somewhat contracted by being flattened toward the plane of the base. This shell has the globose form, the rounded aperture, the swollen last whorl, elevated spire, nearly six whorls and all the characteristics of *Mesodon Andrewsii*.

I have before me a specimen received from Mr. Binney with his label showing that it was one of the original lot from which *Andrewsii* was named. The Missouri shell does not materially differ from it in any respect. It is very slightly larger than the North Carolina shell, but not so large or solid as *Andrewsii* from Talula Falls, Georgia, also received from Mr. Binney.

H. Andrewsii is a species of the Cumberland subregion, but other species of that region extend to Missouri, as for instance *Stenotrema labrosum* Bld., and I have no doubt of the correctness of my identification, though it makes an unexpected extension of the habitat of this species.

A VISIT TO WARD'S.

One stormy night in November the Editors and Manager of THE NAUTILUS, and their friend the Vice-President of the American Association of Conchologists, found themselves *en route* for Rochester, N. Y., via the famous Lehigh Valley route. The object of their pilgrimage was to see the largest Natural History Establishment of its kind in America,—PROF. WARD'S. Dawn of the next day found us still far from our journey's end, near Ithaca, and in sight of the classic walls of Cornell College, where NEWCOMB labored so many years. From here, we rode for miles along the beautiful shores of Cayuga Lake, lying like some shining serpent between its dark Devonian and Silurian cliffs. Then breakfast at Seneca; and finally Rochester was reached where we were hospitably received by Prof. Ward, and by his able assistants Messrs. Crump, DeLaney, Baker and Walton. After the usual amount of talk incident upon the meeting of a half-dozen lovers of shells, we started on a tour of inspection, an account of which I will give in the words of one of our number.

“Here is a grand treat, not only for the lover of nature but also of art, for the preparation of objects of natural history (where accuracy

is of the first importance) is indeed a most difficult art, requiring not only a skillful artisan but a scientist as well. If a museum is a collection of prepared specimens, here is a collection of museums in course of preparation. This work is carried on by a force of from forty to fifty in a group of twelve or fourteen large buildings, each devoted to a special department. Our time being limited we could only take a glance at most of the departments. The nearest building to Prof. Ward's residence contains the minerals. A rich collection of meteorites many of them cut in sections. A splendid series, of the many varieties of Quartz. Many interesting forms of the calcite group, including long stalactites, etc., also beautiful specimens of apatite, garnet, malachite, stibnite, etc. In the next building is the geological department; and here we see a specimen which is a treat to both the paleontologist and conchologist: this is the *Cerithium giganteum* from the Paris Basin (eocene) with a perfect aperture. The entire shell is about a foot long, the aperture being expanded like that of a Stromb. A great series of beautiful Ammonites many of them cut and polished, makes the collector of recent shells envy the paleontologist and wish that even one species had survived with its near kinsman the Nautilus. Here, too, are polished slabs showing sun-cracks, the cracks filled with calcite, great slabs four to eight feet in length covered with ripple-marks, while near at hand is the modelling room, where casts and restorations of rare and unique fossils are prepared. A cast of a great *Glyptodon* is in course of construction. In an adjoining room an Irish elk is almost ready for the museum, also a beautiful piece of work for an archæological museum, a model of the 'Serpent Mound' of Ohio.

"The relief-maps represent a great deal of careful and accurate work. This is the class of maps that should be in every museum, college, and school. Prof. Ward is now at work on a large relief-map of New York State for the State exhibit at Chicago. The department of human anatomy contains many examples of exquisite workmanship. Hastily going through the department of taxidermy we note the large mounted elephant with its young, arranged in a very natural and attractive manner; the Indian and American buffalo, side by side; the many species of *Cervidæ*; the large groups of monkeys; superb specimens of the Bengal tiger, male and female. 'The skunk family' in and around their burrow, as natural as life, is both instructive and amusing; and the hundreds of other spec-

imens all show the highest art in taxidermy. Above the mammals are the birds, which our limited time did not permit us to examine. The adjoining room is the osteological department. Specimens from the elephant and hippopotamus to the small rodents and birds show as near perfection as it is possible to obtain in this difficult branch. In the room above this is a large collection of mammalia skulls."

The invertebrates have long claimed a large part of Prof. Ward's attention; and the magnificent series of corals, sponges, echinoderms and crustaceans, attest alike to the fruitfulness of his journeys abroad and to the skill of his workmen at home.

In spite of the attractions of other departments, our time was mainly spent in the "Shell House." The upper story of this building is occupied with a suite of rooms containing Prof. Ward's special collection of invertebrates, the mollusks being arranged in table-cases along the sides and down the middle of two large rooms. The plan of this collection is to have *every genus* represented by characteristic species, and to have the very best specimens of each species that can be obtained. The result is a strikingly beautiful as well as an uncommonly instructive collection. For the past decade or more, Prof. Ward has been giving special attention to the mollusks; and the results of many a journey half round the globe are here shown. Abalones and limpets from California and the north-west coast; Cypræas, Murices, Olivas, Pleurotomas from Panama; Chitons, black Trochi, Cancellarias, etc., from Peru, and limpets of the *Nacella* type from Magellan and Chili, secured during a trip around South America, represent part of the conchological plunder, while bones of the great fossil edentates, and magnificent minerals galore also were secured. The fruits of other journeys are seen in the splendid suites of *Magilus* and *Leptoconchus*, from Mauritius; Strombus, Cones, Cassis, Cypræas, Tridacna, Malleus, Aspergillum and many others from the Indian Ocean; and besides these, desirable species have been selected from the dealers of London, Paris and Berlin. Not the least part of the pleasure in looking over this collection is the fund of anecdote and adventure connected with many specimens secured by Prof. Ward in unfrequented corners of the world.

The work of classifying this great collection has been well performed by Messrs. Crump, DeLaney, Baker and Walton; the last named gentleman having supplied exquisite colored drawings of Nudibranchs and other naked mollusks.

The lower floor of the same building is Prof. Ward's stock of mollusks and invertebrates, one of the largest stocks of shells in the world, classified in labelled drawers, for the convenience of purchasers.

Again we are homeward bound, and are passing the time in showing, by turns, the specimens secured, and praising or criticising one-another's acquisitions; but in one thing we all agree—that the instruction and pleasure of seeing Prof. Ward's shells, and the enjoyment of a day spent in the company of the Professor and his able lieutenants, is well worth a visit to Rochester.

NOTES AND NEWS.

NOTES ON *UNIO LUTEOLUS* Lam. In THE NAUTILUS for November last Mr. Geo. W. Dean in distinguishing this species from *U. radiatus* adduces the uniform color of the nacre of the luteolus. This is as a rule quite true. But specimens from the northern part of this State occasionally have the posterior part of the interior tinged with a very delicate pink. In a quite peculiar local form of small size found by Dr. M. L. Leach in Crystal Lake, Benzie County, the tendency is quite marked and nearly every specimen has the rosy tinge to the nacre. I have never, however, seen a specimen in which the whole of the nacre is thus colored, as occurs in *U. radiatus*.—*Bryant Walker*.

STROBILA LABYRINTHICA VAR. *VIRGO*. We have received from Rev. H. W. Winkley of Saco, Me., specimens of a *Strobila* differing from *labyrinthica* in being somewhat larger and more depressed, and translucent-white in color, the lip and lamellæ opaque-white. This variety was found by Mr. Winkley near Sebec Lake, Piscataquis Co., Maine.—*Pilsbry*.

A NEW COLOR-VARIETY OF *HELIX ALAUDA* Fér. Mr. Franciscos E. Blanes has lately found, at Maisi, Cuba, a variety of the above species which he proposes to name var. *Weeksiana*, in honor of Mr. W. H. Weeks, Jr., of Brooklyn, N. Y. The variety has the following characters:

H. ALAUDA color-var. *WEEKSIANA* Blanes. Form globose-trochoid with the whorl very strongly deflexed at the mouth. Color pure white with faint oblique pink streaks. Lip bright pink; aperture yellow inside.

Mr. C. A. WHITTEMORE has been elected curator of the museum of the Kent Scientific Institute, one of the oldest scientific societies of Michigan.

GOULD'S TYPES AND MS. That which was burnt at Chicago at the big fire was not Gould's *types* of North Pacific Exploring Expedition but his *complete MS.* and notes, absolutely ready for publication. As conchological executor of Dr. Gould, his family gave me his MS. I kept this of North Pacific Expedition in my fireproof till Stimpson begged me to send it to him at Chicago, where it was burnt.—*W. G. Binney.*

EDS. NAUTILUS: I notice in Mr. Simpson's article on the revision of the American Unionidæ that he believes that not a soul of those of whom he gives a list as collectors in Lea's time remains living. I can say for one that Moores is still living and has been for the past eighty years and five months.—*H. Moores, Columbus, Ohio.*

A NEW SPECIES OF ENNEA has been dedicated to Rev. A. B. Kendig, of Brooklyn, N. Y.—*E. Kendigiana* Rolle, described in the last number of the German Malacozoological Society's *Nachrichtsblatt.* It is from Senegambia.

A REPRINT OF THE "CONCHOLOGISTS EXCHANGE." Many subscribers to THE NAUTILUS desire to obtain the '*Conchologists Exchange,*' but are unable to do so because it is out of print. The proprietors of THE NAUTILUS have been requested to reprint the *Exchange*; and if a sufficient number of orders for the reprint can be obtained to pay the cost of it, they purpose to issue it in the same form as the present journal, indicating the original pagination. The cost of the reprint will be 75 cents for the two volumes. Those who wish to secure them should address the manager of THE NAUTILUS.

Mr. Hedley wishes it to be noted that he now regards the shell, jointly figured and described (P.L.S.N.S.W. (2), vi, p. 558) by Mr. Musson and himself under the name of *Pupa anodonta*, as a second species of the genus *Heterocyclus*, instituted by Crosse (Journ. de Conch., Vol. xx, 1872, p. 156) for the reception of *H. perroquini* Crosse, from New Caledonia. This genus is considered by Fischer (Manual de Conchyliologie, p. 735) equivalent to *Lyogyrus*, a member of the *Valvatidæ*.

Part 1, of Vol. xv, of the Trans. Royal Soc. of South Australia, lately issued, contains nine plates illustrating Australian Tertiary mollusks described by Prof. R. Tate. There are several very large

and peculiar *Cypræas* and *Conus* among the number. *Trichotropis* and *Scalaria* are also well represented.

NEW MOLLUSKS OF ST. HELENA. Mr. E. A. Smith of the British Museum has lately described the land shells of the island St. Helena¹, enumerating 27 species, of which 11 are new, and illustrating them with excellent figures. The prominent characters of the fauna are a group of thin *Bulimuli*, the very variable and curious *B. aurisvulpina*, which has been known for over a century, and a group of *Patula*-like shells very similar to the Pacific group *Endodonta*. Besides these, a novel form is described under the name *Tomigerus* (?) *perevilis*. We can scarcely believe that this belongs to the South American section *Tomigerus*. It seems to be a distinct genus of *Pupidæ* comparable to *Boysidia* and *Hypselostoma*, but distinct from either; and deserving of a separate generic name. We therefore propose to call it *CAMPOLÆMUS*. The following characters may be assigned to the group: T. dextrorsa vel sinistrorsa, parva, anfr. ult. valde ascendens, pone labrum constrictus et scrobiculatus; apertura ovata, superne sinu circulari instructa.

EXCHANGES.

WANTED. Works on Land Shells, and rare North American and Foreign Helices. OFFERED, *Mesodon dentiferus*, *Sayii*, *Acanthinula harpa*, etc.—A. W. Hanham, Bank of British North America, Quebec, Canada.

WANTED, by purchase or exchange,—good specimens of *Anodonta Ferussaciana* Lea, size immaterial provided beaks are perfect.—Bryant Walker, 18 Moffat Bld, Detroit, Mich.

TO EXCHANGE in large or small quantities. *Anodonta suborbiculata* Say and *Anodonta corpulenta* Cooper, also about 40 species of the fine Spoon river Uniones and univalves.—Dr. W. S. Strode, Lewistown, Ill.

EXCHANGE. *Unios heterodon* Lea, *lanceolatus* Lea, *Tappanianus* Lea, *Anodonta Williamsii* Lea and *Marg. undulata* Say (pink var.) for other *Unios* not in collection.—W. T. Farrer, Orange, Va.

¹ P. Z. S. Lond. 1892, p. 258.

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No. 9

CATALOGUE OF THE GENUS *PARTULA*.

BY W. D. HARTMAN, M. D.

(Concluded from November number.)

The genus *Partula* proposed by Baron Férussac in 1819, is restricted to certain small land shells inhabiting the Pacific Islands. The species are found throughout all the groups of these islands, and as far west as New Guinea, which seems their limit. North of the equator they are found at the Caroline, Pelew and Ladrone Islands, and recently the Solomon and New Hebrides Islands have afforded several new species. They have not been found at the Sandwich Islands, New Zealand or Australia. In the Viti group, Mr. Andrew Garrett has discovered that some species are restricted to a single valley, each of which has its specific center, and the range of many species is quite circumscribed. In the Marquesas group some species are found on top of the highest mountains, like many other land shells. The species are either arboreal or terrestrial; hybrids are often found, and they occur between arboreal and terrestrial species. Some hybrids appear to possess a certain degree of fertility, and Mr. Garrett informs us that ten species in the Viti group have produced local varieties. The shells of some species are stout and solid, while others are thin and attenuate. Many species have a tooth-like projection from the inner margin of the peristome giving the aperture an auricular appearance; nearly one half of the species possess this button-like tooth on the parietal wall. Individuals of some species are entirely sinistral while others are

wholly dextral, others again are either dextral and sinistral. They all possess fine spiral striæ, which are decussated by oblique ones giving the surface a waved appearance.

