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## CYPRAEIDAE FROM CHRISTMAS, PALMYRA, WASHINGTON, AND FANNING ISLANDS

BY WILLIAM MARCUS INGRAM  
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Christmas, Palmyra, Washington, and Fanning Islands are situated in the north equatorial region of the Pacific Ocean. This short chain of atolls has a northwest-southeast trend and is somewhat parallel with the Hawaiian group, but about one thousand miles south of the latter and in close proximity to the equator.

Of the four islands Christmas is the most eastern and also nearest the equator, being  $1^{\circ} 57' N.$  Lat. and  $157^{\circ} 27' W.$  Long. Palmyra is the most northern and western with a position of  $5^{\circ} 49' 4'' N.$  Lat. and approximately  $162^{\circ} 11' 30'' W.$  Long. Fanning Island lies about 145 miles northwest of Christmas Island in latitude  $30^{\circ} 51' 25''$ , and 66 miles northwest of Fanning is Washington Island with Palmyra 126 miles to the northwest of it.

Very little information regarding this group of islands was available until recent times, and it has only been within the past few years that efforts have been made to carry out comprehensive scientific investigations of these typical mid-Pacific atolls.

The earliest contribution to the biology of the islands of this group was made in 1877 by Dr. Thomas H. Streets and Dr. William H. Jones, surgeons in the United States Navy. Their systematic report is based on material collected during a survey of the islands of the North Pacific by the United States ship *Portsmouth* in 1873-74.<sup>1</sup> It records 13 species of plants, 13 of birds, 36 of fishes, and 10 of crustaceans collected at Christmas, Palmyra,

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<sup>1</sup> Streets, Thomas H., *Contributions to the Natural History of the Hawaiian and Fanning Islands and Lower California*, Bull. U. S. Nat. Mus., No. 7, 1877.

Washington, and Fanning Islands. That a larger collection of invertebrate fauna was made at this time is indicated by Dr. Streets when he says, "Excepting the crustaceans, the invertebrate portion of the collection is excluded from this bulletin" (footnote, p. 7).

The purpose of this paper is to record cowries from the waters about these islands, and to supplement and extend knowledge of the distribution of the family Cypraeidae in the Pacific. The records are based on specimens collected in 1924 by the *Whippoorwill* expedition from the Bernice P. Bishop Museum, Honolulu, Hawaii, and upon specimens from Palmyra in the author's collection.

A total of twenty-six species is represented. Of this number all but six have also been reported from Hawaii.<sup>2</sup> Apparently the most common species of cowries from these islands are *Cypraea moneta* Linnaeus, *Cypraea intermedia* Kiener, and *Cypraea caput-serpentis*, Linnaeus.

*Cypraea annulus* Linnaeus. Syst. Nat., p. 1179, 1767.

*Cypraea arenosa* Gray. Zool. Jour., i. p. 147, pl. 7, 12, f. 6, 1824.

*Cypraea caput-serpentis* Linnaeus. Syst. Nat., p. 1175, 1767.

*Cypraea carneola* Linnaeus. Syst. Nat., p. 1174, 1767. The specimens in the collections are uniformly small. This may be a racial character.

*Cypraea childreni* Gray. Zool. Journal, vol. i, p. 518, 1824.

*Cypraea cicercula* Linnaeus. Syst. Nat., p. 1181, 1767.

*Cypraea cruenta* Gmelin. Syst. Nat., p. 3420, 1790.

*Cypraea erosa* Linnaeus. Syst. Nat., p. 1179, 1767. The shells of this species are of good size, and much lighter in the dorsal coloration than shells from nearby Samoa and Fiji.

*Cypraea fimbriata* Gmelin. Syst. Nat., p. 3420, 1790.

*Cypraea helvola* Linnaeus. Syst. Nat., p. 1180, 1767. This common and widely distributed Indo-Pacific species varies geographically in the intensity of its dorsal and ventral colorations. The variety from these islands is characterized by its deep orange base and margins.

*Cypraea intermedia* Gray. Zool. Jour., i, p. 77, 1824.

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<sup>2</sup> Ingram, William M., *The Family Cypraeidae in the Hawaiian Islands*, NAUTILUS, Jan., 1937.

*Cypraea irrorata* Solander. Zool. Jour., iv, p. 80, 1828.

*Cypraea isabella* Linnaeus. Syst. Nat., p. 1177, 1767. This species is not uncommon. The dorsal surface is very light, and in most cases the characteristic black flecks on the dorsal surface are much reduced and light brown in color. The extremities are deep orange.

*Cypraea lynx* Linnaeus. Syst. Nat., p. 1176, 1767.

*Cypraea mauritiana* Linnaeus. Syst. Nat., 1176, 1767.

*Cypraea moneta* Linnaeus. Syst. Nat., p. 1178, 1767.

*Cypraea nucleus* Linnaeus. Syst. Nat., p. 1181, 1767.

*Cypraea poraria* Linnaeus. Syst. Nat., p. 1180, 1767.

*Cypraea punctulata* Gmelin. Syst. Nat., p. 3404, 1790.

*Cypraea reticulata* Martyn. Universal Conch., pl. 15, 1782.

*Cypraea scurra* Chemnitz. Conch., vol. x, pl. 144, p. 103, f. 1338, 1788.

*Cypraea talpa* Linnaeus. Syst. Nat., p. 1174, 1767.

*Cypraea testudinaria* Linnaeus. Syst. Nat., p. 1173, 1767.

*Cypraea tigris* Linnaeus. Syst. Nat., p. 1176, 1767. The shells from these islands are small compared with the large, heavy shells from Tongatabu.

*Cypraea vitellus* Linnaeus. Syst. Nat., p. 1176, 1767.

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## A NEW WEST AMERICAN CONE

BY PAUL BARTSCH

CONUS SIGNÆ, new species. Plate 2, figure 8.

1849. *Conus cumingi* Reeve, Conch. Icon. Suppl. pl. 8, f. 277. Not *Conus cumingi* Reeve, *ibid.*, suppl. pl. 3, f. 282.

Shell biconic, with the spire very depressed and concave. The spire is brownish orange, blotched and variegated with white, while the body whorl is roseate with brownish suffusions and streaks of flesh color or white. A faint median pale zone is present. Nuclear whorls questionable. The shoulder of the whorls with a rounded thread at the periphery, crossed by rather strong, protractively curved lines of growth and numerous, very fine spiral lirations. The last whorl bears 20 or more slender spiral threads, which grow successively weaker from the base posteriorly. The entire surface of the shell is marked by fine lines of growth and slender spiral lirations, with much finer, very wavy spiral striations, which give to the surface a beautiful silky texture; interior white with a rosy flush.

The specimen described and figured, U.S.N.M. Cat. No. 37399, comes from Guaymas, and measures: Length 58 mm.; diameter 30.5 mm.

Another specimen, U.S.N.M. Cat. No. 23698, an even larger specimen, measuring: Length 65.5 mm.; diameter 38 mm., also comes from Guaymas.

U.S.N.M. Cat. No. 111235 contains six tips from Panama; U.S.N.M. Cat. No. 96782, four tips from the U. S. Bureau of Fisheries Station 2837, off Cedros Island, 23 fathoms, on fine sand bottom, is believed to belong here.

As my references cite, Reeve created a homonym of *Conus cumingi* when he bestowed that name upon the specimen from Salango "West Colombia." Specimens from the Gulf of California and off the coast of Lower California seem to satisfy Reeve's second description and figure, but it is possible that the Colombian form may be distinct. I am therefore describing the Lower Californian material as a distinct species with which Reeve's homonym will probably prove to be conspecific.

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## NOTES ON WEST COAST EPITONIIDAE

BY A. M. STRONG

The writer had occasion recently to study a number of specimens of *Epitoniidae* from Vancouver Island, British Columbia, and in connection with this work it was found that changes will have to be made in the nomenclature of some west coast species. Dall in his "Summary of the Marine Shellbearing Mollusks of the Northwest Coast of America"<sup>1</sup> included two species under the subgenus *Opalia* H. & A. Adams, 1853, namely *O. wroblewskii* Mörch, 1876, and *O. evicta* De Boury, 1919.

The name *S. wroblewskii* was suggested by Mörch for the shell which had previously gone under the name *Scalaria borealis* Gould, 1852, that name having been preoccupied by Beck in 1839. Grant has called attention<sup>2</sup> to the fact that Tapparone-Canefri had also suggested<sup>3</sup> the name *gouldi* for this shell in a paper dated

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<sup>1</sup> Bull. 112, U. S. Nat. Mus., 1921, p. 113.

<sup>2</sup> Bull. Geol. Soc. Am., No. 43, 1932, p. 1064.

<sup>3</sup> Jour. de Conch., vol. 24, 1876, p. 154.



April 1, 1876 (not 1874 as stated). The paper by Mörch to which Dall and Grant refer<sup>4</sup> was also dated 1876. Dr. Pilsbry in a recent letter states that the date on which the publication containing the Mörch paper was issued is not definitely known but that Mörch first suggested the new name in a Danish paper<sup>5</sup> presented in 1874 and published early in 1875. It therefore appears that the name *wroblewskii* has clear priority though the date and reference will have to be corrected.

*OPALIA WROBLEWSKII* (Pl. 2, fig. 10) is a northern shell not uncommon at Vancouver Island and on the Alaskan coast. In immature specimens there are 8 to 10 strong varices, a strong basal keel and a distinct basal disk. Fully mature specimens, which reach a length of 35 mm. or more, have the lower whorls nearly smooth, with the basal keel faint and the base rounded. Examination of a series of specimens from Forrester Island, Alaska, in the Willett collection, one of which is figured, show that a varying number of the upper whorls have a chalky outer layer which in the interspaces between the varices shows regular rows of microscopic punctations. This layer is rubbed off in beach-worn specimens and on the later whorls of the adult shell.

*OPALIA CHACEI*, n. sp. (pl. 2, fig. 9). Closely related to the preceding species, and in some collections confused with it, is a more southern shell which is somewhat smaller, heavier, and proportionately broader. The eight heavy varices continue over the body whorl to the well-defined basal disk at all stages of growth, and the punctation of the outer layer of the shell is distinct in well preserved specimens. This may take the name of *Opalia chacei*. The type, No. 1045, in the collection of the Los Angeles Museum, Los Angeles, California, was collected by E. P. and E. M. Chace at Crescent City, California. It measures: length 28.3, maximum diameter 11.1 mm. Additional specimens were collected by Mr. and Mrs. Chace at Crescent City and on the coast of Mendocino County, California. The writer has collected specimens at Half Moon Bay, near San Francisco, and Mr. George Willett has dredged a specimen off Catalina Island.

<sup>4</sup> Jour. Acad. Nat. Sci., Phila., ser. 3, vol. 8, 1876, p. 190.

<sup>5</sup> Videnskabelige Meddelelser fra den nat. i Kjobenhavn, Aaret 1874, 1875, p. 251.

The type of *Opalia* is given by De Boury<sup>6</sup> as *Scala australis* Lamarck, Recent, Australia, and is well figured by Reeve.<sup>7</sup> It is quite similar to *O. chacei*, having similar heavy varices and basal disk bounded by a cord. An examination of a fresh specimen in the collection of H. N. Lowe shows definite indications of a similar punctate outer layer on the upper whorls. It would seem that this punctate outer layer should be considered one of the important systematic characters.

OPALIA EVICTA De Boury, 1919<sup>8</sup> (Pl. 2, fig. 11, Forrester Island, Alaska, Willett coll.), is a new name for a shell referred to as *Scalaria pleurocostata* Carpenter by Stearns, Berry and Dall in his earlier writings. Specimens were undoubtedly so labeled by Carpenter, but do not seem to have ever been described by him. Dall attempted to validate the name in 1917<sup>9</sup> by a description but the name was preoccupied by De Boury in 1913. The shell is quite similar to *O. chacei* but only about half as large, with the first few whorls rapidly expanding and the later whorls more cylindrical, giving a more crowded appearance to the 8 or 10 strong varices. The punctate surface of the outer layer of the shell is very distinct in fresh specimens. The specimens examined came from Forrester Island, Alaska; Vancouver Island, British Columbia, and off Catalina Island, California.

OPALIA MONTEREYENSIS (Dall), Pl. 2, fig. 12, described as *Cirsotrema montereyensis* Dall,<sup>10</sup> was described from a single specimen, "probably young," of five whorls, measuring 2.5 mm. in length. It has the punctate surface, 9 solid varices and a conspicuous basal disk. The writer has a specimen dredged off Catalina Island which is very similar but with one more whorl and proportionally larger. It seems certain that this is the young of some species of *Opalia* and the only known species having similar apical whorls is *O. evicta*. In the absence of a satisfactory growth series it is impossible to make a positive statement but if this supposition is correct the name *O. evicta* De Boury, 1919, will have

<sup>6</sup> Monog. Scalidae Viv. Fos., pt. 1, 1886, p. 26.

<sup>7</sup> Reeve, Conch. Icon., vol. 19, pl. 1, fig. 3.