8. Decussatula Group.



P. decussatula.

P. decussatula Pfr. *P. magdalena* Hartm.
P. bellata Hartm.

9. Turgida Group.



P. arguta.

P. turgida Pfr. *P. arguta* Pse.
P. annectens Pse. *P. minuta* Pfr.

10. Rosea Group.



P. rosea.

P. rosea Brod. *P. calypso* O. Semp.
P. varia Brod. *P. assimilis* Pse.
P. virgulata Migh. *P. subgonocheila* Mouss.
P. newcombiana Hartm.

11. Ganymedes Group.



P. ganymedes.

P. ganymedes Pfr. *P. gonocheila* Pfr.
P. inflata Rve. *P. repanda* Pfr.
P. actor Albers.

II. BULIMINOID DIVISION.

12. Guamensis Group.



P. guamensis.

P. guamensis Pfr. *P. obesa* Pse.
P. abbreviata Mouss. *P. rufa* Less.
P. conica Gld. *P. bulimoides* Less.

13. Macgillivrayi Group.

<i>P. macgillivrayi</i> Pfr.	<i>P. turricula</i> Pse.
<i>P. caledonica</i> Pfr.	<i>P. radiolata</i> Pfr.
<i>P. carnicola</i> Hartm.	<i>P. eburnea</i> Hartm.
<i>P. paterna</i> Hartm.	<i>P. proxima</i> Hartm.
<i>P. eximia</i> Hartm.	<i>P. pyramis</i> Hartm.
<i>P. albescens</i> Hartm.	<i>P. auriana</i> Hartm.
<i>P. alabastrina</i> Pfr.	<i>P. compressa</i> Pfr.

Subgenus *Diplomorpha* Ancy.

The jaw, lingual dentition and genitalia are like *Partula*. The shell does not possess spiral striæ.

<i>D. layardi</i> Braz.	<i>D. delatouri</i> Hartm.
<i>D. coxi</i> Hartm.	<i>D. peasei</i> Cox.

BIFIDARIA: A NEW SUBGENUS OF PUPA.

BY DR. V. STERKI, NEW PHILADELPHIA, OHIO.

In the "Preliminary List of North American Pupidæ"¹ the name of this subgenus has been published, but without further note except that it was in my mss. for a few years. Since then I have obtained other species belonging to it, and became more and more convinced that it is really a natural group, and one of the richest in species.

The forms ranging under it are small, few exceeding 3 mm. of altitude (*P. armifera* Say, *hunana* Grdl.). In shape they are rather various; cylindric, turriculate, conic, ovoid. The color is a lighter or deeper horn, to chestnut on one, to colorless, i. e. whitish or glossy-albino on the other side; in some the coloration is rather constant while others show all these variations, e. g., *P. hordeacea* Gabb. The surface is smooth, polished, or finely striate or, though rarely, with fine ribs; heavily ribbed forms have not come to my notice. A prominent feature lies in the formation of the apertural lamellæ, or plicæ, especially in the one on the parietal wall; it is (with few exceptions) large and more or less distinctly complex, designated in the descriptions as "complex, twisted, bicuspid, bifurcate, emarginate,

¹ The Nautilus, VI, p. 4 and 7.

medio excavata, bifida," etc., and from this character the name of the group has been derived. A close examination of the different forms as well as of immature examples leaves no doubt that it is in fact composed of two different lamellæ, the parietalis (inner, deeper) and supraparietalis (outer, or "angular"), almost separate, side by side in some species (*recondita* Tapp.-Can.), united to almost a simple one in others (most of *P. rupicola* Say), comparatively small in *P. curvidens* Gld. and *pentodon* Say, as here the supraparietal is very small or almost obsolete.

The columellar, equally constant, is generally also somewhat complex. The typical inferior and superior palatal plicæ are always present, though sometimes quite small, and are, as a rule deep seated, never reaching the margin; in some species one or the other of them is in a peculiar oblique position (*P. contracta* Say, *P. recondita*). Generally there is a "tooth" or short fold at the base, in some species present or absent. Additional dentiform or lamelliform plicæ, sometimes very small, but characteristic, are found in many species; one on the parietal wall, between the "parietal" and the columella, constant (*P. armigerella* Reinh.) or inconstant (*P. curvidens* Gld.), one above the upper palatal (*P. armifera* Say) one between the two palatals, inconstant (*P. pentodon* Say, *curvidens* Gld.)

As there is no rule without exceptions—and in natural science these "exceptions" are always highly interesting!—some, or even all, of the typical folds may be absent in species which we have reasons to range under this subgenus (*P. corticaria* Say, *arizonensis* W. G. B.). But in general they are remarkably constant throughout the whole group which extends over North, Central and the northern coast of South America, the West Indies and Bermuda, Eastern Asia, and the islands of the Pacific and Indian Seas. Europe has no recent forms ranging in the group; but there is a fossil one, *P. lamellidens* from the miocene of Tuthoritz, Bohemia, closely allied to our *P. contracta* Say.

The species have been ranged under different subgenera, such as *Pupilla*, *Leucochila*, which neither comprise the whole group, nor are homogeneous in themselves, and which can only gain by the removal of these forms.

There are several distinct groups of which peculiar characters, the range of distribution and the species will be stated in the following.¹

¹ Conf. Nautilus, VI, p. 4. The species enumerated there will be omitted here; and so will other species which I do not know well enough as to their identity, or their position.

1. Section: *Privatula*. North America.

Shell cylindric; lamellæ few and small or none.

Type: *P. corticaria* Say.

2. Section: *Eubifidaria* (Bif. s. str.). America, Polynesia.

Shell cylindric to turriculate; lamellæ typical.

Type: *P. hordeacea* Gabb.

P. barbadensis Küst (W. I.)

P. grevillei Chitty (W. I.) and numerous others.

P. exigua Ad. Mauritius.

3. Section: *Boysidia*.¹ Asia, Polynesia.

Shell conic; aperture very peripheric; lamellæ typical.

Type: *P. hunana* Grdl. (China.)

P. strophostoma Mildff. (Philippines.)

4. Section: *Albinula*. America, Asia, Polynesia.

Shell oblong or conic-ovate or cylindrical, colorless (contains rather various forms and should be divided in groups.)

Type: *P. contracta* Say.

P. armigerella Reinh. (China.)

P. recondita Tapp.-Can. (Japan.)

P. pediculus Shuttl. (Japan, Samoa.)

P. artensis Montrz. (New Caledonia.)

P. meridionalis Mildff. (From description; China.)

5. Section: *Vertigopsis*. North America.

Shell small, vertigo-like, albino; parietal lamellæ rather short and almost simple; palatals near the margin.

Type: *P. curvidens* Gld.

* * *

So much for the shells. Of the soft parts very little is known as yet. But it is probable that further investigations will prove the relations shown by the shells, which in general yield true evidences of the natural position of their bearers.

¹ Boettger, in v. Mœllendorff (Jahrb. Mal. Ges., 1884, p. 180, 181) proposes the subgeneric name Gredleriella; but Gredler himself sent me specimens with the above. Dr. v. Mœllendorff ranges the group next to Scopelophila (*P. kokeili* Rssm. and *Rossmassleri* Schm.); but the resemblance is only external, from the conic shape of the shells. In the configuration of the apertural parts and especially the lamellæ it closely resembles *P. contracta* Say, while in Scopelophila they are of quite a different type and wholly marginal.

SHELLS OF WILLIAM'S CAÑON, COLORADO.

BY F. A. SAMPSON, SEDALIA, MO.

Fifteen years ago and again the past summer, I collected shells in William's Cañon at Manitou. On the first visit I asked a specimen dealer if there were any land shells in the vicinity. He said there were no living ones; that he had hunted for specimens over the mountains for years, but had never seen one, though there were dead shells on the side of the mountain near by. I found the dead shells, and also plenty of living *Patula strigosa*, in numbers more abundant than at the latter visit. At that time I had not noticed that Binney's Manual gave *P. hemphilli* as occurring at the same place, else I would have made diligent search for it, though I do not think it will be found there. It seems hardly probable that the young of *strigosa* were mistaken for *hemphilli*, though the shells of four whorls are strongly carinated like *hemphilli*, while the mature shells of five whorls do not show any carina. Cockerell in NAUTILUS, Vol. III, p. 102, thinks the finding of *hemphilli* in the Cañon needs confirmation.

Cockerell states that these shells are typical *cooperi*. They are certainly less elevated than Fig. 152 of Binney's Manual. They are more like Fig. 153 except that they have the two bands shown in Fig. 152, and are not carinated at the commencement of the body whorl. Some of them have the heavy raised callus connecting the extremities of the peristome.

On the rocky ledges by the road side in the Cañon, I gathered a number of small shells, all of them being dead. Had the day not been excessively hot I might probably have found living ones.

The following will show the species and the number found of each:

75. *Patula strigosa cooperi* W. G. B.
9. *Zonites arboreus* Say.
28. *Vallonia pulchella costata* Müller.
18. *Ferussacia subcylindrica* Linn.
5. *Pupa* undetermined.
1. *Pupa hordeacea* Gabb.

POST PLIOCENE SHELLS.

BY O. A. CRANDALL, SEDALIA, MO.

While at Belten, Texas, a short time ago, I discovered great numbers of semi-fossil shells embedded in the clays that were probably formed during the early quarternary period. They are distributed through the clay from two to six feet below the surface and may be seen sticking in the banks at any place along the valley of Nolan Creek where a gully has been washed out. The land is covered with large trees, but the best evidence of the age of the formation is seen in the bed of the creek where the water has worn a channel in the solid limestone rock over which it flows from two to three feet deep. The clay and soil of the valley must have been deposited there before or about the time the creek formed its present channel, many, many hundred years ago. The clay has preserved the shells, in nearly as good condition (except as to color) as when buried; and those found at the greatest depth are in the best condition.

I collected the following species :

Bulimulus dealbatus Say.

Bulimulus schiedianus Pfr.

Zonites friabilis W. G. B.

Zonites—probably an undescribed species.

Patula alternata mordax Shutt.

Helix Ræmeri Pfr. var. *umbilicus* closed.

Helix Ræmeri Pfr. var. *umbilicus* closed and toothless.

Helix Texasiana Moricand.

Helix Mooreana W. G. B.

Helix Leaii Ward.

Helix Berlandieriana Moricand.

Helicina orbiculata Say.

Planorbis bicarinata Say.

Planorbis—probably an undescribed species.

Linnea umbilicata Adams.

Physa Halei Lea.

Physa—probably an undescribed species.

ON ACANTHOPLEURA AND ITS SUBGENERA.

BY H. A. PILSBRY.

In studying the species of this abundant group of Chitons, the writer found the scheme of subgenera adopted by the late Dr. Carpenter and published by Dall¹ to be in several respects both insufficient and faulty. These defects are partly due to the fact that Carpenter's studies on this portion of the Chitons were left incomplete by his untimely death, and partly to his rather lax usage in questions of nomenclature.

Acanthopleura, as a whole, is much more closely allied to *Tonicia* than to any other genus. It has no close alliance with the other genera grouped by Carpenter in "Acanthoidea." It agrees with *Tonicia* in having certain areas on the valves studded with minute eyes, which possess a crystalline lens, and are not especially different from lower mollusk eyes generally. *Acanthopleura* differs from *Tonicia* in having these eyes scattered about the bases of the tubercles on the shell, instead of being arranged in radiating series as in *Tonicia*. The eyes are visible under a good hand lens as minute shining black sunken dots or transparent jewel-like raised drops.

Carpenter supposed the West Indian species, *Ch. piceus*, to be the type of *Acanthopleura*; but in Guilding's original paper no species of that group of forms is mentioned by name. A critical review of the subject compels us to accept *Ch. spinosus* Brug. as the type of *Acanthopleura*. The subgenera will stand as follows:

(1) *Acanthopleura* Guild., (restricted.)

Valves somewhat immersed; posterior valve having a very long insertion-plate, cut into numerous teeth by short slits; intermediate valves with one or two slits; sinus smooth; girdle covered with long spines. Type *Ch. spinosus* Brug. *Francisia* Cpr. is a synonym.

The immersion of the valves gives the tail-valve, when detached, the appearance of that of *Katherina tunicata*.

(2) *Maugeria* Gray, (restricted.)

Posterior valve having the pectinated insertion plate, cut into numerous teeth by slits similar to those of the head-valve. Median

¹ Proc. U. S. Nat. Mus. 1881, p. 284.

valves 1-slit; *sinus smooth*, not toothed; girdle densely, closely clothed with short calcareous spinelets. Type *Ch. piceus*, of West Indian coasts. This group is *Acanthopleura* of Cpr., not Guilding.

(3) *Amphitomura* (s. g. nov.)