<sup>8</sup> Jour. de Conch., vol. 64, 1919, p. 26.

<sup>9</sup> Proc. U. S. Nat. Mus., vol. 53, 1917, p. 473.

<sup>10</sup> NAUTILUS, vol. 20, 1907, p. 28.

to give way to *O. montereyensis* (Dall), 1907. The type, 110431 U.S.N.M., from off Del Monte, Cal., in 25 fms., is figured,  $\times 10$ . The type of *Cirsotrema* is given by De Boury as *Scala varicosa* Lamareck, which is quite different from typical *Opalia*, to which this shell belongs.

Dall placed four West Coast species in the subgenus *Nodiscala* De Boury<sup>11</sup> and several species have since been added to the list.<sup>12</sup> These all have the punctate surface and the basal disk but the varices are faint over the whorls, expanding to form cusps crenulating or pitting the sutures. The type of the subgenus *Nodiscala* is *Scala bicarinata* Sowerby according to De Boury. It is figured by Reeve<sup>13</sup> as a recent shell from the Philippines. The description calls for a shell sculptured with obscure axial ribs and spiral grooves, the sutures pitted and the body whorl with two heavy spiral ridges. It would seem probable that the West Coast species are more nearly related to typical *Opalia* than to this species.

*OPALIA TREMPERI* Bartsch<sup>14</sup> is described as having faint axial ribs forming cusps in the sutures. "The entire surface of the spire is marked by narrow spiral cords. The spaces which separate these cords are crossed by numerous, very slender, axial threads which give them a decidedly pitted appearance." The figure shows the characteristic punctate surface though the punctations are larger than in the species previously mentioned. There is no indication of a basal disk or peripheral cord. As far as is known this species is represented in the collections only by the type specimen. It is not typical of *Opalia* nor does it agree in all ways with the species which have been placed in the subgenus *Nodiscala*.

The use of *Opalia* as a genus under which can be grouped the species mentioned and probably a few other West Coast forms would give a more satisfactory arrangement than that used by Dall. This would make necessary a few changes in the writer's "Key to the Subgenera of West Coast Epitoniidae,"<sup>15</sup> but as

<sup>11</sup> Proc. U. S. Nat. Mus., vol. 53, 1917, p. 474.

<sup>12</sup> Proc. Calif. Acad. Sci., 4th ser., vol. 19, No. 5, 1930, pp. 43, 46.

<sup>13</sup> Reeve, Conch. Icon., vol. 19, pl. 8, fig. 60.

<sup>14</sup> Proc. U. S. Nat. Mus., vol. 70, 1927, p. 3, pl. 1, fig. 8.

<sup>15</sup> Proc. Calif. Acad. Sci., 4th ser., vol. 19, No. 5, 1930, p. 42.

many unfigured species remain to be investigated it is not attempted to do so at this time. Acknowledgment is made to Mr. George Willett of the Los Angeles Museum for the use of specimens, assistance in securing photographs and in the preparation of these notes.

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## THE FAUNA OF THE "CHAMPLAIN SEA" OF VERMONT

BY B. F. HOWELL  
Princeton University

AND

HORACE G. RICHARDS  
New Jersey State Museum

The Pleistocene "Champlain Sea" has long been recognized in Vermont, and scattered references to its fauna can be found throughout the literature. Goldring,<sup>1</sup> discussing the mollusks of this sea in New York State, gives numerous references to Vermont localities.

During several brief field trips in the summers of 1933, 1934, and 1935, it was possible to visit most of the known Pleistocene fossil localities in the State of Vermont and to obtain material from them; in addition, numerous new localities were discovered and their fauna studied. Furthermore, fossils from the Pleistocene of Vermont were examined in the Museum at the University of Vermont in Burlington, and were borrowed from the Vermont Historical Society at Montpelier.<sup>2</sup>

Deposits of the "Champlain Sea" are thought to be of late-Wisconsin age, and extend throughout the entire St. Lawrence Valley from the Gulf almost to Lake Ontario (Prescott, Ont.), as well as along various tributaries of the St. Lawrence, and southward into Lake Champlain. The extent of this sea has been well mapped by Goldring. In Vermont, fossil shells have been found as far south as Chimney Point.

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<sup>1</sup> Goldring, Winifred: *The Champlain Sea*, N. Y. State Mus. Bull. 239-40, pp. 53-94 (1922).

<sup>2</sup> These studies were made possible by funds from the Department of Geology of Princeton University and the Carnegie Institution of Washington.

Fossils can be found at a great many places near the shores of Lake Champlain from Chimney Point to the Canadian border. An accurate list of localities would be of little use because most of these localities were of a temporary nature, and new material could easily be obtained from shallow excavations in the same vicinity.

Fossils were collected near Alburgh, Isle La Motte, S. Hero, Grand Isle, Swanton, St. Albans, Colchester, Winooski, Malletts Bay, Charlotte, Vergennes, Panton, and Chimney Point. Those from the southern part of the lake suggest more brackish waters and at Chimney Point only *Macoma balthica* (L.) and *Leda glacialis* Wood were found.

Probably the best collecting localities were a small clay pit about a mile and a half west of St. Albans on the road to St. Albans Bay; bluffs along the Missisquoi River east of Swanton, and bluffs on Isle La Motte, on the road to the Chazy Ferry. The locality at Malletts Bay, frequently mentioned in the literature, was not found to be very fruitful.

A more complete study of the fauna with synonymy and detailed discussions of distribution, recent and Pleistocene, is to be published elsewhere. The following is the list of species examined by the writers from the Pleistocene of Vermont:

*Macoma balthica* (Linné). Abundant at practically every locality: Alburgh, Isle La Motte, S. Hero, Grand Isle, Swanton, St. Albans, Colchester, Winooski, Malletts Bay, Charlotte, Vergennes, Panton, Chimney Point.

*Saxicava arctica* Linné. Next to *M. balthica* the most abundant shell: Alburgh, Isle La Motte, S. Hero, Grand Isle, Swanton, St. Albans, Malletts Bay, Panton.

*Mya arenaria* Linné. Alburgh, Isle La Motte, Colchester.

*Yoldia glacialis* Wood. St. Albans, Malletts Bay, Chimney Point.

*Macoma calcarea* (Gmelin). Swanton, Malletts Bay.

*Mytilus edulis* Linné. Swanton, Isle La Motte (abundant), S. Hero, St. Albans, Malletts Bay.

*Cryptodon gouldii* Philippi. Malletts Bay.

*Cylichna alba* (Brown). St. Albans.



*Balanus crenatus* Bruguière. Isle La Motte, Grand Isle, St. Albans, Burlington.

A few other species have been reported in the literature: some are undoubtedly synonymous with certain of the species listed above. The presence of a few other species could not be verified, either from our field work or from the examination of the various collections, and therefore they are omitted here; they will, however, be discussed in a later report.

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### SOME NOTES ON AN OLD RACE OF CALIFORNIA LAND SNAIL WITH DESCRIPTIONS OF THREE NEW FORMS

BY G. DALLAS HANNA AND ALLYN G. SMITH

HELMINTHOGLYPTA CARPENTERI (Newcomb). Plate 1, figure *a*.

This snail has long been imperfectly known, for good material has not been available for study and comparison with allied forms until the last few years. Because of the heat and consequent dryness of its habitat, *H. carpenteri* is a difficult shell to find in first-class adult condition. Although we have not examined them, Bartsch<sup>1</sup> has no doubt correctly assigned specimens in the National Museum from Maricopa and McKittrick in western Kern County, California, to *carpenteri*. Recent collecting has resulted in many lots of this shell, which add so much to knowledge of it that the following notes may be of interest, especially to students of the *traskii* group.

The shells are extremely variable in size, as a subsequent table of measurements shows, and we have good reason to suspect that this variability is due in large part to the variation in rainfall (and therefore in snail food) from season to season. The measurements also show, however, that the general form of the shell is remarkably constant.

In life the shells are semi-polished, of a beautiful straw color. The dark brown band has one of pale cream color below, and another rather indefinite one of the same color above. Spiral sculpture is faint but easily detected on the last two whorls under a magnification of  $\times 10$  and is fairly uniform over the surface of

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<sup>1</sup> Bartsch, Paul, Proc. U. S. N. M., Vol. 51, No. 2170, 1916, pp. 617-8, pl. 115, figs. 4-6.

these whorls. The nucleus is not sharply differentiated from the remaining whorls; its sculpture consists (when most perfectly preserved) of a series of tiny papillations, set on a background of silk-like radial lines of growth. Often neither one of these markings is visible and at best they require excellent illumination and high magnification to be seen at all.

Dead shells of *carpenteri* are strewn over the border of the valley floor and among the foothills on the west side of Fresno, Kings, and Kern Counties. Frequently they are found far removed from what would appear to be suitable snail cover. Living specimens have been found mostly in rock slides on north slopes but sometimes in rather exposed locations. Exposures of Etehegoi, Temblor, Tejon, and Cretaceous sandstones furnish the best cover.

The coloration of the shell led us at one time to suspect that *carpenteri* might belong to the genus *Micrarionta*, but an examination of the anatomy, shown in fig. 2, on page 14, indicates at once that it should be retained in *Helminthoglypta*. Even so, there are some striking features to the soft parts. The mantle is grayish-white in color with no other color markings of any kind. The mucous gland is double and located in a membranous sac that permits evagination of the organ, at least in part. The details of the genitalia are believed to be sufficiently shown in the figure so that minute description is unnecessary.

The table of measurements following shows the extreme variation in size :

	<i>Max. Diam.</i>	<i>Min. Diam.</i>
Largest shell (from Lot No. 27615) .....	23.6 mm.	15.4 mm.
Smallest shell (from Lot No. 24807) .....	15.0	10.7
Average of 111 shells .....	19.1	12.0

The shell illustrated in the accompanying figures is haplotype No. 7137 (Calif. Acad. Sci., Paleo. Type Coll.), from Loc. No. 27612 (C.A.S.), Chico Martinez Creek, Kern Co., California, coll. by G. D. Hanna and C. C. Church. We have examined the lots shown in the table on p. 12.

The last-named lot comes from the Salinas Valley, far removed from what appears to be the normal range of *carpenteri*, which is found along the western edge of the San Joaquin Valley. How-

<i>C.A.S. loc. number</i>	<i>No. of speci- mens</i>	<i>Locality</i>	<i>Coll. by</i>
24808	3	S. end of Panoche Hills 4th large creek N. of Panoche Cr. Fresno Co., Calif.	G. D. Hanna & C. C. Church
24809	2	Sec. T18S, R15E, Domingene Ranch Road, Fresno Co., Calif.	G. D. Hanna & C. C. Church
24810	10	Jacalitos Cr., Fresno Co., Calif.	G. D. Hanna
24844	5	Arroyo Ciervo, Fresno Co., Calif.	C. C. Church
24876	3	Sec. 34, T22S, R18E, Kettleman Hills, Kings Co., Calif.	
26809	3	E. flank of N. Dome, Kettleman Hills, Kings Co., Calif.	G. D. Hanna & F. A. Menken
24805	1	1 mi. S. of Big Tar Canyon, Kings Co., Calif.	G. D. Hanna
24134	10	Extreme S. end of Reef Ridge, Kings Co., Calif.	G. D. Hanna & J. H. Show
24807	20	NE. cor. Sec. 28, T25S, R18E, on W. side of road from Devil's Den to Keek's Station, Kern Co., Calif.	G. D. Hanna & J. H. Show
25605	13	Wagonwheel Mountain, Kern Co., Calif.	C. C. Church
27615	9	Carneros Cr., W. side of Kern Co., Calif.	G. D. Hanna & C. C. Church
27612	6	Chico Martinez Creek, Kern Co., Calif.	C. C. Church & G. D. Hanna
24126	6	N. end of Gould Hills, Kern Co., Calif.	G. D. Hanna
27614	3	Upper end of Salt Cr., W. side of Kern Co., Calif.	C. C. Church & G. D. Hanna
27613	15	SE. side of Orchard Peak, Kern Co., Calif.	G. D. Hanna
23350	2	2 mi. W. of Maricopa, Kern Co., Calif.	G. D. Hanna
27617	32	1 mi. NE. of San Lucas, Monterey Co., Calif.	F. A. Menken

ever, a critical examination fails to show any marked differences between these shells and *carpenteri*, and future collections may prove that its range extends across the ranges of hills that separate the two major valleys.



HELMINTHOGLYPTA SIMILANS, new species. Pl. 1, fig. *d*. Fig. 1.

Holotype small, thin, with slightly depressed spire; apical angle about  $105^\circ$ ; umbilicus narrow; whorls  $5\frac{1}{4}$ , well rounded, the last more convex below than above the periphery, descending slightly at the aperture; peristome simple, thin, with very little reflection, set at an angle of  $30^\circ$  with the vertical, its basal termination well reflected but only barely obscuring the umbilicus; callus wash between terminations very thin. Nuclear whorls nearly 2, wrinkled on the first half turn, the wrinkles consisting of low, irregular ridges; these give way on the remaining nuclear whorls to irregularly spaced, rounded papillations, moderately closely placed, which continue over the post-nuclear whorls above and below and into the umbilicus; on the upper portion of the last whorl these papillations are set more closely and in a somewhat descending spiral arrangement; lines of growth irregular, merging into one another, not prominent; spiral sculpture absent or very faint; periostracum exceedingly thin, brownish-buff, with a revolving dark band bordered above and below by bands much lighter in color than the remainder of the shell; bands not sharply defined. Max. diam., 25.8 mm.; min. diam., 13.7 mm.; alt., 9.6 mm.; diam. of umbilicus, about 1.4 mm.

Holotype: No. 7136 (Calif. Acad. Sci., Paleo. Type Coll.), from Loc. No. 25624 (C.A.S.),  $\frac{3}{4}$  mile SE. of Oil City, Fresno Co., Calif.; G. H. Hanna and C. C. Church colls.

The separation of this form from *H. carpenteri* (Newc.), with which it is sometimes associated in locality range and to which it is similar, is rather difficult in old, white-weathered dead shells. With live or even well-preserved adult dead shells, however, the two are easily distinguished. *H. similans* averages smaller in size but the two overlap in all measurements. No good characters separate them in the nuclear structure or shape of shell. The shell of *similans* is covered with small papillations, lacking in *carpenteri*, which has well-incised spiral sculpture, obsolete or not present at all in *similans*. Also, the growth lines of *similans* join together in an irregular manner, which is not true in *carpenteri*. Shells of living specimens of the latter are more highly polished than the former, which is duller because of its peculiar sculpturing.

Of the named species of the *traskii* group, *similans* resembles *cuyamacensis*, but this form is larger, has a wider umbilicus, and is much more densely covered with papillations that do not fol-

low any particular arrangement, at least on a series of specimens at hand from Warner's Springs, San Diego Co., Calif.

The mantle of the animal of *similans* is densely blotched with black, whereas in *carpenteri* the mantle is entirely free of such markings.

The range of *similans* lies within that of *carpenteri* along the west side of the San Joaquin Valley. Except for one colony discovered in the drainage of Big Tar Canyon, Kings Co., and another in the Salinas Valley, it has only been found in a limited area in the vicinity of Coalinga, Fresno Co. Usually it seems to occupy rocky hillsides farther removed from the valley floor than *carpenteri* and this may possibly account for its relatively recent discovery in a well-known territory. The two species do not occur in the same colonies, at least not normally.

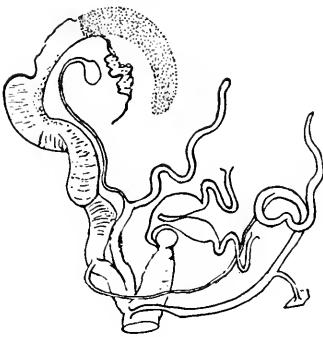


FIG. 1

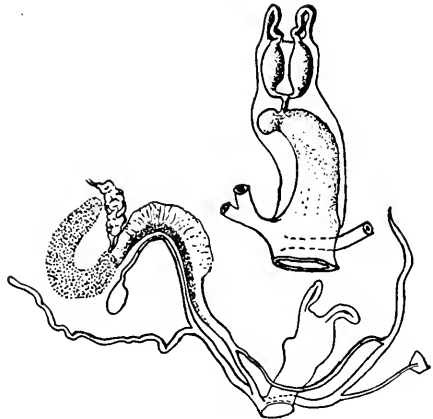


FIG. 2

	<i>Max. diam.</i>	<i>Altitude</i>
Largest shell .....	18.5 mm.	12.0 mm.
Smallest shell .....	14.0 "	8.5 "
Average of 53 shells .....	14.9 "	10.2 "

Coalmine Creek, Fresno Co. (C.A.S. Loc. No. 24806) :

25624	23	$\frac{3}{4}$ mi. SE. of Oil City, Fresno Co., Calif. TYPE LOT.	G. D. Hanna & C. C. Church
25607	16	Jacalitos Creek, Fresno Co., Calif.	C. C. Church
25606	32	6 mi. above mouth of Jacalitos Cr., Fresno Co., Calif.	C. C. Church

24806	64	Eocene Reef, just N. of Coal-	G. D. Hanna &
		mine Cr., Fresno Co., Calif.	C. C. Church
24130	1	Canoas Creek, Fresno Co.,	G. D. Hanna
		Calif.	
24129	3	Eocene conglomerate 2 mi. N.	G. D. Hanna
		of Big Tar Canyon, Kings	
		Co., Calif.	
27618	17	Mouth of Hamilton Canyon,	F. A. Menken
		5 mi. SE. of King City, Mon-	
		terey Co., Calif.	

HELMINTHOGLYPTA CUYAMA, new species. Plate 1, figure *b*.

Holotype, nearly average for the species, thin in texture and spire strongly depressed; apical angle  $137^{\circ}$ ; umbilicus wide, tapering rather sharply to the apex; whorls six, moderately convex, the last slightly expanded and descending at the aperture; peristome simple, moderately reflected, not thickened and not obscuring the umbilicus, inner end connected with a thin callus wash; nuclear whorls nearly smooth, about two, gradually merging into the later whorls which have more or less regular growth lines; spiral sculpture absent; surface somewhat shining, indented by fine irregularly shaped malleations arranged in obscure patches at various places on the body whorl; periostracum extremely thin, light golden brown; revolving band dark brown bounded below by a cream colored band nearly as wide, and above by a narrow indefinite band of the same color. Max. diam., 24.7 mm.; min. diam., 19.8 mm.; alt., 13.5 mm.; diam. of umbilicus, 3.7 mm.

Holotype: No. 7088 and paratypes Nos. 7089, 7090 (Calif. Acad. Sci.) from a rock slide of Franciscan chert on the south side of the highway connecting Santa Maria with Maricopa, 23.7 miles east of the first, Santa Barbara County, California. The locality is two miles west of Cuyama Service Station on Cuyama River. About 50 specimens were taken in the same locality at various times by Messrs. C. C. Church and G. D. Hanna. In May, 1937, the type locality was revisited by Mr. George Willett who informs us that he collected a fair series but no living shells and believes, correctly no doubt, that living specimens must be very deep in the rock slide at that time of year. He also reports finding four specimens of another form referable to *H. traskii phlyctoena* (Bartsch) in the same slide.

## RANGE OF VARIATION

	<i>Max.</i> <i>diam.</i>	<i>Min.</i> <i>diam.</i>	<i>Alt.</i>	<i>Diam.</i> <i>of umb.</i>	<i>No. of</i> <i>whorls</i>
Largest shell .....	28.9	23.4	16.2	4.2	6.25
Smallest shell .....	18.5	15.0	9.3	2.5	5.50
Highest shell .....	24.6	19.6	14.9	3.6	6.00
Average of 30 shells ..	23.1	18.5	12.5	3.2	6.00

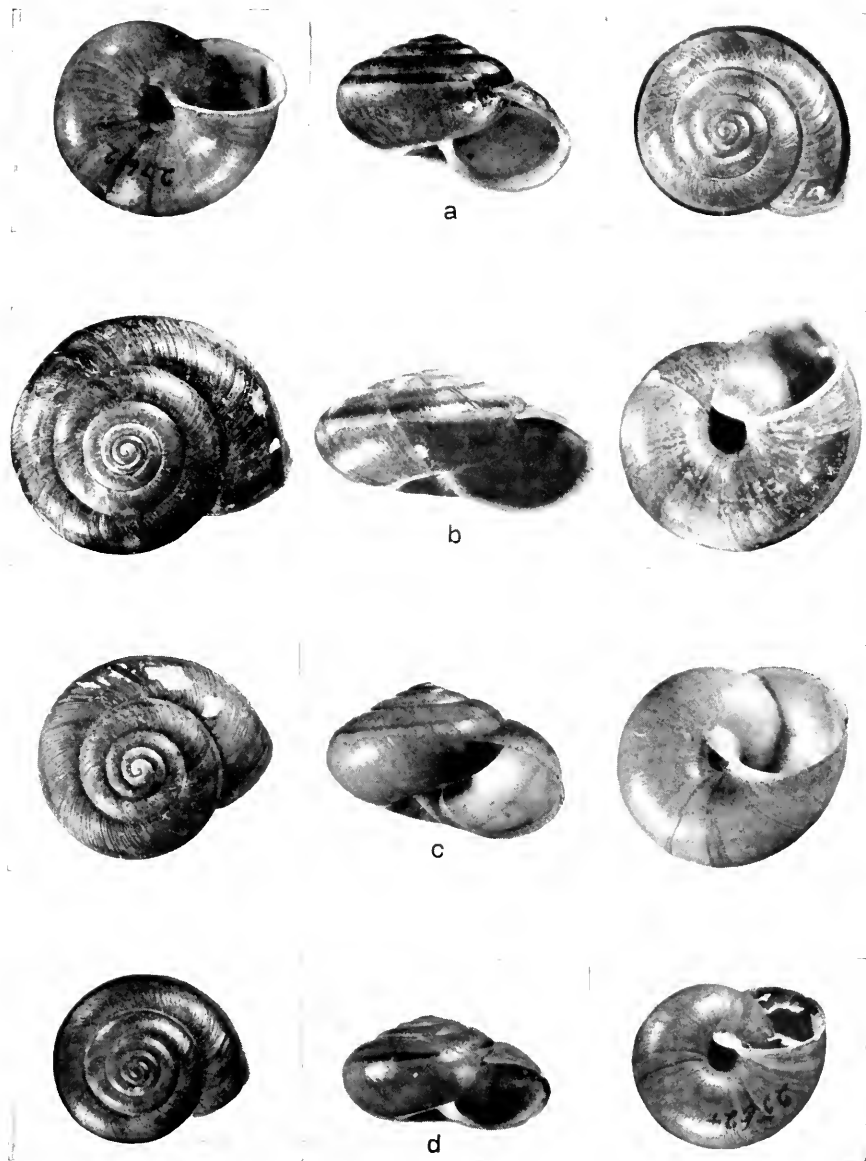
Traces of irregularly arranged papillations are visible on some specimens when considerably magnified; in a young living shell, the sculpture is somewhat more distinct than in the holotype; each of the sparse papillations of the nuclear whorls in this case is set with a stubby, slightly curved hair; on the remaining whorls the papillations are more numerous and there is a suggestion of quincuncial arrangement; these likewise bear short stubby hairs and the surface appears hirsute when magnified 40 diameters.

The species seems distinct from others of the group as might be expected from the isolated collecting station. It is smaller and not nearly so polished as *H. willetti* (Berry) and lacks the characteristic spiral sculpture so pronounced in *H. carpenteri*. The shape is similar to *H. ferrissi* (Pilsbry), a species from the southern Sierra Nevada, but it is a thinner, much lighter colored and larger shell with the umbilicus proportionately narrower; comparison in this case has been made with a large series of specimens (No. 27,791 C.A.S.) from upper Kern River, collected by Mr. Church.

HELMINTHOGLYPTA HERTLEINI, new species. Plate 1, figure *e*.

Shell thin and delicate, pale golden brown, with a very narrow band of a darker shade, bounded below by an equally narrow band of a lighter shade; whorls five, regularly increasing in size; surface marked with fairly coarse growth ridges, and very irregularly scattered papillae; nuclear whorl with faint growth lines and a finely roughened surface; aperture not expanded; peristome simple and scarcely reflected (except in the umbilical region) and slightly thickened interiorly; umbilicus narrow, half covered by the reflected basal wall. Max. diam., 18.5 mm.; min. diam., 15.3 mm.; altitude, 12.5 mm.; diam. umbilicus, about 2 mm.

Holotype: No. 7094 and paratype No. 7095 (Calif. Acad. Sci.) from a lava rock slide 6.6 miles east of the junction of the Klamath Falls road with U. S. Highway No. 99; Jackson County,



a, *Helminthoglypta carpenteri* (Newe.). b, *H. cuyama* H. & S. c, *H. hertleini* H. & S. d, *H. similans* H. & S. Fig. d actual size, the others enlarged.



Oregon; north side of road. H. B. Baker, J. L. Nicholson and G. D. Hanna colls.; July 26, 1929.

The above is a description of the holotype; 17 additional specimens, mostly dead and imperfect, were collected at the same place. These indicate that the species is fairly constant in its characters; the largest shell is 22.6 mm. in diameter and the smallest is 17.8 mm. No species belonging to this group of the genus has been found within a long distance of the present locality. We have noticed in collecting members of the *H. cypraeophila* group, that to the northward in the volcanic country, shells become smaller and relatively thinner than at the type locality in Calaveras County, California. The form here described seems to be at or near the extreme northern range; it has lost the reflected peristome, and most of the surface markings; the bands are much less prominent and the shells are thin and delicate, somewhat like some of the high mountain forms such as *tularensis* (Hemphill).