Posterior valve having the insertion-plate very short, with blunt, crenulated edge, interrupted only by a *single mopaloid slit on each side*; median valves 1-slit; sinus smooth; girdle as in s. g. *Maugeria*. Type *Ch. borbonicus* Desh. The tail-valve alone differs from *Maugeria*, but this character is so significant and so strongly developed that the necessity of separating the two subgenera is obvious.

(4) *Mesotomura* (n. nov.)

Posterior valve having the long insertion plate deeply pectinated outside, its edge interrupted only by a *single median-posterior slit*; median valves 1-slit; *sinus denticulate*; girdle sparsely set with spike-like spines. Type *C. echinatum* Barnes. *Corephium* Gray, 1847, not Browne, 1827, is a synonym.

Mention should be made of the curious fact that Gould's *Ch. incanus* and the similar Japanese species *C. japonicus* Lischke, have been by all authors referred to *Acanthopleura*. An examination shows them to differ wholly in the characters of the tail-valve, the *incanus*, etc., having a smooth crescentic callus in place of the insertion-teeth. It therefore belongs in the immediate vicinity of *Ōmithochiton*, from which it differs in the spiny girdle and rough exterior. The group may be called LIOLOPHURA, *Ch. japonicus* being the type.

A NEW TROCHID FROM JAPAN.

BY H. A. PILSBRY.

Calliostoma Crumpii, n. sp. (pl. I, fig. 3.)

Shell closely resembling *C. argenteonitens* Lischke (Manual of Conchology xi, pl. 63, fig. 32) in contour, color and texture. Differing from that species in the more convex whorls of the spire, the deeply channelled suture, and in sculpture. The body-whorl is rounded, and has a girdle of prominent tubercles at the periphery;

above this is another similar girdle of tubercles, occupying the place of the supra-peripheral series of knobs in *C. argenteonitens*. The deep, channelled suture is bordered by a necklace of beads. The base has six encircling carinæ, like those of *argenteonitens* but more distinctly beaded. The whorls of the spire show the two prominent series of tubercles, and the subsutural row; the beads of the latter sometimes duplicated. Aperture round, oblique, the outer lip slightly expanded; columella and parietal lips regularly arcuate, pearly. Interior silvery, with the reflections of opal. Alt. 31, diam. 26, oblique alt. of aperture 17 mill.

Habitat, Japan.

This is one of the most exquisitely beautiful shells of this family. It differs markedly from *C. argenteonitens* in having a double row of prominent bosses or tubercles. The opaline hues of the nacre shine faintly through the thin, duller whitish outer layer; and the aperture is iridescent with the most intense red and emerald reflections. The specimen is from the collection of Mr. Shelley G. Crump, of Pittsford, N. Y., who is making a special study of *Trochidæ* and *Turbinidæ*, and in whose honor the species is named.

It should be noted that *Trochus moniliferus* Lmk. placed in *Calliostoma* in my monograph of this family in the Manual of Conchology, really belongs to the subgenus *Eutrochus*, but Fischer has instituted a section *Lischkeia* for it. A very fine typical specimen of this species is in the collection of Mr. Crump.

NOTES AND NEWS.

NOTE ON *CONULUS STERKII* Dall.—In Proc. U. S. Nat. Mus. vol. xi, 1888, p. 214, Dall published the description of a n. sp. of *Hyalinia* which he called *H. sterkii*. The description was copied in NAUTILUS V, p. 10, without a name. The figures represent fairly well the form, except Fig. 3 which shows the spire too high. As Mr. Dall justly supposed, it is a true *Conulus*, which genus has since been confirmed as being distinct from *Hyalinia* by anatomic characters (Dr. v. Ihering and others). In 1891, I examined jaw and radula of a dried specimen, softened, and could not obtain the radula in its totality; now, as there is no hope to have any fresh examples before next year, I publish the general result. The jaw is of nearly exactly

the same shape as that of *Con. fulvus*, only the upper edge more equally rounded, 0,036 mm. wide, while that of *fulvus* measures 0,024. (Specimen from New Philadelphia). Radula: the central tooth is comparatively large, tricuspid; laterals 5, tricuspid, similar to the central; marginals 8 (and probably more) tricuspid, formed as in *C. fulvus*. The shell presents, under the microscope, the same peculiar aspect as that of *fulvus*.—*Sterki*, New Philadelphia, O.

MR. HUGH FULTON has recently purchased the collection of the late A. Morelet, containing a large number of rare species, especially land shells of Africa and adjacent islands.

SUBULINA OCTONA, a West Indian snail, has been detected by Mr. Robert Walton, in a green-house at Roxborough, Philadelphia. It seems to be well established there, having been found for several years, in considerable numbers.

MR. T. WAYLAND VAUGHAN, the well-known Texas and Louisiana Conchologist, is studying at Harvard University.

THE PROPOSAL TO REPRINT the "*Conchologists Exchange*," noticed in our last issue, has met with quite a favorable reception; but the number of subscribers is still insufficient to warrant its publication. The reprinting and price will depend entirely upon the number of subscriptions.

MR. T. T. WOODRUFF, of Boston, has recently purchased the collection of Dr. Tryon, of Buffalo (3000 species), which he intends to display in the West.

During the past month, the Conchologists of Philadelphia have had the pleasure of meeting quite a number of the Conchological fraternity from other cities. Early in the month Professor O. B. JOHNSON, of Seattle, Wash., stopped a few days at Philadelphia and later at Washington, on his way southward. MR. JOHN RITCHIE, JR., of Boston is in Philadelphia to stay several weeks. MR. W. J. RAYMOND, of Oakland, Cal., who is studying Physics at Johns Hopkins University, Baltimore, was with us a day or two, the guest of Mr. Ford. Messrs. SIMPSON and HENDERSON, of Washington, D. C., spent a few days with their friends in Philadelphia, and also made a flying trip to New York City, during the holidays. Mr. S., as usual, would admire nothing so much as the dingiest sort of clams. MR. I. GREGOR, of Jacksonville, Fla., was also in the city early in the month. Mr. S. Raymond Roberts spent New Year day at the Academy with his old associates. And finally, our friend

C. E. BEECHER, of Yale College Museum, called upon us for only about ten minutes, but we had time to ask, how was his collection of recent *Brachiopoda* coming on? And to hear that he had about 80 out of the 130 or so known species, and is still trying for more.

DR. J. S. NEWBERRY, who has been professor of Geology and Paleontology in Columbia College, New York City, for twenty-two years, died at New Haven, Conn., Dec. 7, 1892.

EXCHANGES.

Will some of the members of the A. A. of C. kindly send me some LIVING species of *Helix* for my snailery? Zonites not wanted, as they cannot survive the trip across the continent. The favor will be fully appreciated and receipt of specimens acknowledged.—*Willard M. Wood, 2817 Clay St., San Francisco, Cal.*

SHELLS and books to exchange. Send lists, and receive mine.—*Chas. Le R. Wheeler, Damascus, Pa.*

WANTED, by purchase or exchange,—good specimens of *Anodonta Ferussaciana* Lea, size immaterial provided beaks are perfect.—*Bryant Walker, 18 Moffat Bld., Detroit, Mich.*

WANTED. Works on Land Shells, and rare North American and Foreign Helices. OFFERED, *Mesodon dentiferus*, *Sayii*, *Acanthinula harpa*, etc.—*A. W. Hanham, Bank of British North America, Quebec, Canada.*

TO EXCHANGE in large or small quantities. *Anodonta suborbiculata* Say and *Anodonta corpulenta* Cooper, also about 40 species of the fine Spoon river Uniones and univalves.—*Dr. W. S. Strode, Lewistown, Ill.*

EXCHANGE. *Unios heterodon* Lea, *lanceolatus* Lea, *Tappanianus* Lea, *Anodonta Williamsii* Lea and *Marg. undulata* Say (pink var.) for other *Unios* not in my collection.—*W. T. Farrer, Orange, Va.*

THE NAUTILUS.

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No. 10

ADDITIONAL SHELLS FROM THE COAST OF SOUTHERN BRAZIL.

BY WM. H. DALL.

In the NAUTILUS for August, 1891, (V, p. 43) the writer enumerated fifty-five species of marine mollusks from the southern coast of Brazil, mostly collected by Dr. H. v. Ihering, which greatly extended the known range of many familiar species of the eastern coast of the United States. A second list is now presented which considerably enlarges the number of North American and Antillean species known to extend to the region mentioned. Among the land and fresh-water species, *Zonites arboreus* Say was a surprise, as well as a shell which appears not to differ from *Vertigo antivertigo* of Europe.

Columbella lyrata Sby. described from the Bay of Panama had previously been identified by Dunker among species from Santa Caterina, Brazil, and is now sent from Bahia by Safford. *C. terpsichore*, which is a common species in Ceylon and has been received from several Indo-Pacific localities, was reported from Barbados by Cuming and now turns up at Bahia. *Labiosa lineata* Say is a surprise from San Paulo, and so is *Lucinopsis tenuis* Recluz. Several of the Patagonian forms are shown to extend further north than was supposed. The species now reported were chiefly collected by Dr. v. Ihering at San Paulo (S. P.) on the tropic of Capricorn, Montevideo (S. Lat. 35°), Rio Grande do Sul (R. G. S.) in S. Lat. 32°, 30', Santa Caterina (S. C.) in S. Lat. 26°, and Bahia in S. Lat. 13°

30'. Others were sent by Ensign Safford, U. S. N. from Maldonado, Uruguay, and Bahia. In this connection attention may be called to the list of shells from Fernando Noronha in the Linnean Society's Journal (Zool. xx, pp. 483-503, 1890) by Mr. Edgar A. Smith of the British Museum. This list is not a long one but the same tendency is obvious there, as in our present lists, for the Antillean species to range far southward. Thorough dredging along the coast would doubtless greatly enlarge the lists both of local and Antillean species. In the following list, which is strictly supplementary to that of 1891, some of the species are extended southward from their most southern previously known range nearly three thousand miles! A few species were sent by Dr. W. H. Rush, U. S. N., in May, 1892, which were dredged in Maldonado Bay near the mouth of the La Plata in 3-6 fathoms mud. Those belonging to the northern fauna have been added to make the supplement as complete as possible.

Ostrea æquinoctialis Orb.? worn, R. G. S.

Plicatula ramosa Lam. S. P.

Spondylus croceus (Chemn.) Reeve S. P.

Pecten (*Janira*) *ziczac* Lin. S. P.

Margaritiphora radiata Lam. S. P.

Mytilus canaliculus Hanley S. C.

Mytilus exiguus Dkr. S. P.

Arca candida Chemn. S. P.

Arca auriculata Lam. S. P.

Arca incongrua var. *brasiliensis* Orb. S. C., R. Y. S., S. P.

Arca Orbignyi Kobelt (*rhombea* auct.) S. P.

Leda electa A. Ad. S. P.

Chama arcinella Lin. S. P.

Cardium muricatum Lin. S. P.

Venus subrostrata Lam. S. P.

Venus circinata Lam. S. P.

Venus purpurata Lam. R. G. S.

Venus pectorina Lam. S. P., fossil.

Meretrix rostrata Koch. S. P.

Meretrix texasiana Dall? S. P.

Tivela mactroides Born S. C.

Tivela Iheringi Dall, S. P.

Tivela bicolor Gray, var. S. C.

Lucinopsis tenuis Recluz S. P.

Petricola robusta Sby., Bahia.

- Heterodonax bimaculata* Lin.
Tagelus gibbus Spgl., Maldonado.
Tellina striatula Lam. S. P.
Macha Cumingiana Dkr. S. P.
Mactra brasiliiana Lam. S. P.
Mactra exalbida? worn, S. P.
Mactra cleryana Orb. short var. S. P.; long var. S. C.
Mactra patagonica Orb. R. G. S.
Labiosa lineata Say, S. P.
Corbula caribæa Orb., Maldonado, Rush.
Azara prisca von Martens, (fossil) S. P.
Azara ochreatea Hds., Montevideo.
Azara labiata Gray, Montevideo.
Barnea costata Lin. S. P.
Dentalium (? *eburneum* Desh. worn) S. P.
Cylichnella biplicata Lea, Maldonado, Rush.
Bulla striata Brug. S. P.
Terebra cinerea Born, S. P., Bahia.
Terebra patagonica Orb. S. P.
Olivancillaria auricularia L., Maldonado, R. G. S.
Olivancillaria var.? *pallida* Swains., M. Bahia.
Olivancillaria contortoplicata Rve. R. G. S.
Olivancillaria Deshayesiana Duclos, R. G. S.
Olivella mutica Say, var. *petiolita* Duclos, Bahia, S. P.
Scaphella angulata Lam. R. G. S.
Lencozonia ocellata Gmel. Bahia.
Anachis terpsichore Leathes. Bahia.
Anachis lyrata Sby. Bahia.
Columbella mercatoria L. Bahia.
Bullia (*Buccinanops*) *cochlidium* Kiener, R. G. S.
Ocenebra Haneti Petit, Montevideo.
Purpura hæmastoma L., Maldonado.
Purpura hæmastoma var. *Consul*, Lam. R. G. S.
Purpura hæmastoma var. *inerma* Rve. S. C.
Purpura hæmastoma var. *Floridana* Conr. S. C., Bahia.
Scala Orbigny Nyst. R. G. S.
Ianthina exigua Lam. S. P.
Dolium galea Lin. R. G. S.
Simnia deflexa Sby. S. P.
Strombus pugilis L. S. C.