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## NOTES ON THREE RARE AMERICAN POLYGYRA

BY WILLIAM J. CLENCH

*Polygyra herberti* Walker 1928 (University of Michigan, Museum of Zoology, Misc. Pub. no. 18, p. 43, text fig. 50).<sup>1</sup> This species was published with only a drawn text figure. Miss McGlamery of the Alabama Museum has very kindly furnished me with photographs of the unique specimen taken by Mr. Hodges (Plate 3, figs. 1-3). "Near Gallant" should be added to the type locality as given by Walker. This is the rarest of all Polygyras, as the single holotype is the only specimen known.

*Polygyra chilhoweensis* Lewis 1870 (American Jour. Conch. 6, p. 191, pl. 12, figs. 5-7). One of the largest of all American *Polygyra*. Heretofore this species has only been known from the Great Smoky Mountains of Tennessee and North Carolina. Mr.

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<sup>1</sup> Both the University of Michigan and the University of Alabama published this paper jointly, each, however, retaining their sets under the publication series of the institution concerned. The same title is used and both were issued on the same date, with the same text and pages, etc., the reference to the latter being: Alabama Museum of Nat. Hist. Mus. Pap. no. 8.

W. G. Parris has recently found three specimens of this species 4 miles south of Byrdstown, Pickett Co., Tenn. This locality is on the western slope of the Cumberland Plateau, a region possessing a mollusk fauna quite different from the main mass of the southern Appalachians east of the Tennessee River system. Mr. Paul Adams of Alpine, Overton Co., Tenn., has also reported finding this species, a locality also on the Cumberland Plateau, and SE. of Byrdstown, specimens of which are now in the collection at the University of Michigan. A specimen kindly donated by Mr. Parris measures  $35 \times 29.5$  dia., 21.5 mm. height. There is no parietal tooth.

Mr. Archer and I found this species to be rare on the slopes of Mt. LeConte in the Great Smoky Mountains. It is a species of the heavy deciduous forest and is generally found on the forest floor, occasionally climbing a few feet on the boles of the trees. It is not a species peculiar to the rock slides.

*Polygyra ferrissii* Pilsbry 1897 (NAUTILUS 11, p. 92). The collections we made on Mt. LeConte extend the range of this species about 7 miles to the NE. of the location assigned by Pilsbry (Proc. Acad. Nat. Sciences, 1900, p. 120). Many of the specimens we obtained were collected near the base of the "Chimneys," which is also about 1000 feet lower in altitude than Pilsbry's records. They were found mainly on small moss covered rocks on a steep slope with plenty of seepage water, a remarkably wet situation for a *Polygyra*.

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### A NEW VARIETY OF *BULIMULUS DEALBATUS* FROM ALABAMA

BY WILLIAM J. CLENCH

*BULIMULUS DEALBATUS* JONESI,<sup>1</sup> new variety (Plate 3, fig. 4). This form differs from the typical *B. dealbatus* Say by being much thicker in texture and being all white rather than mottled with axial streaks of opaque and translucent areas. In addition, the

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<sup>1</sup> Named for Dr. Walter B. Jones, State Geologist and Director of the Alabama Museum, University of Alabama, Tuscaloosa. I am indebted to Miss Winnie McGlamery for the privilege of studying and describing this new variety.



apex (nuclear whorls) are a pale straw color and somewhat glass-like in appearance. Proportionately, the shell is more attenuated and the whorls somewhat less convex. All remaining characters appear as in the typical form.

Length 19.1, width 9.9, aperture  $9 \times 5.1$  mm. (holotype). Length 20, width 11, aperture  $9.4 \times 5.9$  mm. (average of five paratypes).

*Holotype*.—Univ. of Alabama, no. 89, 2 miles North of West Greene, Greene Co., Alabama. Paratypes, Mus. Comp. Zoöl. No. 75036 from the same locality. Miss Winnie McGlamery collector, 1933.

This variety does not appear to be an ecological form. Though a member of the species assemblage found in the "chalk" area, it differs quite sharply from most of the lots studied from these regions. It is possibly a small geographical race. West central Alabama is still imperfectly known and the adjoining territory in Mississippi remains to be investigated.

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### THREE NEW SPECIES OF CERIONS FROM LONG ISLAND, BAHAMAS

BY WILLIAM J. CLENCH

During the past July and August (1936) a third expedition was made to the Bahama Islands to continue the molluscan survey initiated in 1935. To date, Grand Bahama, the Abaco group, Eleuthera, New Providence, Cat and Long Islands have been covered sufficiently to render individual reports. The present expedition, undertaken by H. D. Russell, R. A. McLean, J. H. Huntington and R. W. Foster was made to Long Island. Two very remarkable Cerions were found, quite different from any species heretofore discovered in these islands, and in addition, a large series of *C. stevensoni* Dall was collected, the locality of which had been previously open to question. Mr. J. V. Malone, Commissioner of Long Island, has just submitted a third new species, of considerable interest as it is a connecting form between *C. malonei* (new) and members of the *regina* group of Cerions to which both of these forms belong.

CERION (STROPHIOPS) MALONEI, new species. Plate 3, fig. 6.

*Description*.—Shell cylindrical, rather short, smooth to ribbed, solid and widely and deeply umbilicated. Color: flat white, with no indication of mottling. Whorls: 9 to 10, the last three more or less parallel sided, the remaining whorls narrowing rapidly to form a short slightly convex spire. Spire produced at an angle of  $90^{\circ}$ – $100^{\circ}$ . Aperture sub-ovate to sub-quadrate, generally with a fairly straight margin along the parietal wall, the peristome occasionally pinched so that the aperture becomes holostomatous. Columella inclined slightly, supporting a small inconspicuous tooth which is sometimes reduced to a minute, irregular lump. Parietal wall with a large tooth that does not penetrate any distance within the aperture. Lip expanded, thin and not turned backwards. Umbilical perforation wide and very deep—a probe reaching as far back as the nuclear whorls. Suture barely indicated, sometimes the last whorl is offset and smaller than the mid-whorl, leaving a small ledge or overhang. Occasionally there is an upturn to the body whorl just before the aperture, so much so that the superior margin of the aperture is close to or even with the whorl above. Sculpture: smooth to somewhat coarsely ribbed, with about 18 to 23 ribs on the body whorl, an unusual character is that the ribs are most strongly developed on the penultimate whorl. Nuclear whorls always smooth. Length 31.5; width 18.6; aperture  $9 \times 6$  mm. (holotype). Length 25.6; width 16.6; aperture  $7.6 \times 5.7$  mm. (average of 7 specimens).

*Holotype*.—Mus. Comp. Zoöl. No. 112706,  $3\frac{1}{2}$  mi. SE. of Simms, Long Id., Bahamas. Russell, McLean, Huntington, Foster, collectors, July, 1936. A large series of paratypes obtained from the same locality.

*Remarks*.—This species forms a striking parallelism with *C. dimidiatum* Pfr. of Gibara, Cuba, particularly to the short and squat form known as *proteus* Pfr. Superficially the resemblance is exceedingly close, but the apertural characters exhibited by *C. malonei* show a direct relationship to the *regina* group of the lower Bahama Islands. It would appear rather that *C. malonei* is an extreme divergent form of this group, connected to the main stock through a more or less intermediate form, *C. fernandina* herein described. Form parallelisms are very abundant in Cerions, the less pronounced characters, such as the structure of the aperture, columellar and parietal teeth, and particularly the lip seem to be far more stable and indicate relationships in accord with the geographical distribution of the individual elements.

The group of *regina*, however, is probably directly related to the group of *maritimum* in which *dimidiatum* is a species. Most of the species of this latter assemblage are found on the north coast of Cuba.

CERION (STROPHIOPS) FERNANDINA, new species. Plate 3, fig. 5.

*Description.*—Shell large, perforate, solid, subconical to sub-cylindrical, shining and nearly smooth. Color a flat white, nuclear whorls glass-like and opaque. Interior of aperture a very pale brownish yellow to cream. Whorls 10–11, nearly flat sided, first 7 to 9 forming the slightly convex cone of the spire. Occasionally the whorls, particularly the body whorls, may be slightly inset, forming a slight overhang with the whorl above. Body whorl usually the largest in diameter. Umbilical perforation generally large, located deeply in the broad excavated area behind the columellar lip. The excavated area is abruptly formed by the infolding of the base of the body whorl and in many specimens is wider below the edge. Parietal tooth short, centered and rather high but not penetrating very deeply within the aperture. Columellar “teeth” composed of, usually two, very slight, irregular, flattened and rather inconspicuous knobs, occasionally the upper one large enough to be called a tooth or lamella. Aperture subovate with only a slightly thickened, expanded lip which is usually flat though occasionally slightly folded back. Parietal wall calloused with a thickened ridge connecting the lip extremities; it is, however, not built forward. Sculpture of coarse and irregular growth lines somewhat evenly disposed over the entire shell other than the nuclear whorls. These growth lines on certain species are somewhat grouped forming a few ribs on the body whorl. Sutures only very slightly indented. The spire is produced at an angle of approximately 60°. Length 34.3; width 16.5; aperture 9.2 × 5.8 mm. (holotype). Length 32; width 16.2; aperture 8.2 × 5.3 mm. (average of 8 specimens).

*Holotype.*—Mus. Comp. Zoöl. No. 65131, Millers, 8 mi. SE. of Simms, Long Island, Bahama Islands. J. V. Malone collector, Oct., 1936. (The name *Fernandina* was originally applied to Long Island by Columbus.)

*Remarks.*—Though the general outline of this form appears to be quite different from *C. malonei*, they are apparently rather closely connected. *C. malonei* is in reality a widely divergent form and represents an extreme in the morphological development of the shell. Both of these forms possess an open umbilical

orifice and similar lip and tooth characters. The present form exhibits but little variation in shape in comparison with *C. malonei*, which from form modification is one of the most variable in the genus.

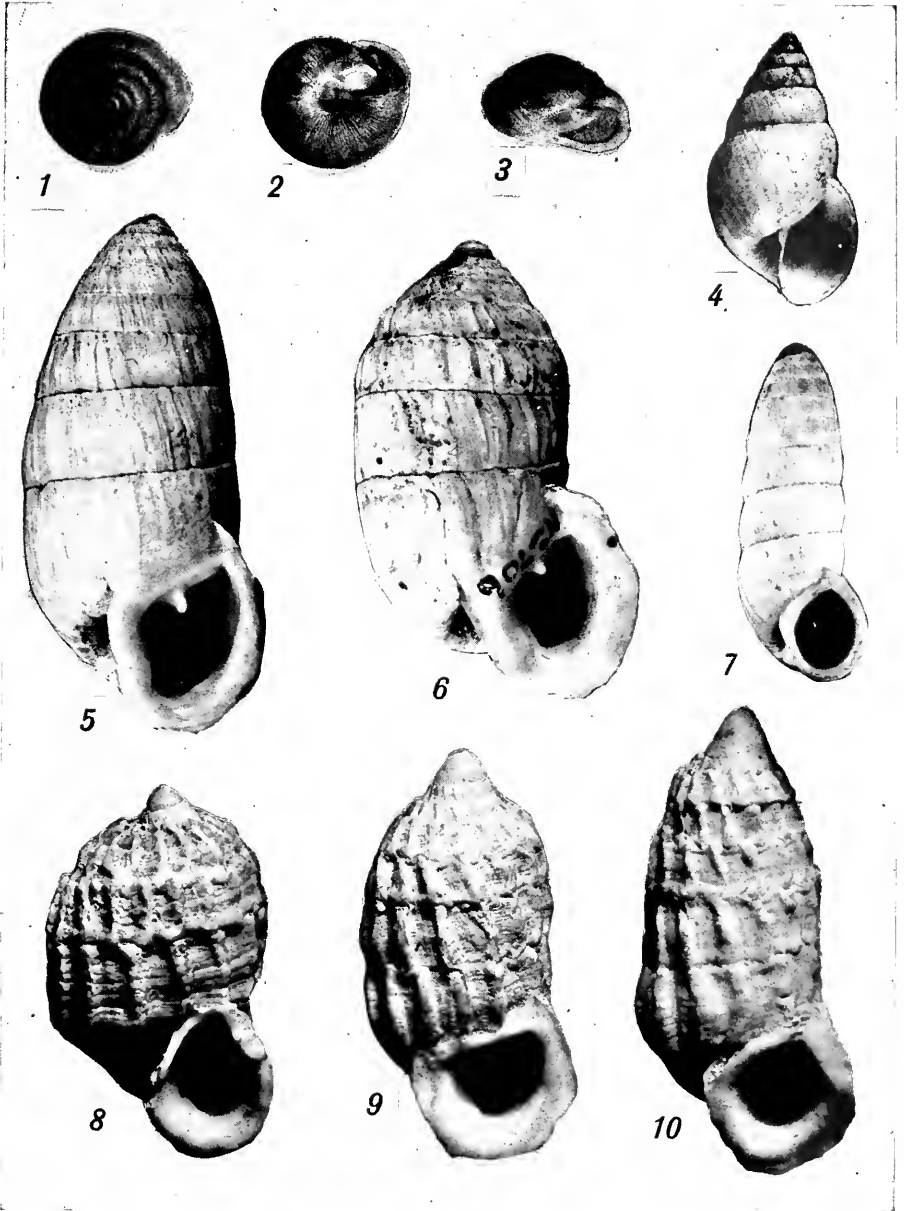
*C. fernandina* is a member of the *regina* group of Cerions and is patterned quite closely after *C. regium* of Castle Island on the Crooked Island Bank. It is a smaller species, however, and does not possess the rather sharply tapering cone of this latter form.

CERION (STROPHIOPS) MCLEANI, new species. Plate 3, fig. 7.

*Description*.—Shell narrow, rather coarsely ribbed, cylindrical, small, solid and generally minutely perforate. Color a flat white. Whorls  $9\frac{1}{2}$  to 10, slightly convex, and gradually tapering above the fourth whorl to the summit. Spire slightly convex, produced at an angle from  $46^\circ$  to  $56^\circ$ . Aperture subquadrate, holostromatous in fully adult shells owing to the produced parietal ridge. Parietal tooth strongly developed but not extending a great distance within. Columellar tooth obsolete or indicated by a very slight and somewhat broad, thickened area. The interior of the aperture colored a pale brown. Umbilical perforation small, with no definite ridge around the base. Lip flaring, slightly thickened and only very slightly turned back, connected along the parietal wall by a well elevated ridge. Sculpture of rather coarse ribs, most strongly developed on the body whorl, varying from 12 to 16, with many irregular growth lines both between and on the ribs. No spiral sculpture indicated. Suture fine, not impressed but indicated by the contour of the whorls. Nuclear whorls glass-like, opaque and smooth. Length 21; width 8; aperture  $4.5 \times 3.5$  mm. (holotype). Length 19.8; width 7.6; aperture  $4 \times 3$  mm. (average of 4 specimens).

*Holotype*.—Mus. Comp. Zoöl. No. 112701, one mile East of O'Neills, Long Island, Bahama Islands. Russell, McLean, Huntington and Foster collectors, July, 1936.

*Remarks*.—A remarkably well differentiated species, totally different from any hitherto obtained in the Bahamas. As with *malonei*, it represents a sharply divergent line of evolution from the normal type of the group assemblage in which it is included. It is a member of the *gubernatorium* group as outlined by Pilsbry (Man. of Conch. (2), 14, p. 240, 1902) and perhaps nearest to *C. eleutherae* P. & V. of southern Eleuthera Island.



1-3, *Polygyra herberti* Walker. 4, *Bulimulus dralbatus jonesi* Cl. 5, *Cerion fernandiana* Cl. 6, *C. malonei* Cl. 7, *C. mcleani* Cl. 8-10, *C. stervensoni* Dall. Figs. 1-7, 9, holotypes.



CERION STEVENSONI Dall. Pl. 3, figs. 8-10.

*Cerion stevensoni* Dall 1900, NAUTILUS 14, p. 65 (Long or Berry Island); Pilsbry 1902, Man. of Conch. (2), 14, p. 220, pl. 44, fig. 70-71; Dall 1905, [in] The Bahama Islands, Baltimore, p. 40 (Rum Cay, not Long Island); Clench 1934, Proc. Boston Soc. Nat. Hist. 40, p. 209 (Probably Cat Island).

A very large series of this remarkable species was collected at Wemyss, 7 mi. SE. of Simms on Long Island by the present expedition and this place can be accepted as the type locality. Through the courtesy of Dr. Bartsch, I have been privileged to examine and photograph the three type specimens (Plate 3, figs. 8-10, figure 9 being the holotype). This species has had a curious history as locality assignment. The original locality, Long Island, now known to be correct, was later changed by Dall to Rum Cay, though Dall did not state his reasons for this change. As Rum Cay has since been fairly well explored, particularly by the parties on the "Utowana" and neither *stevensoni* or any species similar to it were found, I had assumed that possibly Cat Island would prove to be its origin on the basis of its relationship to *C. felis* P. & V.

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## A NEW PLEISTOCENE RACE OF POLYGYRA APPRESSA

BY FRANK C. BAKER

POLYGYRA APPRESSA HUBRICHTI, nov. var.

Shell differing from typical *appressa* in its much greater size, more elevated spire, rounder aperture, and general gibbous form. The parietal lamella is long, curved, and extends to the umbilical region as in the typical form. Basal tooth of peristome usually well developed, but the upper denticle of race *fosteri* rarely developed. Sculpture of fine lines of growth.

Diam. 25.5; Height 14.5; Ap. Diam. 10.0; Height 7.0 mm. Holotype.

Diam. 25.0; Height 13.5; Ap. Diam. 9.5; Height 7.0 mm. Paratype.

Diam. 23.5; Height 13.0; Ap. Diam. 9.0; Height 6.0 mm. Paratype.

Type locality: Valmeyer, Monroe Co., Illinois, in pink loess of Sangamon age. Holotype No. P6629; paratypes No. P6630, Museum of Natural History, Univ. Ill.; paratypes No. 168631,

Academy of Natural Sciences of Philadelphia; collection of Leslie Hubricht, No. A1562.

This form is another of the peculiar variations which have been noted in loess deposits in Illinois. Typical *appressa* is rare in these deposits, only two specimens having been noted among fifty of the new race. In size *hubrichti* is the largest form of the *appressa* group, exceeding that of *P. a. perigrapta*, which attains a diameter of about 22 mm. The lamella or tooth on the parietal wall also differs greatly in form in this race. There is considerable variation in size among the fifty specimens of *hubrichti* from Valmeyer, about a dozen specimens ranging from 19 to 21 mm. in diameter. All have the peculiar elevated, dome-shaped spire of the new variety and not the flat spire of typical *appressa*.

The material was collected from loess deposits at Valmeyer by Mr. Leslie Hubricht, in whose honor the variety is named.

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## A NEW BOLIVIAN HELICOID, DINOTROPIS HARRINGTONI

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

In the course of work in Bolivia Mr. George L. Harrington picked up the peculiar snail described below. In shape it is curiously like some depressed, carinate helices from different parts of the world and belonging to widely separated genera, such as the Californian *Monadnia circumcarinata* (Stearns) or the Australian *Glyptorhagada kooringsensis* (Ang.). In the surface sculpture and general shape it is like depressed Jamaican members of the *Pleurodonte* group. The basal lip is unfortunately broken; possibly it was toothed there, though we are disposed to believe it was toothless. In texture it is unlike *Labyrinthus*, which always has a parietal tooth. It does not seem to be related to *Xenothauma* Fulton. On the whole we are inclined to think it a specialized member of the *Epiphragmophora* group, but no definite opinion can be formed without anatomic data. We form for it a new group, the exact status of which remains in abeyance.

DINOTROPIS, new genus. The openly umbilicate shell is strongly depressed, keeled, of few ( $4\frac{1}{2}$ ) whorls, the nuclear  $1\frac{1}{2}$  smooth, the



rest closely granulose; aperture strongly oblique, the peristome expanded above, reflected basally, the strong parietal callus short.

DINOTROPIS HARRINGTONI, n. sp. Pl. 2, figs. 14.

The umbilicus is contained about six times in diameter. The spire is only slightly convex. The whorls are weakly convex in the inner, concave in the outer half, the last whorl descending slowly below the very acute peripheral keel, the base being concave below the keel, convex towards the umbilicus. The color (dead) is light buff, with very faint indications of a brownish band above the keel. The dull surface is very closely granulose, the granules pustuliform, indistinctly arranged along light growth-striae, but in places forming short oblique trends. The peristome is well expanded and, so far as preserved, reflected basally, but most of the basal margin is broken away. Height 8.5 mm. (estimated); diam. 27.7 mm.

Bolivia: Rio Iguembe, two or three miles above junction with Rio Ingre, collected near a limey horizon by Mr. George L. Harrington. Type 168636 ANSP.

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## A NEW CALLISTOCHITON FROM LOWER CALIFORNIA

BY G. WILLETT

During December, 1936, Mr. and Mrs. Philip M. Connelly, of the Southern California Conchological Club, while collecting at Arbolitos Point, near Ensenada, Lower California, secured forty specimens of a chiton that appears to be new to science. For this I propose the name of:

CALLISTOCHITON CONNELLYI sp. nov. Pl. 2, fig. 13,  $\times 6$ .

*Description.*—Small; cream-colored, with white girdle. Head valve with nine or ten low, rounded, very finely pustulate ribs; tail valve with apparently fewer ribs, but these only faintly indicated and not perceptible in some specimens. Lateral areas with two rounded, finely pustulate ribs which, on the posterior part of most specimens, merge into a single rib with a more or less faintly indicated notch at the margin. Pleural tracts crossed by about fifteen very fine ribs, connected with each other by faint riblets; these ribs are obscure or imperceptible on the jugal area, which is finely punctate. Girdle clothed with densely crowded, microscopic, imbricating scales with a marginal border of fine spines. Length, 6; diam., 3.4; alt., 1 mm.

Type No. 1048, Los Angeles Museum; paratypes in Philadelphia Academy of Natural Sciences, and in collections of Mr. and Mrs. P. M. Connelly and G. Willett. Type locality, Arbolitos Point, near Ensenada, Lower California, Mexico.

This species is perhaps nearer to *C. acinatus* Dall than to any other known member of the genus, but, judging from the description of *acinatus*, which has not been figured, *connellyi* differs in being less elevated, and in possessing finely pustulate (not nodulous nor prominently pustulate) ribs, very fine reticulation of the pleural tracts, and the jugal tract being punctate rather than reticulate.

From the three allied Mexican species, *C. gabbi* Pils., *C. infortunatus* Pils., and *C. pulchellus* Gray, *connellyi* is easily distinguished by smaller size, lighter coloration, and less pronounced sculpture. It has fewer ribs on the head valve than *gabbi* or *pulchellus*, and the lateral ribs are unserrated. It lacks the prominent ribs on the tail valve that characterize *pulchellus* and *infortunatus*, being more like *gabbi* in this respect. It has no indication of the netted sculpture on the jugal area that is found in *pulchellus*.

I am indebted to the San Diego Society of Natural History for use of specimens of Mexican species, in the Lowe collection.

Los Angeles Museum, Los Angeles, California, January 15, 1937.

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## THE RACES AND ALLIES OF PLEURODONTE GUADELOUPENSIS

BY H. A. PILSBRY

In the course of his ornithological researches in Martinique, Mr. James Bond obtained some pleurodont helices evidently new but related to the species long known as *Helix badia* Fér. While describing them, it seems best to review the allied races.

PLEURODONTE LABEO, new species. Pl. 2, fig. 1.

The shell is larger and more solid than any form of *guadeloupensis*, deep chestnut brown, acutely angular in front, suture descending steeply and deeply to the aperture. Peristome white, the two basal teeth nearer together than in *P. g. roseolabrum*, the

upper margin of lip bearing an oblong callous lobe, which hangs in front of the aperture. Height 11.4, diam. 18.7 mm.; nearly 5 whorls.

Baie des Anglais, Ste. Anne, southern Martinique. Type and paratypes 166148 ANSP., collected by a native of the island for Mr. James Bond.

The callous lobe is on the lip in this form, not a thickening of the parietal callus as in *P. nucleola* Rang and some other species.

This belongs to the immediate group of *P. guadeloupensis*, but it appears sufficiently distinct by the characters given above.

PLEURODONTE GUADELOUPENSIS (Pils.). Pl. 2, fig. 4.

*Helix badia* var. *guadeloupensis* Pilsbry 1889, Man. Conch. 5: 87, pl. 29, f. 28.<sup>1</sup>

This is a small form, diam. 12 to 14.4 mm., in which the two teeth in the basal margin are large and much closer together than in the form now called *P. g. roseolabrum* (*Helix badia* Fér.). The inner tooth is lower, oblique, with long right and short left slope; in the outer lip a small denticle. The brown bands above and below the light peripheral line fade towards suture and base. The surface is rather weakly, finely granulose. The peristome is white in all seen (6 from Robert Swift, 3 from W. Newcomb). All are labelled "Guadeloupe."<sup>1</sup> The type is 32586 ANSP.

PLEURODONTE GUADELOUPENSIS ROSEOLABRUM M. Smith. Pl. 2, figs. 2, 5, 6.

*Helix badia* Férussac, 1822, Prodr. No. 124; Hist., Expl. pl. XXII livr., pl. 56, f. 1, Pfeiffer, 1848, Mon. Hel. Viv. 1: 309; Conchyl. Cab. pl. 63, f. 7, 8. Not *Helix badia* Gmelin, 1791, Syst. Nat. (13) p. 3639, No. 171.

*Helix* (*Dentellaria*) *badia* Fér., var. *roseolabrum* Maxwell Smith, 1911, NAUTILUS 25: 48; also var. *unicolor*, l. c.