- Crepidula aculeata Gmel. R. G. S., Maldonado (Rush.)
 Crepidula fornicata Lin. R. G. S.
 Sigaretus maculatus Say, S. C.
 Acmæa onychina Gld., S. P. Maldonado.
 Astralium olfersi Troschel, S. P.
 Astralium latispina Phil., S. P.
 Omphalius viridulus Gmel. var. brasiliensis Mke. S. P.
 Omphalius patagonicus Orb., Maldonado.
 Lucapinella adpersa Phil. S. P.
 Fissuridea barbadensis var. rosea Gmel. S. P.
 Fissuridea patagonica Orb., Maldonado.

DESCRIPTION OF A NEW FORM OF CYPRÆA.

BY JOHN FORD.

Cypræa cruenta Gmel. var. *Greegori* n. var.

Shell depressed, orbicular-oval in form, heavily calloused on the sides and ends. Callus on the sides light salmon in color, with irregular purple-brown spots, having a blotchy appearance. Dorsal surface similar to that of *cruenta*, but lacking the whitish spots typically present in that species. Base spotless, salmon colored, darkest in the interstices. Teeth on outer lip very strong, long and whitish; on inner lip finer, with the exception of the anterior fold; and the adjacent tooth, both of which are very prominent. Space between the anterior fold and the following tooth wide and bright red; posterior teeth of inner lip prolonged outward upon the base.

Dimensions of an average specimen: length $1\frac{1}{4}$, breadth $\frac{7}{8}$ inch.

At a glance this shell appears somewhat related to *C. caurica* Linn., but a careful examination will show that it is entirely distinct from that species, the columella of *caurica* being more concave, and the anterior fold bifid in character; the following tooth of *caurica* also is less prominent, and the form and color of the species altogether different.

This variety differs from *C. cruenta* in being smaller, more rounded in form, entirely lacking spots on the base, and in the peculiar variations of the teeth as described above.

While most students would probably consider var. *Greegori* a distinct species, I am inclined to believe it too closely related to *C.*

cruenta for unquestionable specific distinction. The form has not been known, at least to American collectors, until very recently.

The shell bears the name of my good friend Mr. Isaiah Greeger, of Cuyahoga Falls, Ohio, an untiring collector and student of shells.

THE UNIO MUDDLE.

BY BERLIN H. WRIGHT.

For the past fifteen years my father and myself have been making a study of the family Unionidæ and have brought together something like 700 species. Like many others we have often been greatly perplexed to know where to place a form, being frequently reminded of what a celebrated palæontologist once wrote me regarding a certain gastropod. "It is — — but if it had lived a little longer it would have been — —"

Several years ago we brought to New York the results of four years hard collecting in South Florida, several bushels of Unios. The perplexing part of the work was commenced, having in hand a figure or description or both of almost every species of the family. All of the shells belonging to the *trossulus* group were placed upon a large table. There was *U. amygdalum* Lea, *lepidus* Gould, *modioliformis* Lea, and *trossulus* Lea. Then with the figures and descriptions of these species before us, we selected a few perfectly typical individuals of each species and undertook the task of dividing the mass of material into four groups corresponding with the above-named species. There were not less than 500 individuals, all cleaned and taken alive. Many days were spent in this work. At the close of the day we would congratulate ourselves that they were correctly divided and the next day on reviewing the work make many changes, until, at last, we gave up in despair and have never dared to send many of them out—only the extreme forms being thus far used.

Then the work of dividing the others in the same manner was undertaken. Typical specimens of various ages and differing sexes of the following species were selected. *U. Buckleyi* Lea, *Jayanus* Lea, *Anthonyi* Lea, *Buddianus* Lea, *aheneus* Lea, *Blandingianus* Lea, *coruscus* Gould (comparison having been made with the type at Albany), *fuscatus* Lea, *Jewettii* Lea, *minor* Lea, *Monroensis* Lea

(here let me say that I have traversed every inch of the shore of *L. Monroe*, dredging in scores of places in the lake and adjacent streams and never found a perfectly typical specimen of this species), *occultus* Lea, and *papyraceus* Gould, the last a specimen loaned from the Newcomb collection. When we finished, thousands of specimens remained that could not well be placed with any of the groups. These were divided into groups and further search made among the various authorities at hand to discover their identity. After eliminating all possible, many interesting forms remained, represented by large numbers of individuals. These we desired to classify and use in exchanges, and names we must have for them. We reasoned thus: The water system of South Florida is in no way connected with Georgia or the States north, the rivers flowing *northward* instead of southward; many of these forms are found in isolated lakes or ponds; large numbers of our known species described by Lea, Conrad and others from a single individual, sometimes a single valve only and rarely more than a small suite being at hand; some of the oldest known species have never been found outside of the original station. These facts justify us in erecting into species such well marked forms as are well represented in these unknown lots. Accordingly this was done and now I am censured for not having given the matter sufficient study. Will those who claim to know, tell us through the NAUTILUS how they arrive at such definite and positive conclusions regarding the genuineness of some of my own and other's species? Will the censor name the exact characteristics of any species? Information of this sort will be hailed with wild delight by all working naturalists, and the name of the discoverer will always be held in grateful remembrance by all lovers of science. We wait.

I believe there can be no safe middle ground. It is either true that there is but one species in the family or else most of the described species must stand as good.

In the U. S. the *Anodon* graduates by imperceptible stages into the *Margaritana* and that into the *Unio*.

We once found a lot of shells in a Pennsylvania stream that bothered us greatly, and the late Dr. Wesley Newcomb pronounced them a cross between *An. undulata* Say, and *U. pressus* Lea. Exteriorly they were the latter but interiorly the former. This suggests the law of hybridization. Distinguished authorities tell us that members of the same species only are fertile; the crosses in some rare cases prov-

ing fertile only for a generation or two. Crosses of *widely differing* forms or races are *very* fertile, but sterility is the law with members of the same family but of *differing species*. Has this test been applied to the family Unionidæ? This seems to be the only way the *true* boundaries of species will be fixed.

It can be asserted without fear of successful contradiction that the members of this family (Unionidæ) are connected in such a manner that it is impossible to draw a limit to any species. The same is true in many other families, recent and fossil, as the Ammonites, snails, sponges, etc. Is it not true that species are mutable, similar conditions and surroundings only yielding like forms? Dr. Newcomb, to settle a dispute, reared from a single pair, five species (?) of *Achatinella*, their surroundings being varied to produce the desired change. The most cautious recent investigators incline to the theory of mutability of species. The wild dog has descended from the wolf; the domestic dog in all its forms from the wild dog; the domestic cat from the wild cat and the pet guinea-pigs from the wild guinea-pig of Brazil. The domestic forms of these will not pair with ancestors, the new *species* being evolved by differing conditions.

Hence it is that almost every branch of Zoology is burdened with synonymy and is in great confusion. The only practical course for the purpose of classification and study of Natural History is to admit that the principal well characterized forms are species. There is no other course open to us and I have concluded from this process of reasoning that Lea's, Conrad's and others' names, where based on well characterized and differing forms as exhibited in numerous individuals, will have to stand as "good species" in spite of the dictum of individuals. This must be the case or the very foundation of all Natural Science will be destroyed and systemization be impossible. It, therefore behooves us to exercise much caution in our strictures upon the work of others especially where we have not the means of knowing the facilities possessed by the one with whom we differ.

Regarding the classification of the family Unionidæ, I think Dr. Lea's Synopsis a pretty close approximation to what we want. By making some changes it becomes a most useful adjunct to the cabinet. It enables the student to hunt down a species by the process of elimination very expeditiously. I have found some changes and additions expedient. The habitat is entered opposite each species as also a reference to the work, page and plate where it is

described, together with marginal notes of allied species, and all the species described since the last edition was published are entered in their proper place as indicated by the author. A new edition of this work is what we need and not any sweeping change in the arrangement of species.

ON CLEMENTIA SUBDIAPHANA CPR. IN SAN PEDRO BAY.

BY MRS. BURTON WILLIAMSON.

To a collector interested in the geographical distribution of shells, the occurrence of species in distinct areas, is full of interest, even though it may modify his preconceived notions regarding defined limits of certain species.

In Dr. Wm. H. Dall's work, "On some New or Interesting West American Shells," (From Proc. U. S. Nat. Mus., Vol. XIV), he reports the dredging of *Clementia subdiaphana* Cpr., near San Francisco Bay, in 24 fms. The writer says, "the locality whence the specimen was obtained is 600 miles farther south than before reported." The habitat of this species was Vancouver Island and Puget Sound, until Dr. Dall dredged it from Port Etches and southward on the Alaskan coast. A small valve of *Clementia subdiaphana* has recently been collected in San Pedro Bay, by Mrs. Laura H. Trowbridge. Mrs. Trowbridge found it on the beach and sent it to me for identification. As nothing like it had been collected in San Pedro Bay, to my knowledge, I sent the interesting specimen to Dr. Dall for determination. He writes; "looking over some material now on hand, I find young specimens from among my dredgings of 1873 at Catalina Island, and a young one dredged in 1890 off Santa Barbara by the Fish Commission, thus fully confirming the extension southward." This extends the species 500 miles farther south.

DESCRIPTION OF A NEW SPECIES OF BULIMUS.

BY HENRY A. PILSBRY.

Placostylus alienus n. sp.

Shell subcylindrical, with conical spire, very solid, the body-whorl buff, spire tawny. Whorls $4\frac{1}{2}$, convex. Aperture slightly exceeding half the total length of the shell, somewhat oblique, oblong ovate, whitish inside becoming orange toward the lip; per-

istome very heavily calloused within, the callus orange; face of the lip convex, thickened, a little expanded; columella arcuate, reflexed, having a strong fold above the middle, produced by a strong crescentic ridge which encircles the columella immediately behind the reflexed columellar lip. There is a shallow peripheral sulcus upon the latter third of the body-whorl.

Alt. 29, diam. $14\frac{1}{2}$ mill.; alt. of aperture $16\frac{1}{2}$, width 10 mill., inclusive of peristome.

Habitat, New Hebrides.

This species was sent to me by Dr. J. C. Cox of Sydney, N. S. W. Australia. It seems to be quite distinct from any of the described forms. In some characters it resembles the genus *Diplomorpha*, and Dr. Cox suggests that it may belong to that group; but the balance of characters seem to me in favor of *Placostylus*.

Dr. Cox writes "I have only recently received this, to me, quite a new species of shell, and fancy it belongs rather to the genus *Diplomorpha* than to *Bulinus*. I have one specimen with a thin brown epidermis on it, another with the mouth quite pale colored."

NOTES ON THE HELICES OF THE BIOLOGIA CENTRALI-AMERICANA.

BY H. A. PILSBRY.

Dr. von Marten's work on the land shells of Middle America, now in course of publication in Godman and Salvin's magnificent work, *Biologia Centrali-Americana*, promises to rank as one of the great faunal works of our time. Coming after Crosse and Fischer's elaborate and beautiful volume, it is naturally more complete, and to a great degree supplements the work of the French authors.

The last parts of the *Biologia* issued contain a portion of the account of the Helices, and as a résumé of the principal points of classification will be of interest to specialists, the writer has ventured to briefly pass them in review.

v. Martens recognizes *PATULA* as a genus, and in it he includes the sections *Thysanophora* and *Microconus*.

In the genus *HELIX* the following subgenera are adopted: *Acanthinula*, *Vallonia*, *Trichodiscina*, *Praticolella*, *Arionta*, *Pomatia*, *Lysinoë*, *Oxychona*, and *Solaropsis*. In the subgenus *Acanthinula* are included the minute, conical-globose, narrowly umbilicated forms for which the writer some years ago proposed the name *Ptychopatula*. These forms seem to me to be nothing more than nar-

rowly perforated *Patula*, having no especial relations to *Acanthinula*. The jaw and dentition of *A. granum* Strebel are like the thin-shelled Mexican *Patulas*, not at all like *Acanthinula*. The subgenus *Trichodiscina* Martens (= *Trichodiscus* Strebel, preoc.) includes the forms grouping around *H. coactiliata* Fér. The very peculiar species *H. macneili* Crosse is included with doubt. If it really belongs here, the name *Averellia* Ancey, 1887 (type *H. macneili*) will take precedence over *Trichodiscina*. In 1889 the writer from a study of specimens collected by Gabb, referred this species to *Cepolis*, although not without doubt.

(to be continued.)

NOTES AND NOTICES.

ZONITES STERKII Dall.—I collected this species last Spring near Mt. Lebanon, La., under damp leaves. Dr. Sterki kindly determined the specimens for me.—*T. Wayland Vaughan*.

NOTES ON THE UNIONIDÆ OF FLORIDA AND THE SOUTHEASTERN STATES, by Charles T. Simpson, Aid in the Dept. of Mollusks, U. S. National Mus. (32 pp., 26 pl. extract from Proc. U. S. Nat. Mus. XV). In this critical study of the mussels of the southeast drainage we find much to commend. Mr. Simpson discusses their distribution, dividing our area into two regions, one the Mississippi Valley with the Texas and eastern Mexican area as a subregion, the other region comprising the States bordering on the Gulf of Mexico from the Mississippi to Florida, and the Atlantic drainage north to Canada, and also including the St. Lawrence (Great Lake) drainage. In this second region, the specific forms are comparatively few and much less diversified in character than in the Mississippi drainage. One of the most ubiquitous types is *Unio complanatus*, which extends, with variations, throughout the system.

Lea's well-known *classification* of *Unio* is criticised and designated as "artificial and not in accordance with all the facts of nature;" and in this conclusion we heartily join Mr. Simpson. The arrangement of Lea was a temporary expedient only, and bears about the same relation to a natural system that the arbitrary systematic botany of Linnæus bears to the modern natural system of plants. The species are classified into "groups" by Mr. Simpson; and under each one are given the synonyms, as he understands them, with notes on distribution, and the salient specific characters of each are pointed out. These notes, with the characteristic and generally

very good outline figures of all the species, will be of the greatest use to students of the Uniones of this region. The synonymy given under some species, such as *U. buckleyi*, *obesus*, etc. is rather alarmingly extensive, and some of his conclusions may cause our Unio-specialists to hurl (verbal) missiles at Mr. S.'s devoted head, "just to show there's no ill feeling;" but the Uniologist must learn to dodge these little things or take them in good part, as they are all incident to the pursuit of a noble science. One new species, *U. subburidus*, is described, from Orange Springs, Volusia Co., Fla. We are sorry to see that by some oversight, Mr. S. has given to Lea the beautiful *Anodonta* of the Florida lakes. It was previously described by Thomas Say, and attains a much larger size than the figures given by Lea or Simpson.—*H. A. P.*

CYPRÆA CHRYSALIS Kiener.—This species, which apparently has not been seen by REEVE, SOWERBY and ROBERTS, who quote their descriptions from KIENER, is commented upon and described by MELVILL in the October number of the *Journal of Conchology*, issued last month. He places the species between *irrorata* Sol. and *quadrifasciata* Gray; and it is considered by him a good species, possessing some of the attributes of the *C. finbriata* Gmel. var. *microdon* Gray, some of *C. (Naria) irrorata* Gray, and others of *quadrifasciata* Gray, but differs from all in the produced extremities.

CYPRÆA AMPHITHALES Melv. is also discussed in the same paper, a more perfect specimen than the type having been obtained from Port Elizabeth, S. Africa. This species has the characters of *Cypræovula*, combined with those of "*Luponia*" *algoensis*. It has lately been figured by Sowerby in "The Marine Shells of South Africa," pl. 5, figs. 94-96.

POST PLIOCENE SHELLS.—In the January NAUTILUS, p. 103, a list of semi-fossil shells from Belton, Texas, is given. The *Zonites* mentioned without specific name is a large form of *Z. indentatus* Say. The *Planorbis* is *trivolvus*; and the *Physa* is a very slender form, like a small *Aplexa hypnorum*, or the slenderest sort of a *Ph. pomilia* Con. It seems to be new, but is represented in Mr. Crandall's collection by a single specimen.

SPIRULA FRAGILIS FOUND ON THE BEACH NEAR GAY HEAD, MASS.—The stranding of *Spirula fragilis* on Nantucket has been described in Binney and Gould's *Invertebrates of Massachusetts*. It may be of interest as showing the further distribution of this little

cephalopod to note two specimens of the dried internal shells of this species found by Dr. Aug. F. Foerste and myself on the sandy beach between Gay Head light-house and Squibnocket, in August, 1889. The specimens lay on the surface together, above high tide mark, are the only examples which I have seen from the island of Martha's Vineyard. One of the specimens, which I have lately deposited in the collection of the Boston Society of Natural History, was broken anteriorly and the protoconch was missing.—*J. B. Woodworth.*

Cambridge, Mass., January 21st., 1893.

NEWSPAPER CONCHOLOGY.—The gloriously free daily press of this country does not often discuss scientific matters, but when it does, *facts* are apt to be mangled. The following clipping is not so bad: "It is generally supposed to be a sign of wet weather when snails go about without their shells. One species of snail never takes its walks abroad except when rain is at hand. Some climb trees two days before a down fall, setting upon the upper side of the leaves if a storm is to be of short duration, but taking shelter on the under side if it is to last some time. Still other snails turn yellow before rain, and blue when it is over."

MR. JOHN WALTON, formerly of Ward's Natural Science Establishment, Rochester, N. Y., is now employed as Artist in the Biological Department of the University of Chicago, and his address in future will be *Science Hall, University of Chicago, Chicago, Ill.*

THE DEATH OF RICHARD OWEN, the great anatomist, has been announced.

MR. ISAAC MARTINDALE, well-known as a botanist and entomologist, and treasurer of the Academy of Natural Sciences of Philadelphia, died at his home in Camden on January 10th.

AT THE ANNUAL election of the Conchological Section Academy Natural Sciences of Philadelphia, the following officers were chosen: Director, W. S. W. Ruschenberger; Vice Director, John Ford; Secretary, Edw. J. Nolan; Treasurer, S. Raymond Roberts; Conservator, Henry A. Pilsbry.

EXCHANGES.

LAND AND FRESH-WATER SHELLS to exchange for shells from any other locality.—*Morris Schick, 2349 Fairhill St., Philadelphia, Pa.*

TO EXCHANGE: Fine fossils for Foreign or rare North American Helices. Also wanted, "Manual of American Land Shells" by W. G. Binney, 1885.—*C. S. Hodgson, Albion, Illinois.*

THE NAUTILUS.

VOL. VI.

MARCH, 1893.

No. 11

OBSERVATIONS ON THE HELICES OF NEW ZEALAND.

BY DR. H. V. IHERING.

Upon this matter Mr. Pilsbry has communicated two papers in the NAUTILUS for 1892 (pp. 54-57 and 67-69). A curious confirmation of his observations upon simultaneous discoveries in science is the fact that I published the same ideas as Mr. Pilsbry, at the same time, in a paper finished by me in 1891.¹ In that paper, p. 487, I stated that:

Maoriana Suter is synonymous with *Strobila*;

Phrixgnathus Hutton is synonymous with *Punctum*.

And that these genera, and also the (so-called) *Microphysa*, and the other allied New Zealand genera are *Patulidæ*. Mr. Pilsbry having made the same disposition of them in his paper, p. 55.

Mr. Pilsbry, again, (p. 69) has offered the same opinion upon the systematic value of the mucous pore as I have done on p. 401 of my paper, and has even used the same examples, to which I added *Zonites* with, and *Zonitoides* without mucous pore. I trust that Messrs Hedley and Suter will recognize from the study of my paper, that the ideas of Semper on the *Zonitidæ* are extremely erroneous; and that they will therefore agree with Pilsbry and myself, in discarding Semper's conclusions.

¹ H. v. Ihering Morphologie und Systematik des Genitalapparates von Helix, Leipzig, 1892. Zeitschr. f. wiss. Zoolog. Bd. 54, p. 386-420 and Taf. 18, 19.

I agree completely with Mr. Pilsbry in regarding the numerous "genera" of the *Charopidae* instituted by our Australasian *confrères* as subgenera of *Patula*. Thus *Patula* is a completely cosmopolitan genus. The true *Helicidae* do not exist in New Zealand. In my paper already cited, I have restricted the family *Helicidae* (p. 426) to the genera having a dart sack or sacks (belogonous). These are the following :

1. *Xerophila* (Held.) v. Ih.
2. *Fruticicola* (Held.) v. Ih.
3. *Helix* (L.) v. Ih.
4. *Campylæa* (Beck) v. Ih.
5. *Gonostoma* Held.
6. *Dorcasia* (Gray) v. Ih.
7. *Cochlostyla* Fér.

The genus *Helix* comprises *Tachea*, *Pomatia*, *Iberus*, *Macularia*. The Helices of U. S. are not belogonous and form my genus *Neohelix* (p. 482), corresponding in general to what Mr. Pilsbry called *Polygyra*. But as Mr. Pilsbry's genus also included *Gonostoma* and *Vallonia*, these genera are not synonymous. It is not at all convenient to give the name *Polygyra* to the section *Polygyra* and also to a *greater group* which each zoologist defines in a different manner. The genus *Neohelix* is a very natural one, but its systematic position will not be evident until the origin and affinities of the genus are demonstrated, and this, I believe, will be made out by farther anatomical and embryological studies.

I provisionally give the name *Parahelix* (p. 492) to all Helices which are not *Helicidae* or *Neohelix*. The anatomy of the *Parahelix* group is almost unknown.

The family of *Helicidae* is not represented (excepting the imported genera) in the U. S. east of the Rocky Mountains; and there seems no paleontological evidence that they formerly existed there. The genus *Campylæa* extends from Europe and Asia to California, Central America and eastern South America. These South American Helices without doubt are pliocene immigrants. No *Helicidae* are found in Australia, New Zealand or Polynesia. Nor in Chile and La Plata tertiary beds no true *Helicidae* occur. There can be no doubt that the family *Helicidae* is a palæarctic one, which in tertiary time extended to America.

I agree in general with the observations made by Mr. Pilsbry on the relations of the New Zealand fauna; but I believe that Mr.

Pilsbry did not take into consideration the disposition of some cosmopolitan genera in certain points. Thus *Pupa* is represented but by one species in New Zealand, and *Succinea* not at all; and notwithstanding there are perhaps no two genera of Nephropneusta more cosmopolitan than *Pupa* and *Succinea*. The genera *Physa*, *Planorbis*, *Limnæa*, *Ancylus* (with *Latia*), *Cyclus*, *Pisidium*, *Neritina*, *Helicina*, *Melania* are cosmopolitan but have disappeared with time in some localities. Some genera now confined to one locality were once cosmopolitan like *Partula*, now Polynesian only, but found in the European eocene by Oppenheim and in the Florida miocene by Heilprin. Other genera may have been more restricted in distribution as I presume with the *Chilinas* of Archiplata, which shall be discovered I assume some day in mesozoic beds of Australia or New Zealand. It is to be studied which are the genera or families of Nephropneusta which once spread cosmopolitan over the globe. I can name *Patula*, *Succinea*, *Pupa* and perhaps some *Zonitidæ*, *Bulimulus* with *Partula*, *Bulimus* with allied genera.

If we compare the molluscan fauna of South America and New Zealand, it is evident that it is impossible to expect to see the relations as very close. Both have undergone enormous modification since they were disconnected in the beginning of the tertiary period according to the theories of Mr. Hutton and myself. The archiplatan province of South America has in the later tertiary received immigrants from North and Central America (such as *Campylæa*) and from the Archamazonian province (as *Streptaxis*, *Ampullaria*, *Glabaris*, etc.). New Zealand on the other hand, received immigrants from the adjacent islands and from Australia, and this Australian element is perhaps in part Asiatic. The genera common to Archiplata and New Zealand thus may be very few. Anyone who studies land shells from Archiplata, excluding the northern immigrants will be astonished by the extreme poverty of the fauna. And what remain as presumably autochthonous, are such genera as *Pupa*, *Succinea*, *Patula*, *Bulimulus*, *Bulimus*.

I am quite aware that these facts are not sufficient to prove the ancient connection of Archiplata and New Zealand; but it should also be stated that no facts contradictory to such connection have been adduced. The argument can be conclusive only when we know better the paleontological history of the fauna. What is known to-day is in favor of my theory, as I have demonstrated in relation to the fresh-water shells. Also the fossil marine shells will probably

give the same result. Is it not a curious fact, that in the Patagonian eocene occurs a true *Struthiolaria*, a genus not elsewhere encountered either recent or fossil but in New Zealand? All these questions can only progress when the relations of the fossil faunas of Australia and New Zealand are compared with those of South America.

ON THE ORIGIN OF THE LAND-SNAIL FAUNA OF QUEENSLAND,
AUSTRALIA.¹

BY CHARLES HEDLEY.

In a former article I dealt with the internal distribution of the mollusca of British New Guinea. A few remarks on the external relations of this fauna have since suggested themselves. Wallace's line, so conspicuous a severance among the vertebrates, appears to be quite blotted out when the distribution of animals is regarded from a molluscan standpoint. No sharp break occurs between the Malayan fauna as exemplified in Borneo or the Philippines and in New Guinea. All the characteristic Malayan forms, *Atopos*, *Xesta*, *Helicarion*, *Microcystina*, *Trochomorpha*, *Obba*, *Chloritis*, *Cochlostyla*, *Pupina* and *Diplommatina*, are common to both regions. The Solomon Islands, Fiji, Samoa, etc., appear by the light of the Papuan shells to be inhabited by an eastern extension of this Malayan fauna, which has also overflowed into Queensland.

One of the most remarkable facts yielded by an analysis of the Australian land molluscan fauna is that the operculate snails are confined to a narrow strip of land along the Queensland coast. Proceeding southward from Torres Straits, they diminish gradually till the last outpost of the invading army is reached about the Clarence River. The sole apparent exception to this rule is *Truncatella*, which spreads to Tasmania and South Australia; but as this genus is strictly littoral and evidently migrates not by land but by sea, it cannot be considered as a disturbing factor in my generalization. Contrasting the fauna of Queensland with the more typically Australian and probably archaic fauna of Tasmania, Victoria and Western Australia on the one side, and that of New Guinea on the other, it will be seen that this foreign aspect of the operculate genera *Pupina*, *Helicina* and *Diplommatina* is shared by the inoperculate

¹ From an article in Proc. Lin. Soc. N. S. Wales, Australia.

forms of *Atopos*, *Hadra*, *Chloritis* and *Pupuina*; *Atopos prismaticus* of Papua claiming affinity with *A. australis* of Queensland; *Hadra broadbenti* with *H. fraseri*; *Chloritis chloritoides* with *C. porteri*; and *Pupuina naso* with *P. macgillivrayi*. The species actually common to both regions are few; *B. macleayi* inhabits both countries, *T. annula* only finds a place in the Queensland catalogue by courtesy, while *Pupa pedicula*, *S. gracilis*, *T. ceylonica*, *T. valida*, and *Leptopoma vitreum* are widespread throughout Polynesia. From these premises it may be deduced that the Queensland mollusk fauna, though isolated sufficiently long to have lost specific identity with that of Papua, has nevertheless been derived from it.