Férussac figured more than one form under the name *H. badia*, but his first figure may be accepted as typical *badia*. His third and fourth figures are probably *guadeloupensis* and his figure 2 almost certainly that. The name *H. badia*, being preoccupied, passes out of use.

The shell is of a bay color, either uniform, or lighter on the base, near suture, and at the apex; the peristome is vinaceous brown of different shades. However, in some lots the color runs

<sup>1</sup> The Spanish form of the name of this island might better have been used in the specific name, as the French form is rather awkward as a Latin word.

by intermediate nuances into cream-buff or lighter, with spire of a somewhat darker tint or brown, and with apricot-buff or pale flesh colored peristome (the typical color of *roseolabrum*), or the peristome may be white; finally some shells are ivory or marguerite yellow, fading to white at the summit, peristome white, these being Mr. Smith's var. *unicolor*, fig. 5. In a lot collected by the Abbé Vathelet all of these colors occur, with transitional shades, and I presume were found together. The upper margin of the peristome is thin and nearly straight. Of the two teeth in the basal margin, the outer one is compressed and rather high, the inner lower and tubercular; they are rather widely spaced. There is no denticle in the outer lip. The surface is finely granulose.

Height 10.2 mm., diam. 16.8 mm.

Height 9 mm., diam. 15.5 mm.

It appears to be common in Martinique, which may be taken as the type locality (32587 ANSP.). Type in the Maxwell Smith collection, fig. 2, central fig.

PLEURODONTE GUADELOUPENSIS DOMINICANA Pils. & Ckll. Dominica.

See note on page 34.

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## SOME LESSER RACES OF MONADENIA FIDELIS (GRAY)

BY S. STILLMAN BERRY

### MONADENIA FIDELIS OCHROMPHALUS new subspecies

**DESCRIPTION:** Shell similar in general features to typical *fidelis*, but smaller, solid, highly polished, especially on the base, which in some specimens appears more or less dished or reamed out, in others is full and rounded, the umbilicus open and permeable to the apex. Spiral sculpture weak to moderately developed above, very fine and delicate on the base.

Color of shell prevailing dark, the spire banded, often not too distinctly, with tones varying from deep colonial buff to russet and mars brown; peripheral band wide (2-3 mm.), deep blackish umber, sharply bordered below by a much narrower band of chamois or deep colonial buff; base uniformly a lustrous deep blackish umber excepting the area immediately surrounding the umbilicus, which, together with the umbilical interior, is a strongly contrasting old gold. Color of animal: dorsum fawn color to wood brown, more or less heavily suffused darker (bone brown to clove brown) with a light median line on the ridge,

sometimes more or less maculated, the tail consistently paler; sole buffy brown to grayish olive, widely margined fuscous to fuscous-black.

	Maximum diameter	Minimum diameter	Altitude	Diameter of umbilicus	Number of whorls
7768b. Paratype .....	32.7	27.8	19.5	3.3	6 $\frac{1}{4}$
7768. " .....	32.6	27.7	21.4	3.1	6 $\frac{2}{3}$
7768. " .....	32.2	27.5	20.1	3.9	6 $\frac{2}{3}$
7767. Holotype .....	31.7	26.4	19.1	4.1	6 $\frac{1}{2}$
7768a. Paratype .....	30.5	26.1	19.5	4.0	6 $\frac{1}{4}$
7768. " .....	30.0	25.5	17.3	3.7	6 $\frac{1}{4}$
7768. " .....	29.6	24.8	18.9	3.3	6 $\frac{1}{2}$

HOLOTYPE: Cat. No. 7767 Berry Coll.

PARATYPES: Cat. No. 7768 of same collection; others to be deposited in the collections of Allyn G. Smith, E. P. Chace, the United States National Museum, the Academy of Natural Sciences of Philadelphia, and Stanford University.

TYPE-LOCALITY: Etna Creek, about 2 $\frac{1}{2}$  miles above Etna, Siskiyou County, California; Leo Shapovalov and M. Hanavan, 13 June 1934.

FIELD-NOTE: Taken alive "on ground, on leaves and sticks, on concrete walls of irrigation ditch, and on mossy boulders and stones, several days after showers"; some ovipositing (Shapovalov).

It may appear questionable to describe a subspecies characterized by so little other than color, but the shells of this beautiful race are very characteristic in appearance and the open yellow umbilicus centering the polished black-brown base is a conspicuous feature seen by me in no other lot of *fidelis* from any locality whatsoever. As the race seems uniform in the characters noted and apparently strongly localized, it will be useful to have a name for it. That proposed is derived from the Gr. *ὄχρος*, yellow, + *ὀμφαλος*, umbilicus.

#### MONADENIA FIDELIS LEONINA new subspecies

DESCRIPTION: Shell small and thin for the group, translucent by transmitted light, depressed to low-conic in outline; umbilicate, the umbilicus openly permeable to the apex and having a

diameter on the average about one-ninth the maximum diameter of the shell; umbilical suture deep. Whorls  $5\frac{2}{3}$  to  $6\frac{1}{4}$ , convex, the last with the superior portion descending rather strongly in front. Aperture ovate, slightly squared at the short columella, the lower border moderately or not at all flattened. Peristome little everted or thickened above, moderately so below, especially near the umbilicus, the edge of which is partly roofed by the columellar flare; edges connected across the whorl by a thin callus, the parietal one converging. Sculpture of nepionic whorls finely heavily wrinkly-granulose, the granules very crowded and for the most part showing arrangement in a pattern with both protractive and retractive alignment, passing into the weaker and much more distant papillation of the succeeding whorls, which on the adolescent and mature whorls becomes entirely obsolete; lines of growth very strongly developed, the major wrinkles well-spaced and almost rib-like on the earlier post-nuclear whorls, relatively finer, closer, and more irregular on the later whorls, which also carry weak traces of an incised spiral sculpture.

Color of shell: spire cream-buff to isabella color, sometimes with one or two narrow bands of cinnamon brown, or sometimes with a single wider band of dark olive buff, or sometimes unbanded save for the conspicuous wide supra-peripheral band of a lustrous and very dark liver brown (deeper and blacker than any of the Ridgway colors), 1.3 to 1.7 mm. wide, which may be either simple or varyingly bordered above and below with a rather narrower zone of ivory yellow or deep olive buff; base isabella color, either uniform or suffused dresden brown, more rarely a uniform dark liver brown.

Color of animal: (common light form), dorsum wood brown on margin and tail, heavily clouded natal brown on sides of back and head with lighter speckling and with a light median line on body of wood brown; sole a lighter buffy brown, obscurely margined a slightly deeper tone of the same; brown-based variety usually rather darker, the margins of the dorsum together with the tail region buffy brown, the head and sides of body clove brown with minute buffy brown spots and a narrow median line of the same; sole army brown, the marginal zone not very distinct.

**HOLOTYPE:** Cat. No. 7687 of the author's collection. *Paratypes* Cat. No. 7688 of same collection; others to be deposited in the collections of Allyn G. Smith, E. P. Chace, the United States National Museum, the Academy of Natural Sciences of Philadelphia, and Stanford University.

**TYPE-LOCALITY:** Beaver Creek about one mile above mouth, Siskiyou County, California; Leo Shapovalov, 27 May 1934.

		Maxi- mum diam- eter	Mini- mum diam- eter	Alti- tude	Diam- eter of um- bilicus	Num- ber of whorls
7688.	Paratype .....	26.8	23.0	21.5	3.1	6 $\frac{1}{3}$
"	" .....	25.8	22.1	16.7	3.2	6 $\frac{1}{4}$
"	" .....	25.8	22.1	16.2	2.7	5 $\frac{3}{4}$
"	" .....	25.7	21.2	15.1	3.0	6
"	" .....	24.7	21.0	15.7	3.2	6 $\frac{1}{3}$
"	" .....	24.6	21.3	15.1	2.6	6 $\frac{1}{3}$
7688a.	" .....	24.5	20.7	14.3	2.8	5 $\frac{3}{4}$
7691a.	Brown base	24.2	20.6	16.1	2.3	6 +
7687.	Holotype .....	24.1	20.5	15.4	2.8	6 $\frac{1}{3}$
7688.	Paratype .....	24.1	20.3	15.4	2.5	5 $\frac{3}{4}$
7691b.	Brown base	24.2	20.7	15.4	2.7	6 $\frac{1}{3}$
7688b.	Paratype .....	23.1	20.1	15.4	2.5	6 $\frac{1}{3}$
7688.	" .....	22.7	19.3	13.2	2.5	5 $\frac{3}{8}$
7688c.	" .....	22.4	19.3	14.8	2.5	6 +
7688.	" .....	22.3	18.7	13.2	2.5	6
"	" .....	21.7	18.2	12.9	2.4	5 $\frac{2}{3}$

The special characteristics of this very distinct race are the small size, thin translucent shell, completely permeable umbilicus, reduced banding, generally pale yellowish coloration, and sharply contrasted heavy peripheral band. It is one of the most beautiful snails we know in a specific complex where nearly all examples are strikingly handsome. The warm coloring and extremely conspicuous peripheral band give the shell an aspect more suggestive of one of the Oriental Euhadras than can be said of any other West American snail I know. The name selected, besides doing honor to the discoverer, finds additional significance in its suggestion of the tawny hues of the shell.

These snails were found by the collector in some numbers on dead alder leaves near the stream and likewise on alder trunks to a height of about nine feet.

#### MONADENIA FIDELIS KLAMATHICA new subspecies

DIAGNOSIS: Shell of but moderate size and heaviness, low-conic or low pyramidal-conic, umbilicate; the umbilicus steep-walled, distinctly permeable to apex, and having a maximum diameter in the type specimen of about one-ninth the major diameter of the

shell, but in other specimens usually narrower (1/12 to 1/14 the diameter of the shell). Whorls about  $6\frac{1}{4}$  or a trifle less, convex, the last with the superior portion distinctly descending in front. Aperture ovate, somewhat flattened below, and deflected from the vertical axis about  $48^\circ$ . Peristome sinuous, distinctly everted below and especially at the umbilicus, the outline of which thus becomes materially indented, but only slightly expanded on the upper segment; the edges converging and connected by a thin but evident callus.

Surface of first  $1\frac{3}{4}$  turns densely and closely set with diamond-shaped papillae usually eroded in mature shells, separated by narrow grooves, of which the obliquely descending are rather more distinct than the obliquely ascending ones, but the arrangement not always wholly regular. Lines of growth absent or difficult to make out on the first turn and a half, but quite strong on the succeeding quarter turn, after which the diamond-shaped papillation abruptly ceases, but the growth wrinkles, becoming further accentuated, are henceforth the dominant periostracal ornamentation. Surface of main portion of shell smooth and polished, unsculptured both above and below save for the lines of growth and a very finely incised almost microscopic spiral striation.

Color a much richer and darker chestnut brown, or a glossy light seal brown on the spire, and with a conspicuous tri-colored band bordering the periphery, the dark central stripe of about 2.5 mm. thickness being approximately the color of the base of the shell and in rich contrast to the stripe just below it which is of a thickness of 1.5 mm. and is ochraceous buff to yellow ochre in color. The uppermost band of hazel is slightly narrower than the lowermost and less conspicuous.

	Maxi- mum diam- eter	Mini- mum diam- eter	Alti- tude	Diam- eter of um- bilicus	Num- ber of whorls
Type .....	33.2	27.4	19.6	3.6	$6\frac{1}{4}$
Paratype .....	32.3	27.3	19.7	2.3	$6\frac{1}{4}$
“ .....	30.4	26.2	20.0	2.5	$6\frac{1}{8}$
“ .....	30.2	25.4	18.6	2.2	$6\frac{1}{8}$

TYPE: Cat. No. 6011 Berry Coll.

PARATYPES: Cat. No. 6172 Berry Coll. and Cat. No. 2714 A. G. Smith Coll.

TYPE-LOCALITY: Along Oak Flat Creek, near Klamath River, Siskiyou County, California; 3 living and 1 dead adults, 4 living juvenals, and 8 fragmentary shells; Allyn G. Smith; 7 July, 1924.

REMARKS: This seems a very distinct, though possibly local, subspecies of *fidelis*, and an exceedingly beautiful one. The dis-



tinctive characters are the comparatively small size, low-conic form, polished surface, and rich dark coloring, set off by the bright ochraceous banding. In the open funicular umbilicus of some of the shells the suggested approach is toward *M. mormonum*, which it also approaches in habitat as nearly as any member of the true *fidelis* series which the present writer has seen.

### NOTES AND NEWS

EXACT DATES OF THE NAUTILUS.—Volume 50 (1): pp. 1-36, was mailed July 14, 1936; (2): 37-72, pl., Oct. 29, 1936; (3): 73-108, Jan. 29, 1937; (4): 109-144 (+ viii), May 4, 1937.—H. B. B.

A CORRECTION: *Drymaeus fusagasuganus*.—By error this name was printed *Drymaeus "tusagasuganus,"* Proc. Acad. Nat. Sci. Phila., vol. 87, p. 85, 1935. The locality is Fusagasugá, near Bogotá, Colombia. In the same paper, pp. 83-4, "*Plectostylus*" was printed instead of *Plckocheilus*.—H. A. PILSBRY.