The shallow sea of Torres Straits now severs this continent from the adjoining island. Were its bed raised but seven fathoms, the two countries would be united, while an elevation of ten fathoms would form a wide bridge between them. When the marine life east and west of Torres Straits is better known, it will be of interest to observe whether the influence of an ancient isthmus is still visible in any divergence between the fauna inhabiting the two areas.

Further to the westward, the coasts of Australia and New Guinea again converge, being separated by an arm of the Arafura Sea, which gradually shoals from a central depth of 40 fathoms and stretches for about 150 miles between Cape Wessel in the northern territory and Cape Valsche on the opposite shore of Dutch New Guinea.

In the Transactions of the Royal Society of S. Australia, Vol. v., pp. 47-56, Professor Tate enumerates the land and fresh-water mollusca of tropical S. Australia [North-central Australia] it is remarkable that whereas a third of the landshells of Papua and a sixth of the landshells of Queensland are operculate, his census includes no operculate landshells whatever. Thus at the remote date when the ancestors of the present Queensland mollusk fauna migrated from New Guinea across the ancient isthmus that I suppose to have bridged Torres Straits, the Arafura Sea appears to have still presented an impassible barrier between the two countries. The former elevation of land in this region, if uniform from east to west, may therefore be calculated at more than seven and less than forty fathoms.

HELICES COLONIZED IN HERKIMER CO., N. Y.

BY WILLIAM B. MARSHALL.

Mr. Albert Bailey recently sent me specimens of *Helix elevata*, *Helix Mitchelliana*, *Helix profunda* and *Helix exoleta* from localities in Herkimer Co., N. Y. The following notes bearing upon the occurrence of these species in Herkimer county are extracted from a letter received from Mr. Bailey:—

“I think it will be necessary for me to explain the presence of certain Helices in Herkimer Co., N. Y. Several years ago (about 20) Dr. James Lewis, of Mohawk, colonized several species from Ohio in a branch of the ravine leading from Ilion to Cedarville. The specimens sent you are the offspring of the imported species. Of *Mesodon exoleta* Binn., I have collected many specimens—in fact they have become numerous. *Mesodon Mitchelliana* is also quite plentiful. Of *Mesodon elevata* I have found only nine specimens. Of *Mesodon profunda* I have six perfect specimens and some immature. Of *Mesodon multilineata* I have not succeeded in finding any. I have had the good fortune to find one reversed or left handed *Mesodon exoleta*.”

NOTES ON UNIO CORUSCUS GOULD.

BY BERLIN H. WRIGHT.

In the Proc. of the National Museum, Vol. xv., page 419, Mr. Chas. T. Simpson, of the Smithsonian Institution, makes some notes on this species and others which he considers identical with it. He classes my beautifully rayed chestnut *U. fryanus* with the rayless, pitchy-black species, which Dr. Gould described in Proc. Bost. Soc. Nat. Hist., 1856, p. 15, as *U. coruscus*. The description says “*epidermide piceo*,” or tar-like, “*solida*,” or solid, “*transverse ovata ad dorsum lata*,” or transversely ovate and broad behind. The habitat is given as the “St. John’s River, near Beresford, Florida.” The author remarks that it might be taken for a young *U. buckleyi* Lea, but is more *solid*, less angular and *darker colored*, *stronger hinge*.

I have tried hard to find out just what shell Dr. Gould described, have compared shells with the original type and have collected over every foot of ground in the vicinity of Lake Beresford, where the types were found. The original is a *wedge-shaped*, pitchy-black, rayless and *very* solid shell and in but one particular, resembles my *handsomely rayed, oval, thinnish* shell, with a *light* chestnut epidermis. The single point of resemblance is the *naere*, which in both is brilliantly copper colored and iridescent. The type shell at Albany is truncated anteriorly, and *very* abruptly so, according to my figures which are most faithful representations of the different views of Dr. Gould's type specimen, and the dorsal margin is much more strongly arched than in any of my *U. fryanus*. I will add that my shell was not described from a small representation, but I have fully a half bushel as near alike as two pins; and I will add further that no man can find my shell in Lake Beresford or in that vicinity. Neither can it be said that they have become extinct there as no vestige of them occurs on Hontoon Island, at the entrance to Lake Beresford, where there is a perpendicular cut or embankment, fully fifteen feet high, through a mass of Unios.

True it is that *U. fryanus* can be connected by intermediate forms with *U. coruscus* Gd. So also I can just as perfectly connect Mr. Simpson's *U. subluridus*, which he has just described from Florida, with any one of a half dozen Florida species.

SLUGS INJURING COFFEE.

BY T. D. A. COCKERELL.

Mr. Walter W. Wynne, of Brokenhurst, Mandeville, Jamaica, sends me some slugs which injure his coffee trees, together with the following interesting notes: "I first noticed this pest in 1888; it was brought to my notice by seeing numbers of brown leaves on the trees, all at the ends of the primaries. I was very much afraid the leaf disease had come here; however, on examination I found the new growth was, in every case, barked, and after some search found it was done by the slug. Since the discovery I have hardly left off my 'picking gang,' which turns over the rocks and stones, dead tree-trunks, etc., where the beasts lurk in daytime; I have also put heaps of lime at the tree roots, which helps to keep them away

and at the same time does the trees good. On the whole, though, I think the best plan is to plant bananas or plantains, which I am doing, as they are the especially favorite food of the slug, and by carefully searching the bananas, etc., great numbers can be found. The people remember a plague of these slugs some twenty years ago."

Mr. Wynne has gone into the question of remedies so carefully that there is little to add from the practical standpoint. It would probably be a good plan to encircle the trees, near the ground, with a thick ring of some obnoxious substance, such as coal tar or cart-grease. This could be done quite cheaply, and the slugs would be prevented from ascending the trees.

These slugs belong to a species called *Veronicella sloanii*. They were first noticed by Sir Hans Sloane, and afterward named *sloanii* by Cuvier. I have seen a specimen, collected by Sloane, preserved in the British Museum. The typical form is white or whitish, but Mr. Wynne's specimens constitute a variety, which may be called *Veronicella sloanii* var. *coffea*. This variety is over three inches long when adult, and about an inch and a quarter broad. Above it is dark brown, obscurely mottled with darker, but beneath white, more or less tinged with yellow. The foot or sole on which it walks is very much narrower than the body.

Institute of Jamaica, Jany. 26th, 1893.

NOTES ON THE HELICES OF THE BIOLOGIA CENTRALI AMERICANA.

BY H. A. PILSBRY.

[Continued from p. 117.]

The new section, *Praticolella*, is proposed by von Martens to replace *Praticola* Str. & Pffr., preoccupied. *H. griseola* and *H. berlandieriana* are united and both are well figured. The use of the subgeneric name *Lysinöë* for the *Aglaia* and *Odontura* of previous authors, is a needed reform and was adopted some years ago by the writer. The Mexican species of *Arionta*, described a year ago by R. E. C. Stearns, is not included.

In his rehabilitation of the subgenus OXYCHONA, Dr. v. Martens neglects to state that he follows the arrangement originated by the writer three years ago, and discussed at length in the *Manual of Conchology* (2), V, p. 128.

Oddly enough, v. Martens says that "perhaps also the Brazilian *H. bifasciata* and *H. lonchostoma* may find their natural place in this subgenus." The "perhaps" might well have been omitted in view of the fact that *H. bifasciata* is the type of the group! The curious *H. sigmoides* of Morelet is placed with doubt in SOLAROPSIS.

The genus POLYGYRA is adopted in the sense in which it is understood by myself and later American writers. Two new species of *Polygyra* are described and figured.

Of the genus STROBILA an interesting form, *S. salvini* Tristr., is described and figured. It is from N. Guatemala and resembles our *S. labyrinthica*, but the umbilicus is much wider.

The part concludes with the genus LABYRINTHUS. This group will prove to be a subgenus or section only of the genus *Caracolus*, as defined by me in 1889. The anatomical characters of *Caracolus* and its sections, *Lucerna*, *Dentellaria*, etc., have been discussed in the Proc. Acad. N. S. Phila., during the past year.

NOTES UPON DR. v. IHERING'S OBSERVATIONS.

BY H. A. PILSBRY.

The paper upon New Zealand Helices by our distinguished South American correspondent calls to mind a few thoughts which may be of interest to those who have read the previous articles.

It may be stated here, although the matter of no consequence, that my two articles upon this subject were published respectively two and one month prior to the issue of the *zweiter Theil* of v. Ihering's paper¹ (the portion containing his remarks upon New Zealand forms), although there is no doubt that the latter was written before mine, in fact during 1891. Our essential agreement upon certain points is a great satisfaction to me because it is a strong recommendation of the truth of those views. Especially is this the case in the estimation made by each of us of the systematic value of the mucous pore in *Zonitidæ*, and in the reliance upon characters of the generative system for the foundation of generic groups of Pulmonates. In regard to the mucous pore the writer wrote emphatically some years ago, that it could not be a family character, and in some cases is not even generic. Should we make a new "family"

¹Zeitschr. f. Wiss. Zool., 54, drittes Heft. Ausgegeben den 4, October, 1892. Received at Philadelphia, Oct. 25, 1892.

for *Pæcilozonites*, which has the dentition, radula, etc., of *Zonites*, but *no mucous pore*? Or for *Streptostyla ligulata* because it has a tail-pore while some of the other *Streptostylas* with very similar shell and anatomy have none?

Passing over Dr. v. Ihering's limitation of the family *Helicidæ*, which I can readily prove to be untenable, I may be excused for making some mention of the new genus *Neohelix*. Several years ago, when I recognized the essential identity of *Polygyra*, *Triodopsis*, *Mesodon*, etc., I selected the first of these as a generic name for the whole, because it was the *oldest* name proposed. In common with the vast majority of modern naturalists, I recognize the *rule of PRIORITY* as absolute. Were it otherwise I could change Dr. v. Ihering's *Neohelix* to "*Paleohelix*" on the ground that he includes *H. townsendiana* Lea in it, that species being really a *Lysinoe*!¹ Or on the ground that *Neohelix* is a misnomer, for they are not "new" helices at all, but a much older, more archaic type than the genuine *Helix* of Europe! The latter, indeed, are the *new* *Helix*, being the most highly specialized of all *Helices*.

As to v. Ihering's group "*Parahelix*," formed to include "all *Helices* not *Helicidæ* or *Neohelix*," it seems to me to be an entirely unnecessary addition to nomenclature; for it would include forms in no way related to one another. The anatomy may be unknown to Dr. v. Ihering, but, as may be seen by glancing over my paper on the genera of *Helices*, it is not unknown to some others. It is as if one were to propose a "family" to include *all carnivora* not belonging to *Felidæ* or *Canidæ*.

In respect to the former wide range of *Partula*, it should be said that Oppenheim's "*Partula*" are *Buliminus*, and Heilprin's are *Bulimulus*; both groups exist in the same regions to-day. A word on the former connection of New Zealand and South America. The only elements the two faunas have in common seem to be either (1) cosmopolitan genera, all of which probably date back to the Carboniferous period, or (2) genera of like ancient origin, but which have been replaced in the Tropics and the North by the more modern types developed by the more active competition. At the same time, I offer this simply as an *opinion*, which may stand or fall. In any case, the hypothesis of Prof. Hutton and Dr. von Ihering is of great interest, and cannot fail to stimulate investigation of this most important question.

¹ v. Ihering probably meant *H. ptychophora* Brown, a *Mesodon* formerly confused with the other species.

G. W. LICHTENTHALER.

To-day the news has reached me from California, of the death in San Francisco, February 20th, of GEORGE W. LICHTENTHALER, late of Bloomington, Ill. He was an enthusiastic conchologist, and his name is well known among lovers of shells, throughout the country. Deeply interested from the start in the success of the American Association of Conchologists, he contributed largely to its special American collection. Many of the labels in that collection, especially of West Coast shells, bear his name. But not alone in public was his generosity shown. Many of our younger conchologists can testify to the practical help received from him in the early stages of their study. He was a quiet, unassuming man, and it is fitting that we should express in words the sense of loss which we all feel.

I first met him in 1878 on the Pacific Coast, where he spent the winter for many years accompanied by his wife, travelling from San Diego to Puget Sound, in search of the forms of marine life which were their special objects of study. His wife died not many years after the period of which I speak, deeply mourned, and since then he has travelled alone. I last saw him in Oakland about a year ago.—*Wm. J. Raymond.*

NOTES AND NOTICES.

ANNOUNCEMENT.—Conrad's "Fossil Shells of the Tertiary Formations of North America" will be republished as soon as 100 subscriptions can be obtained at \$3.00 each. The republication will consist of No's 1, 2, 3 and 4, of the original edition, 1832-33, and the so-called reprint of No. 3, 1835. The various changes made in the text of each of these parts in different editions will be given in full. Those desiring copies of this work should confer at once with Mr. G. D. Harris, Smithsonian Institution, Washington, D. C.

The Wagner Free Institute of Science will doubtless republish Conrad's "Medial Tertiary" under somewhat similar conditions.

HELIX NEMORALIS IN WISCONSIN.—While in Baraboo, Sauk Co., Wis., last fall, a little boy gave me a handful of *Helix* shells, that he said he picked up in the summer, while his father was plowing. They were all dead excepting one, which seemed to be of a different species and new to me. Through the kindness of Mr. Bryant Walker, I found the shell to be of the European species, *Helix nemoralis* Müller. It was so late in the fall I could not go out and

look for more specimens, but hope to be able to do so in the spring. If I succeed in finding more will report it, believing that some of the readers of the NAUTILUS would be interested in the find, from this locality.—*Nettie A. Rowley, Evansville, Wis.*

CANTHARIDUS IRIS Martyn.—It is not generally known, we believe, that the young of this handsome New Zealand shell is umbilicated; but a specimen 18 mill. in length in the collection of Mr. Shelley G. Crump shows this to be the case. The umbilicus is narrow and like that of an *Eutrochus*. The shell is evidently quite normal, and would serve quite well for a "new species" of *Eutrochus*, the periphery being sharper than in adult *C. iris*. Under a lens the surface of this specimen, as well as of some others in the Philadelphia Academy collection, is seen to be finely *pitted*, as if eroded by an *Eschara*. We say *as if*, for no trace of foreign growth is visible on the shell. It would be interesting to know the cause of this sculpturing.—*H. A. P. & C. W. J.*

DR. WM. H. DALL's second volume upon the tertiary mollusca of Florida, etc. has appeared. A full notice of the numerous important additions to our knowledge of this fauna contained therein will be given next month.

An interesting paper read by Mr. Joseph Willcox before the Delaware County Institute of Science, entitled "ON THE EVOLUTION OF THE EARTH AND THE HEAVENLY BODIES," has been published in pamphlet form. The course of cosmic and terrestrial evolution is graphically described in the light of the latest researches; it would be difficult to find elsewhere the same amount of reliable information presented in such compact and readable form.

EXCHANGES.

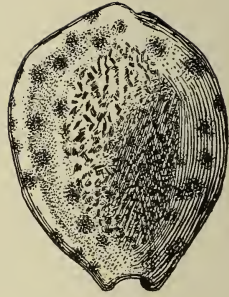
WANTED.—Fossils, especially *Trilobites*, also *Murex* and *Zonites*, any locality, and shells not in my collection. Offered—British Land and Fresh Water and U. S. Land and Fresh Water shells.—*Robert Walton, Houghton St., Roxborough, Phila., Pa.*

MARINE, Land and Fresh Water shells, fossils, minerals, to exchange for marine shells or reliable works on marine mollusca.—*Homer Squyer, Mingsville, Montana.*

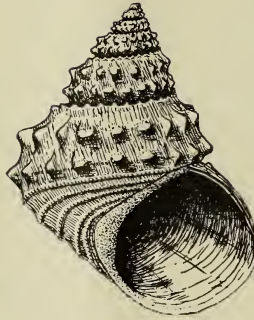
WANTED.—*Unios* and other fresh water and land shells, in exchange for those of southern Wisconsin. Please send list and receive mine.—*Nettie A. Rowley, Evansville, Wis.*



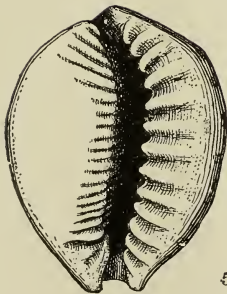
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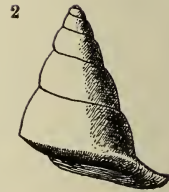
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THE NAUTILUS.

VOL. VI.

APRIL, 1893.

No. 12

ILLUSTRATIONS OF NEW SPECIES OF SHELLS.

NOTE.—In the December, January and February numbers, plate II is referred to erroneously as pl. I. All the figures of this plate are slightly magnified, being one and one-third times natural size.

Nanina (Ariophanta) Dohertyi Aldrich. Pl. II, figs. 1, 2.

This species was described in the December no., p. 90.

Bathybembyx Crumpii Pilsbry. Pl. II, fig. 3.

This species was described in the January no., p. 105, as *Calliostoma Crumpii*. In the last number of the "Journal de Conchyliologie" (Paris), Mr. Crosse proposes the name *Bathybembyx* to replace Watson's genus *Bembyx* (preoccupied). In it he places *B. æola* Watson, *B. argenteonites* Lischke, and also, with doubt, *B. alwinæ* Lischke. The last species should, I believe, be left in *Calliostoma*. The others form a natural group of very beautiful shells, characteristic of the Japanese fauna. These shells are closely allied to *Solariella*, but larger and imperforate. They seem very nearly related to Dall's subgenus *Turcicula*, differing only in the very thin (or lacking) epidermis. The species here figured is perhaps the most beautiful of the three now referred to *Bathybembyx*.

Cypræa cruenta var. **Greegori** Ford. Pl. II, figs. 4, 5.

Described on p. 112, February, 1893.

A NEW ANODONTA.

BY CHAS. T. SIMPSON.

Anodonta mearnsiana.

Shell rhomboid, compressed anteriorly, inflated posteriorly, generally smooth and shining, covered with rather sulcate growth lines, moderately solid in structure, having a thin epidermis, which is easily worn off, and varying from yellowish to olive-green in color; beaks sculptured with some half dozen undulations, which are acute posteriorly, and rounded anteriorly. The female shell exhibits a considerable degree of inflation extending from some distance back of the beaks to the posterior-ventral region, and with the male shell occasionally shows a couple of slight sulcations running from the umbones along the dorsal slope.

The upper part of the anterior curve is rather more prominent than the lower; the ventral region is sometimes slightly emarginate in the center of the females; and there are occasional slight traces of biangulation posteriorly in the shells of both sexes. Nacre a soft silvery color, inclining to a lurid brownish in the quite shallow cavity of the beaks; and near the rather straight hinge line; the brown patch or scar at the end of the nearly concealed ligament rather elongated; cicatrices rather distinct.

Mantle large, thin, not heavily bordered, brownish in the region of the fringes and anal opening, whitish elsewhere; fringes few, fleshy, and rather pointed. Branchiæ moderate, the inner slightly larger, and darker than the outer; branchial opening large, furnished with a few rather short, fleshy papillæ. Palpi elongated, pointed at the posterior, united for three-fourths of their length. Foot solid, rugose. Anal opening large, not furnished with papillæ; super-anal opening small, removed to some distance above the anal opening.

Length from anterior to posterior ends 85, breadth 45 mm.; diameter 25 mm. San Bernardino Ranch, Mexican Boundary Line, Arizona.

A large number of shells and a few specimens preserved in alcohol were sent some time ago to the U. S. National Museum by Messrs. Mearns and Holzner of the International Boundary Commission. Externally the shell closely resembles certain forms of *Unio complanatus*, but it is in general a smoother species, and has a more delicate texture. Much as it differs from the ordinary *Anodonta*

angulata I believe that species to be its nearest ally; the two forming a group peculiar to the Pacific drainage of the United States, and quite distinct from *Anodonta wahlametensis*, *californiensis*, *nuttalli*, *oregonensis*, *kennerlyi*, and *youkonensis*, which undoubtedly group with *Anodonta cygnea*, and which may have descended from that protean species, and reached North America by way of a former land passage in the neighborhood of Bering Strait. A dorsal view reveals a striking resemblance between the present species and *Anodonta angulata*; both have the area of greatest inflation about one-third the length of the shell from the posterior point, from which they gradually narrow to near the anterior end, where they become more rapidly compressed to the point, the beak sculpture is similar; the general outline of the shells is much alike, and there is quite a strong resemblance in the texture and the nacre. *Anodonta angulata* in the Museum collection (Mus. no. 104,165) from Northern California, shows a remarkable fading out of the peculiar keel common to that species, and another specimen (no. 104,166) from Los Angeles shows still less of this character, and in a photograph taken by Mr. Hemp-hill from a specimen in his collection it is wanting altogether, while the two sulcations on the posterior slope show quite plainly.

At the same time, the species under consideration differs sufficiently from *Anodonta angulata* in texture, and the form of the inflation of the posterior region in the female to separate it at once specifically from that form.¹ This new species will be figured when the large amount of land and fresh-water material from the western United States collected by the Biological Survey of the Agricultural Department is worked out, and the results published.

THE SHELL-BEARING MOLLUSCA OF MICHIGAN.

BY BRYANT WALKER, DETROIT, MICH.²

Aplexa sp. A small species about the size of Lea's *Physa hor-ducea* and apparently related to it, was found in a small lake lying between Torch Lake and Grand Traverse Bay in Antrim County.

¹ So far as I know no description of the soft parts of *Anodonta angulata* has ever been published.

² The following portion of Mr. Walker's paper should have appeared in the August NAUTILUS.

It is quite different from any other species found in the State, but in present chaotic condition of the synonymy of this genus it does not seem advisable to run any risk of duplicating some previous description.

Planorbis lentus Say. Cited by Miles, who probably had a large form of *trivolis* before him.

P. trivolis Say. Abundant everywhere. *P. corpulentus* Say and *regularis* Lea usually referred to this species are cited as distinct by DeCamp. The latter is doubtfully cited by Currier.

Specimens exhibiting the distorted appearance caused by a change of plane in the growth of the whorls as described by Ingersoll in his *P. plexata* occur not infrequently in some localities.

P. truncatus Miles. This peculiar and well marked form appears to be confined to Michigan. Described originally from specimens collected from Saginaw Bay, it seems to have escaped further notice until 1887, when it was discovered in the Elk river, Antrim County. These specimens are quite typical and not only confirm the validity of the species, but extend its range across the entire northern part of the State.

P. bicarinatus Say. Common everywhere.

P. bicarinatus corrugatus Currier. Perch Lake, Kent County. A well marked form characterized by its costate surface. Specimens from Long Lake, Grand Traverse County, exhibit the same tendency but not to the extent shown by the shells from the original locality.

P. bicarinatus major. Specimens from Crystal Lake, Benzie County, from their perfection and size are worthy of being separately noticed. They are larger, pinkish-white in color, with the carinæ on both surfaces elevated into a keel which is white. The superior carina extends to the lip and modifies the shape of the aperture, which is a more or less expanded and darker in color within. The outer lip is somewhat thickened and white.

P. multivolis Case. The rediscovery of this long lost species by Dr. M. L. Leach, in Marl Lake, Roscommon County, has been recorded in the Journal of Conchology, V, p. 330. The hump on the last whorl opposite the aperture as figured in Land and Fresh-Water Shells pt. II, fig. 186, is not a characteristic of the normal shell, as but a small percentage of several hundred specimens exhibit any tendency toward it. When it does occur, it bears the appearance of being an abnormal extension of the last whorl being

more or less irregular in form, and usually deflected from the plane of the rest of the whorls.

P. campanulatus Say. Common everywhere. An occasional specimen has a hump on the last whorl opposite the aperture as described by Case in *P. multivolvis*.

P. campanulatus minor Currier. Distinguished only by its smaller size. Perch Lake, Kent County.

P. albus Mull. Commonly distributed over the State.

P. exacutus Say. This species which is found in all parts of the State, varies considerably in size and color.

P. deflectus Say. While not a common species, it undoubtedly ranges over the whole State.

P. parvus Say. Common everywhere and varies considerably under local influences.

P. costatus DeTar and Beecher. A minute costate form said to be from the neighborhood of Ann Arbor. I know nothing of it.

Segmentina armigera Say. Common everywhere.

S. wheatleyi Lea. (?) Found in great abundance several years in the suburbs of Detroit. Has not been noticed elsewhere in the State. This form if not Lea's *Wheatleyi* is easily separated from the typical *S. armigera* by its thickened lip, which decidedly contracts the aperture.

Ancylus fuscus Ad. Although cited in all the catalogues from that of Miles down, this species does not seem very common. Belle Isle, in the Detroit river is the only locality where I have found it.

A. rivularis Say. Cited by DeCamp.

A. parallelus Hald. Northern part of the State.

A. diaphanus Hald. River Rouge, Wayne County. Also cited by DeCamp.

A. tardus Say. The most common species we have, judging from my own experience.

Valvata tricarinata Say. Common everywhere. The forms *bicarinata* Lea, *unicarinata* DeKay and *simplex* Gld. are cited as distinct by DeCamp.

V. sincera Say. Very abundant in favorable localities all over the state. The form known as *striata* Lewis, or *Lewisi* Currier, distinguished by its coarser striæ and larger size, is cited as distinct by

Currier and DeCamp; the latter, however, now considers it a strongly marked form of *V. sincera*. *V. humeralis* as cited by Miles, is undoubtedly a form of this species.

Lyogyrus pupoidea Gld. Cited by DeCamp.

Vivipara contectoides W. G. Binney. The only reference to the occurrence of this species in Michigan, that I know of, is that made by Binney (Land and Fresh-Water shells II, p. 24). It does not appear to have been found by any of our local collectors and must be considered a very doubtful member of our fauna.

Campeloma ponderosa Say. Cited by Sager, Miles and Currier, but does not appear in any of the later lists and must be considered a doubtful species in Michigan. "I have never seen it from this state as I found it in Alabama. It is not a northern species." W. H. DeCamp.