MICRARIONTA HARPERI ORCUTTIANA, new name.—*Sonorella baileyi orcutti* Bartsch, Smiths. Misc. Coll. 47: 196, 1904, now referred to the genus *Micrarionta*, is homonymous with *Epiphragmophora orcutti* Dall, 1900, which is also a *Micrarionta*, though belonging to a different section of that genus. According to Willett (NAUTILUS 50: 123) my *orcutti* is a subspecies of *M. harperi* (Bryant), 1900. It may be called *Micrarionta harperi orcuttiana*.—PAUL BARTSCH.

THE SELECTION OF FAMILY NAMES.—In recent years some authors have changed well-known family names on the pretext that they were not formed from the names of the oldest genus included in the family. The International Commission on Nomenclature has now considered this in Opinion 133, concluding that "The original author of a family name is free to select any contained genus as the nomenclatorial type of that family. It is not necessary to select the oldest included genus as type genus of the family."

THE SUPPOSED INTRODUCTION OF AN AFRICAN ARCHACHATINA INTO THE WEST INDIES.—In our recent revision of the genus *Archachatina* we mentioned (Rev. Zool. Bot. Afric., vol. 29, 1936,

p. 81) Dr. F. Haas' record of *A. marginata* (Swainson) being found at Frankfort a.-M., Germany, supposedly introduced with bananas from Jamaica. The occurrence of this large West African snail in the West Indies seemed, however, highly problematical to Dr. Haas and to us. Dr. Caesar R. Boettger has kindly informed us that, in his opinion, the Frankfort *Archachatina* was introduced with bananas from Victoria, Cameroons. At present Germany receives bananas, not only from the West Indies and Canary Islands, but also regularly from Cameroon. There seems to be no evidence whatsoever that any of the large Achatinidae have been imported as yet from Africa into the West Indies.—J. BEQUAERT and W. J. CLENCH.

FOOD OF *CASSIS MADAGASCARIENSIS*.—For five years it has been noticed that nearly all specimens of living *Cassis madagascariensis* Lam. were found in, or near, clusters, or colonies, of the young sea urchin *Toxopneustes variegatus* (Lam.). Therefore, the opinion was formed that these urchins must be the food of this species of *Cassis*. Positive proof that this opinion was correct was produced on March 23, 1937, when upon removing the animal parts of a specimen of *madagascariensis* the undigested spines of what appeared to be several of this sea urchin was found in the inner parts of the *Cassis*. Since *Cassis tuberosa* and *Cassis testiculis* also are found mostly in or around these urchin colonies it is very probable that they are also fond of the food so evidently favored by their cousin.—FRANK B. LYMAN, Lantana, Fla.

PLEURODONTE GUADELOUPENSIS DOMINICANA, new subspecies.—The shell is smaller than the Martinique race (*P. g. roseolabrum*), but with the teeth in the basal lip as widely spaced as in that, the bay between them therefore wider than in *P. guadeloupensis*. Typically russet to cinnamon-brown with light summit, but sometimes olive-buff, or olive-buff with some brown on the spire; peristome white or brown. Height 9.2 mm., diam. 14.6 mm., or smaller, diam. 12 mm. Pl. 2, fig. 3. Dominica, B. W. I., coll. by Benj. Sharp, C. A. Barber, T. Barbour and others, the type, 78306 ANSP., coll. by C. A. Barber. Many specimens show that while this Dominican race is close to that of Martinique and exhibits much the same color variations, it appears constantly separable.—H. A. PILSBRY and T. D. A. COCKERELL.

RHACHISTIA HISTRIO IN NEW CALEDONIA.—When my wife and I were in New Caledonia, we found snails on the small trees and bushes at Bourail; the only truly arboreal species observed on the island. It was easy to identify the species as *Rachis mageni* Gassies, recorded from Prony Bay, Balade, Bourail, Isle of Pines, and the Loyalty Islands. It is variable and the color varieties have been named *monozona* Crosse, *colorata* Crosse, *punctata* Gassies, and *unicolor* Gassies. The shell from Kanala, called *zonulatus* Pfeiffer, 1863, is said to be the same as *mageni*. In the New Caledonia fauna this species is entirely isolated, and appears exotic. I brought back some alcoholic material and Lieut.-Col. A. J. Peile has kindly mounted the radula. He finds that the species is identical with *Rhachistia (Eorrhachis) histrio* (Pfeiffer).—T. D. A. COCKERELL.

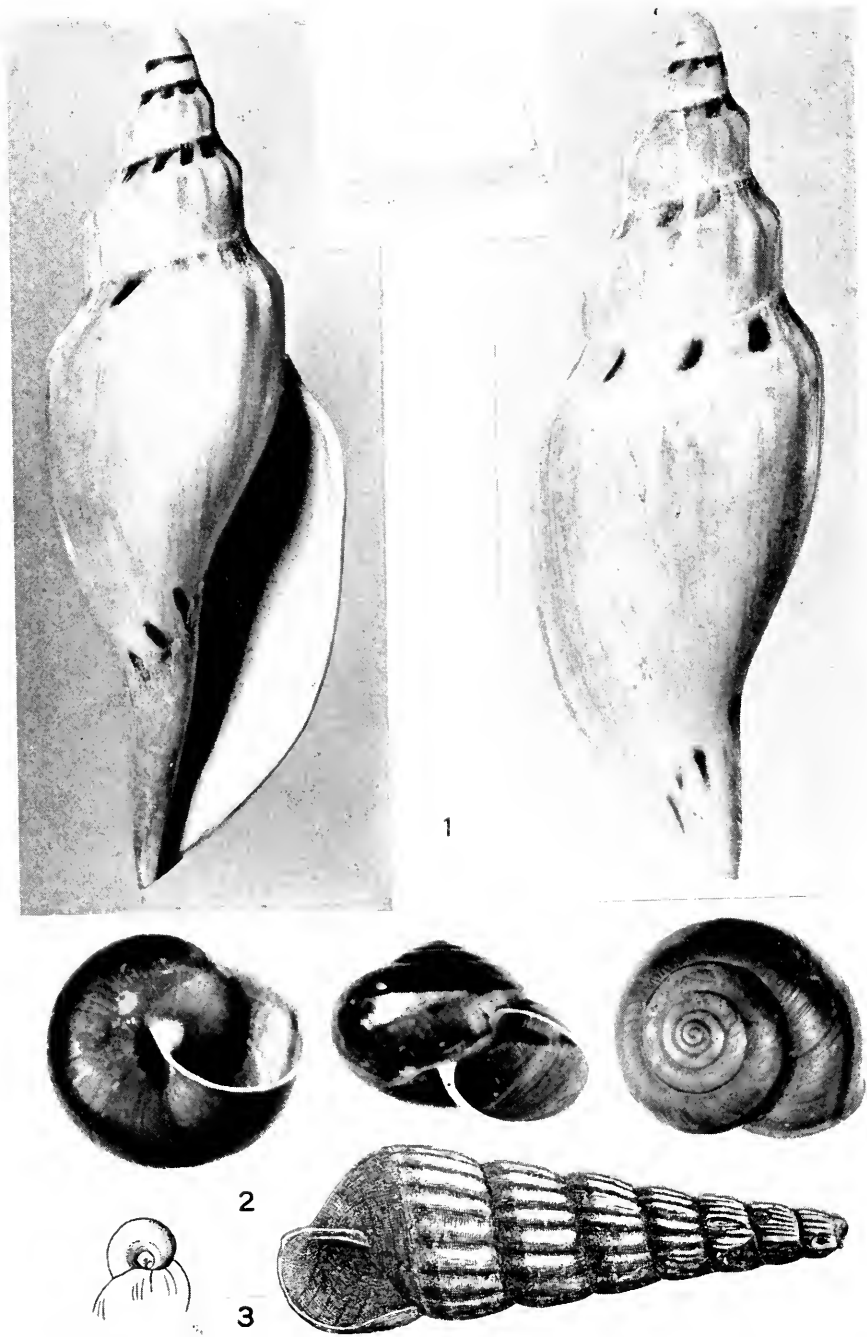
HELMINTHOGLYPTA SONOMA, n. sp.—The shell is rather strongly depressed, umbilicate, the umbilicus contained about  $7\frac{1}{2}$  times in diameter. Color varying from cinamon-brown to tawny-olive, paler on both sides of the chestnut-brown band above periphery. Surface glossy, the first  $1\frac{1}{2}$  whorls microscopically and indistinctly wrinkled radially, with a few low, sparsely scattered pustules; following two whorls with fine growth striae and a few scattered pustules; last whorl finely wrinkle striate with some shallow malleation at and below the periphery, and faint traces of spiral impressed lines below the suture, near aperture. The whorl scarcely descends in front. Aperture oval, fawn color and showing the dark and light bands inside. Peristome is expanded above, narrowly reflected outwardly and at base, the columellar dilation impinging but little on the umbilicus. Height 13.8 mm., diam. 23.6 mm.; 6 whorls, or  $13.5 \times 22.6$  mm. Monte Rio, Sonoma Co., California. Type and paratype 153680 ANSP., coll. by Stanley C. Field. It is smaller than *H. sequoicola*, more depressed, with papillae so few that they are easily overlooked.—H. A. PILSBRY.

RISSEA BERMUDEZI AGUAYO AND REHDER.—Dr. Wendell P. Woodring has called my attention to the fact that *Rissoa (Folinia) bermudezi*, which Dr. Aguayo and I described a short while ago (Memorias Soc. Cubana Hist. Nat., vol. 9, 1936, p. 265)

is similar to a form from the Bowden formation which he named *Rissoa lepida*, erecting for it a new subgenus, *Mirarissoina* (Carnegie Inst. Washington, Publ. no. 385, p. 365). Our species is therefore the first living form to be referred to *Mirarissoina*, a group which is not closely related to *Folinia*, as Woodring has pointed out (loc. cit.). *R. bermudezi* differs from *lepida* Woodring in being larger, with finer spiral sculpture, and with a conspicuous apophysis on the parietal wall at the anal notch; *lepida* has only a slight protuberance there.—H. A. REHDER.

THE TYPICAL FORM OF HELMINTHOGLYPTA CALIFORNIENSIS (Lea).—Some time ago I had occasion to overhaul our helices of the *californiensis* group, but was stumped by finding two distinct subspecies from Cypress Point, Monterey Bay, in our collection, and I could not understand how it was possible for two subspecies to occupy the same zone, and yet they were perfectly good distinct forms. So in going West in 1923 I ran down to Cypress Point and scratched around for material, which resulted in my finding the big form among the dead cypress needles on the mainland of the Point. This is the *Helix vineta* Val., and that race only occurred at this place. I had previously talked with Dr. Dall about this problem. He had collected there in the sixties, and he told me that he had camped out at the Point over night in order that he might be able at low tide to examine some of the offlying rocks. He thought it might be possible that the smaller shells, which he had collected and which were put in with our larger things, all labelled Cypress Point, might have come from some of the offlying rocks. With that end in view, I jumped over to these offlying rocks at the Point, and there discovered the small race in company with the small race of *E. dupetithouarsi* crowded together under mats of ice plants (*Mesembryanthemum*). This small race is the *Helix californiensis* of Lea. We have three specimens in our Lea collection received from Nuttall by Lea, just as he states in his description; so they are undoubtedly part of the material used by Lea in his description. The mystery, therefore, of the relationship of the larger *H. vineta* and *californiensis* is solved, since they do not occupy the same territory, but distinct habitats. Both names can therefore be retained.—PAUL BARTSCH, letter of Jan. 20, 1927.





1, *Aurinia torrei* Pils., with apical whorls  $\times 4$ . 2, *Helminthoglypta traski misiona* Chace. 3, *Turbonilla (Pyrgolampros) skogsbergi* Strong. Type, length 5.6 mm., and apical whorls of paratype, length 2.5 mm.

# THE NAUTILUS

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## AURINIA TORREI, A NEW CUBAN VOLUTE

BY H. A. PILSBRY

In June of this year Dr. Carlos de la Torre received from Señor Prida, an able amateur conchologist, two volutid shells which had been taken in a *nasa* (fish trap) in over 10 fathoms, off Cayo Francis, Caibarien, on the north coast of central Cuba.

This graceful volute, distinguished for its beauty in a family famous for lovely lines and coloring, may appropriately be named in honor of Dr. CARLOS DE LA TORRE, premier authority on Cuban mollusks, and President of the American Malacological Union.