C. decisa Say. Common and variable. Sinistral specimens are cited by DeCamp as var. *heterostropha* DeKay.

C. decisa flava Currier Mss. Specimens from Long Lake, Grand Traverse County are so named by Mr. Pilsbry. A very beautiful form of this common species.

C. decisa melanostoma Currier Mss. A small form from Grattan, Michigan, was sent to me under this name by Mr. Streng.

C. integra Say. Common everywhere.

C. rufa Hald. Generally distributed over the State, but not as common as *C. integra* and *decisa*.

C. gibba Currier. I know nothing of this form beyond the description by Currier and Dr. Jas. Lewis' critical remarks thereon in the American Journal of Conchology (III, p. 112 and IV, p. 81.)

C. Milesii Lea. Originally described from Antrim County. The reference of specimens from the Detroit river to this form has been approved by Mr. Pilsbry.

C. obesa Lewis. Quite common throughout the State and frequently of large size.

C. subsolida Anth. Cited by DeCamp. Specimens from the Boardman river, Grand Traverse County, identified as this specimen by Prof. R. E. Call are referred to *decisa* by Tryon and Pilsbry.

Lioplax subcarinata Say. Dr. Leach informs me that a single specimen from Higgins Lake, Roscommon County, was referred to this species by Mr. Tryon.

Bythinia tentaculata L. The recent discovery of this species at Holland, Michigan, by Dr. DeCamp was noticed in the NAUTILUS for October, 1891. I am indebted to him for specimens.

Somatogyrus isogonus Say. Cited by Miles and Currier. Stimpson's anatomical studies of this species for his "Researches upon the Hydrobiinæ" were made from Michigan specimens. (Loc. cit., p. 22). DeCamp cited it in his catalogue on Currier's authority but writes: "I do not believe that it exists in this State. Have for many years examined the ground where Currier said he found the specimens sent Stimpson, but have never found anything but young of *Campeloma decisa*."

Ammicola porata Say. Common all over the State. *A. pallida* Hald. and *limosa* Say, which are cited in different lists as distinct, are now I believe generally considered forms of this species.

A. cincinnatiensis Anth. Not as common as the preceding specimens, but ranges over the whole State.

A. decisa Hald. Cited by DeCamp.

A. grana Say. Common in the southern part of the State.

A. lustrica Pils. Common and somewhat variable. The late Dr. James Lewis, many years ago, characterized specimens from the Huron river at Ann Arbor as "largest I have ever seen."

Bythinella attenuata Hald. Cited by DeCamp, to whom I am indebted for specimens from Grand Rapids.

B. tenuipes Coup. Cited by DeCamp, who writes me: "I sent living specimens to Tryon and he sanctions their identity."

B. Binneyi Tryon. Cited by DeCamp.

B. Nicklinana Lea. Cited by DeCamp.

B. obtusa Lea. River Rouge, Wayne County. Also cited by DeCamp from Kent County.

Pomatiopsis lapidaria Say. Common in the southern part of the State.

P. cincinnatiensis Lea. Cited by Beecher in the list of Ann Arbor shells. I have received specimens from Petersburg, Monroe County collected by Mr. Jerome Trombly.

Pleurocera subulare Lea. Southern part of the State. Common.

P. subulare intensum Anth. Collected by Dr. Leach in Mono Lake, Muskegon. Cited also by DeCamp.

P. neglectum Anth. Cited by Miles and DeCamp. Mr. Streng has kindly sent me specimens from Grand River, Kent County.

P. elevatum Say. Grand River, Michigan, received from Mr. Streng.

P. labiatum Lea. Cited by DeCamp.

B. pallidum Lea. Cited by DeCamp.

Goniobasis livescens Mke. Very common and considerably subject to local variation.

G. livescens cuspidatus Anth. This form occurs abundantly in the Maple River, Clinton County, where it was collected by Dr. Leach. Cited by DeCamp from Kent County, and collected by Streng at Berlin, Ottawa County.

Goniobasis Milesii Lea. Huron River, Ann Arbor, Michigan. This form originally described from Tuscola County specimens, is probably a local variety of the preceding species.

G. translucens Anth. Grand River, Kent County, collected by DeCamp. It is doubtful whether this species is more than a banded variety of *G. livescens* Mke.

G. brevispira Anth. Collected at Mono Lake, Muskegon by Dr. DeCamp and identified by Pilsbry.

G. pulchella Anth. Cited by Miles and DeCamp.

G. gracilior Anth. Cited by DeCamp from Round Lake, Peto-sky, Michigan.

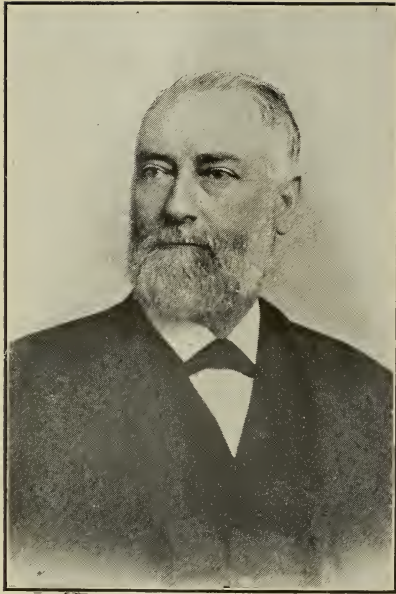
G. Niagarensis Lea. Cited by Miles.

G. Virginica Gml. Cited by Sager and Miles. Clearly an error as the species does not occur west of the Alleghanies. As *P. subulare* is not given in either of these lists, it seems probable that that is the species referred to.

Unio alatus Say. Southern part of the State. Muskegon is the most northern locality known to me. Specimens from the Detroit river are but half the size of those from the Rouge river, one of its tributaries in Wayne County. The same dwarfing effect of the colder water of the Detroit river is noticeable in nearly all of the species found there.

ADDENDA.

On page 66, line 14, for *S. partumeium* Prime, substitute *S. Jayan-um* Prime, and add the following:



GEORGE W. LICHTENTHALER.

S. partumeium Say. Very abundant everywhere and quite variable.

GEORGE W. LICHTENTHALER.

BY MORTON J. ELROD, ILLINOIS WESLEYAN UNIVERSITY.

The familiar face of George W. Lichtenthaler, one of the best known of American conchologists, and one of the most earnest and energetic collectors of natural history specimens, will be seen no more. He passed away at San Francisco on Tuesday, February 20th., death being caused by fatty degeneration of the heart. He was 60 years of age.

Mr. Lichtenthaler was born in Pennsylvania, and came to Bloomington, Ill., at the age of twenty-two. For five years he was a drug clerk, then bought out the stock, conducted business for himself for seventeen years, after which he retired with a snug fortune. During this time he imbibed a taste for natural history, and after his retirement devoted his entire time and the proceeds of his large estate to the gathering and collecting of shells, ferns, and algæ. Mrs. Lichtenthaler died nine years ago, leaving no children. After her death Mr. Lichtenthaler turned his mind more than ever to his chosen work. His wife's death was a great blow to him, and he was no doubt greatly moved to collecting to forget his sorrow. His affection for her is shown in his desire that the vast collection should be given a name that would incorporate the name of "Rebecca S. Lichtenthaler."

Mr. Lichtenthaler was an amateur collector, never having sold specimens, or labored for hire. It was a labor of love. If he could not exchange he would give of his duplicates to those who would make use of them. Many people of this community treasure collections from distant climes given by him, and many a lad with a love for nature has had this love fanned into a flame through his encouragement, and has gone from the presence of this great-hearted man not only with a greater love for nature's works, but with a liberal gift of shells or other specimens carefully preserved. Many a case has he recounted to me, sitting by my fireside, of boys he has helped to knowledge and position, by pointing the way and lending substantial aid.

Had he desired, he might have been famous as a traveler, by putting his observations in print. But he disliked and shunned publicity, and we know of nothing he has written. He was one of those workers who cared little for making new genera or species, and who collected not wholly for himself, but also for his fellow workers, and for public museums. In his travels he has been in nearly every country in the world, has been several times along the entire west American coast, was at home in the Sandwich Islands, has traversed the coast of Europe from North Cape to Gibraltar, and has been up and down both coasts of Africa, as well as around the Indian Ocean. In these travels many of the rarest species known to science were brought together, and are left among his great collection.

He was one of the early members of the "American Association of Conchologists," being enrolled as a member, May 15th, 1890. His special study was shells of the Pacific Coast. He was an active and enthusiastic member, and did much toward its promotion. His gift of Pacific Coast shells to the collection of the Association was a large and valuable addition.

Few men have as wide a personal acquaintance with men of science as he had. Devoting all his energy and time to travel and collecting, and having been all over the American continent, he met them everywhere. His retiring disposition led him to make little mention of his achievements and his great work was not known to many of the people of his home. But to a few of his friends and acquaintance who could appreciate his work he unburdened his heart, and would recount his travels and experiences, and give descriptions of museums and countries for hours at a time. He was an interesting conversationalist, and would relate his experiences in a manner that always commanded attention.

His main work was in conchology. His collection embraces many highly polished specimens, and he spared no expense to have always the finest and best that was to be had. While on a trip to France a few years ago he heard of an English firm who cut gastropods longitudinally to show their spiral arrangement, and he has case after case of shells of this exquisite workmanship. All his specimens are authoritatively correct, having been labelled by the highest authorities, and we are glad to announce to the conchologists of the middle and western United States that he has left the collection where it will be accessible to the public for comparisons.

His collection embraces shells, crustaceans, echinoderms, corallines, corals, fossil shells and plants, minerals, ferns, and marine algæ. There are six to eight thousand species of shells, and at a low estimate twenty-five thousand specimens, from all parts of the world. There are eight hundred species of marine algæ, and four hundred species of ferns. The latter include a nearly complete collection of the ferns of North America, a complete collection from the Hawaiian Islands; also many from India, China, Japan, Australia, New Zealand, South America, Europe, etc. He stated that he had two species not in any other collection.

This vast and valuable collection he leaves without reserve to the Illinois Wesleyan University, in Bloomington, where his life has been spent, where his bride was wedded and laid to rest; and here his many friends will be permitted to again look through it, but without his guiding hand and eloquent description. This gives the Illinois Wesleyan University his life work, and endows it with one of the finest conchological collections in the West. It will be known as the "George W. and Rebecca S. Lichtenthaler Collection," and will enshrine their names not only in the hearts of their friends, but also in the hearts of many students who will receive inspiration from his work, as many have done from his life.

NOTES AND NOTICES.

CORRECTION.—In the February No. the date of Mr. Martindale's death was by error given as Jan. 10, instead of Tuesday Jan. 3d.—*P. N.*

PROF. B. SHIMEK, of the State University of Iowa, is collecting invertebrates and cryptogamous plants in the interests of that institution in Nicaragua.

CONRAD'S MEDIAL TERTIARY.—The Wagner Free Institute of Science of Philadelphia, Pa. proposes to reprint the book on The Medial Tertiary Fossils of the United States by T. A. Conrad, if 150 subscriptions can be obtained at \$3.50. For circular apply to the Institute.

UNIO CORUSCUS, SUBLURIDUS, etc.—In looking over Mr. Berlin H. Wright's "Notes on *Unio coruscus* Gould," in the March NAUTILUS I see that he acknowledges that his *U. fryanus* can be con-

nected by intermediate forms with *U. coruscus*; and he states that he can as perfectly connect my *U. subbluridus* with any one of a half dozen Florida species. Not long ago Mr. Wright sent me for inspection the shells he identified as *subbluridus*, and I saw at once that he had made a total mistake as to the species; as these specimens were undoubtedly *U. buckleyi*, quite inflated, somewhat keeled, and rather smooth, shining shells, and no more like my species than is *U. obesus*. Individuals of *Unio buckleyi*, *coruscus*, *lugubris*, *hazelhurstianus*, and other species of the *buckleyi* group vary from being absolutely smooth and rayed, a young or adult stage generally to dull colored, and even rough externally, a condition quite common in old specimens.—*Chas. T. Simpson.*

COLLECTION OF SHELLS FOR SALE.—We learn that the collection of Rev. A. Dean, numbering about 3500 species, is offered for sale, as Mr. Dean is about to remove from his home at Muncy, Pa. The American land shells are richly represented by a nearly complete series, including almost all of the rarer species. The west African and Sandwich Island forms are also well represented, as well as an unusually large proportion of interesting foreign marine shells.

We are in receipt of "The Microscopical Bulletin" published by Queen & Co., which contains a Bargain list or Clearance sale of microscopes, objectives, etc. Any one desiring these should send for the February Bulletin to Queen & Co., Chestnut St., Philadelphia.

MR. B. B. WOODWARD has lately published (*Ann. Mag. Nat. Hist.* Feb., 1893) a classification of the *Pelecypoda*, in which the families of bivalves as given by Fischer are rearranged in accordance with Pelseneer's scheme founded on the morphology of the gills. The table of families is very useful as it gives the gist of Pelseneer's ideas at a glance. In his review of the various recent classifications Mr. Woodward does not mention that of DALL, being apparently ignorant of it. It is much to be regretted that those who set forth new classifications should not first acquaint themselves with the work of their predecessors.

UNIVERSITY OF ILLINOIS-URBANA

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