### AURINIA TORREI, new species

Plate 4, fig. 1

The shell is fusiform with rather long anterior canal, not very thick, glossy. Color pale ochraceous-buff, darkening on the anterior canal to light ochraceous-salmon, the first two whorls white; with a series of short, protractive, oblong to trapezoidal spots of mars brown to russet color below the suture, connected by a weak, irregularly developed subsutural band, which begins at the end of the second whorl and fades out on the last whorl. Around the base, at the origin of the anterior canal, there is an obliquely spiral series of short streaks, like the subsutural spots in color. The apex is formed of a short projecting point; the surface of the first whorl is uneven. Near the end of the second whorl fine spiral striae appear, continuing to the penult whorl where they gradually disappear. The fourth and later whorls become bluntly shouldered and develop short axial folds which are prominent at the shoulder but disappear above and below it. There are about fifteen such folds on the penult whorl; on the last half of the last whorl they become subobsolete. The long aperture is

tinted within like the outside. Outer lip blunt, in profile view seen to be retracted towards suture and base. Columella almost straight, smooth. Length 113 mm., diam. 38 mm.; length of aperture 72.5 mm.; 6 whorls.

This species is not closely related to any of the known aurinias, being perhaps nearest to *A. dubia* Brod.

The type is 168804 A.N.S.P.; another specimen is in Dr. de la Torre's possession.

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## NOTES ON THE RECENT SPONDYLUS OF FLORIDA

BY HUGH C. FULTON

The following species of *Spondylus* have been quoted in various publications as having been taken off Florida, viz.: *Spondylus americanus* Lamk., *S. echinatus* Lamk., *S. spathuliferus* Sow. (non Lamk.), and *S. gussoni* Costa. The first two named are conspecific. *S. spathuliferus* Sow. is *ictericus* Reeve, and *S. gussoni* Costa (a Mediterranean species), is probably a wrong identification. This leaves two species.

### 1. *Spondylus dominicensis* Röding.

1784. *Spondylus echinatus* Martyn, Univ. Conch. fig. 154 (not binomial).

1798. *Sp. dominicensis* Röding. Bolten Catalogue p. 193.

1819. *Sp. americanus* Lamk., Anim. sans Vert. Vol. VI, p. 188 (not of Schreiber, 1793).

1819. *Sp. arachoides* Lamk., Anim. sans Vert., Vol. VI, p. 188.

Two other names have been associated with *americanus* Lk. They are *longispina* and *avicularis* both of Lamarck. I am unable to identify *avicularis*, but it is certainly not the same as *americanus* Lk. *Sp. longispina* Lk. is a synonym of *Sp. pesasininus* Röding.

In my "List of species of *Spondylus*," Jour. of Conch. 1915, p. 331, I followed Hedley and Pilsbry in "Nautilus," Vol. 26, p. 46, in giving Hermann, 1781, as author of the name *americanus*; but I have since discovered that it was a *nomen nudum*, no adequate description or reference to any figure being given.

The next earliest name available known to me is *dominicensis* Röding.



Schreiber's *Sp. americanus* (Versuch einer Vollständigen Conchylienkenntniss, 1793) is to me the same as the *variegatus* Röding (Bolten Catalogue p. 194). I am unable to agree with Cox (Proc. Mal. Soc. Lond. Vol. 18, p. 251) that Schreiber's species is Lamarck's *longitudinalis*, a species that I believe to be unidentifiable.

## 2. *Spondylus ictericus* Reeve.

1856. *Spondylus ictericus* Reeve, Conch. Icon. pl. XI, fig. 40 (a beach-rolled specimen).

1848. *Spondylus spathuliferus* Sow., Thes. Conch. p. 421, pl. 89, fig. 61. (Not of Lamarck, 1819, a synonym of *ducalis* Röding, 1798.)

The type of *ictericus* is beach-rolled and difficult to associate with perfect specimens. One requires a series in varying conditions to see the connection. I recently received a fine specimen from Mr. Lermond, it was taken 80 miles off the west coast of Florida. This species appears to be common in the West Indies, and like most Spondyli varies greatly in color and in the disposition and length of its spines.

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## A DENSE AGGREGATION OF SNAILS

BY E. A. ANDREWS

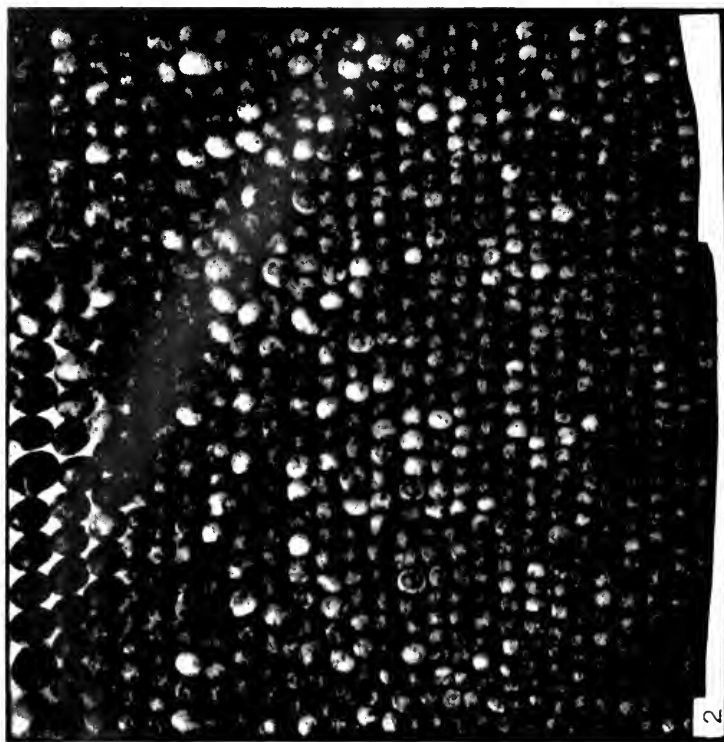
(Plate 5)

The crowding together of animals, not members of a family or colony, may sometimes be brought about by favorable conditions for feeding and such seems to have been the case in the aggregation to be described. Land snails may aggregate about limestone, or even old oyster shells, and marine snails may crowd together upon sea weed between tides, or about food on mud flats. T. D. A. Cockerell in *Science Gossip*, 1885, described *Limnaea stagnalis* on a newspaper in a pond: "So that for a space of about a foot square nothing else could be seen." In fresh-water streams the density of snail population varies much from point to point.

The "Great River" of the northwest part of Jamaica B. W. I. drains a limestone area some twenty miles long and ten wide as a rapid stony stream with but a few miles of submerged bed where set back by the sea and navigable for canoes. Among the

various snails living in its rapid waters is the *Neritina alticola* described by Pilsbry in 1932, from specimens taken in 1910 far up the main stream near Marchmont at an elevation of 627 feet. But in 1932 this locality yielded only the common river snail, *Hemisinus lineolatus*—and it appeared as if the encroaching banana cultivation had modified the conditions too greatly. But at a much greater elevation this species was common both in 1910 and 1932 in the branch stream arising from the spring at "Spanish Dam," Catadupa. In the main stream also, some miles farther down, these snails were collected both at Shettlewood Bridge and Lethe Bridge in 1932, at elevations of 300 and 216 feet. In the last named locality there were also some *Ampullaria fasciata* and *Neritina virginea*. This last species, along with *Neritina punctulata*, was found in great numbers a few miles yet farther down stream where the last rapids enter the smooth tide-level reach of the river. This locality is shown in figure 1. Here is the head of an old sluice that once carried water to a hydroelectric plant for the town of "Montego Bay." The scattered stones swarmed with old and young snails of these two species of *Neritina* along with few *Hemisinus lineolatus*; and many of the small *Neritilia succinea* Sby. in clusters of fifty to a hundred. In June 1910 these *Neritinas* were so thickly crowded on rocks and stones, little below water level, that, in a short time, there were collected by hand some eight quarts containing 5249 shells. A month later still more were taken, by feeling them in the turbid rising freshet flow on the deeper surfaces and under sides of large stones. Often the snails *Neritina punctulata* were deeper down than the *Neritina virginea* and in spite of their wider flat form, that seems so well shaped to cling to stones, they fell off more readily when touched than the rounder *N. virginea*, escaping in the flood of rushing waters. This shrinking-in reaction may be what was described for certain *Neritinas* by Fredericque as "death-feigning," reported in "The Biology of the Sea Shore," by Flattely and Walton. In July 1932 both species of *Neritina* were still abundant in this same locality. They were commonly not far beneath the surface, crawling upon rocks and upon old water-logged trunks of trees, sometimes in clusters, so that several were taken in the hand at once. *Neritilia* also occurred then as





E. A. Andrews:—Fig. 1, Great River, Jamaica. 2, *Nautilina virginea* and *N. punctulata*.

twenty-two years before, but chiefly under the larger stones, and when these were placed upside down out of water these small snails began a rapid flight, in files one after the other, from the light down under the inverted stone. Egg capsules of both species of *Neritina* were very abundant over the stones and wood under water, as were the capsules of *Neritina alticola* in the upper reaches of this river; this being a breeding season.

In 1910 the greatest crowding of *Neritinas* was in certain depressions in the rocks of midstream where unusual amounts of moss and algal growths seem to have attracted the snails which were also here somewhat more protected from the force of the stream. One such depression had an area measured as one square foot and from it were taken all the shells shown in figure 2. This photograph represents a square foot of paper on which all the shells were paced in lines according to size, covering closely all the square foot except for the small area below, still seen as white paper. While in the original habitat some of the snails were crawling upon top of one another the rock surface well covered since there were many *Neritilia* and some small young *Neritinas* not collected and hence not shown in figure 2. The entire number of shells from this square foot was 829, or at the rate of 5.7 per square inch. Most of them, 765, were *Neritina punctulata* at the rate of 5.3 per square inch and only 64 *Neritina virginea*, at the rate of less than one-half to the square inch. As seen in figure 2, these snails were not all of one size but were a collection of various sizes, and presumably ages, of which some of the very smallest and youngest were not captured. Those collected and shown in the photograph were: 37 of diameter 17-23 mm. that stuck on a wire mesh of 11 mm. side; 706 sticking on a mesh of 5.5 mm.; 82 on a mesh of 4.5; and but 4 on a mesh of 3.5. Apparently all but 37 of the *Neritina punctulata* were young of several ages while 50 of the 64 *N. virginea* were well grown.

The water in this locality is so heavily charged with lime that calcareous sinter forms not only upon stones but upon the shells of these snails many of which bear minute algal growths that accumulate the white deposits so noticeable upon many of the shells in figure 2; upon the upper surfaces and about the lower rims. Not only is there an abnormal rough white surface thus given to many of these shells but the form and proportions are distorted,

*ogy* so far located nine have all seven parts, but only five of these have the original covers. Of the five, only one bound copy, that originally owned by W. G. Binney, and the unbound set now in the Tomlin collection, have the text, plates, and covers in their original sequence.<sup>4</sup>

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Separata of Say's article on *Conchology* from the *third* edition of Nicholson's *American Encyclopedia*, 1819, are sometimes found in bound copies.<sup>5</sup>

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The second American edition of the *Encyclopædia*, published in 1818, contains the same article of fourteen pages, and the four plates. The article is unsigned.

*Description of the Several Parts*

The rarity of the work is probably due to the conditions under which it was written and published. The author was remote from a reference library; dependent on inadequate equipment at the New Harmony School Press, where the work was printed page at a time; and the public was indifferent to a technical and occasional paper on a new and unfamiliar subject. Say's biographer, Dr. George Ord, sometime President of the Academy of Natural Sciences, and a close personal friend of the author, does not hesitate to characterize the work as a wretched and disgraceful example of American typography, whose only redeeming feature was the lovely plates drawn by Mrs. Lucy Say and engraved by such masters as Tiebout and Lyon. The work was, in fact, in glaring contrast to the superb volumes of Say on *American Entomology*, published under the liberal patronage of Mr. Samuel Augustus Mitchell, in Philadelphia (1824, 1825, 1828, three volumes; republished by W. G. Binney, with the original plates, in 1859, in two volumes). Dr. Ord's strictures on Say's indifference to the habits and life history of his species are not always justified, his treatment of the genera *Pecten*, *Ostrea*, and *Petricola*, for example, being in every way commendable.

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The third American edition, published in 1819-21, contains, in Vol. 4, the same article, revised and enlarged to 20 pages, together with the four plates, and this is well known to be the work of Say. A paragraph from the revised article reads as follows: "We think it proper to state, in addition to the above remarks, which are annexed to the descriptions in the first and second editions of this work, that several species and three new genera are now added, which, with the exception of a small number of new species now first published, we have previously given to the world, in several detached essays, in the pages of the Journal of the Academy of Natural Sciences, in the collection of which Academy all the species are preserved."

In the London edition of *Nicholson's Encyclopædia*, published in 1809, in Vol. 2, there is a seven page article on Conchology, without plates, but this was certainly not the work of Say.

through the accumulated literature at the Academy by Dr. James A. G. Rehn resulted in finding two complete copies of Say's *American Conchology*, and a small package containing copies of Part VII in the original covers. This discovery prompted a more thorough inquiry as to the status of original copies in public and private collections, which inquiry disclosed the facts which are here presented. It will be apparent that this work, with or without the supplemental section edited by Conrad, is one of the great rarities in American scientific literature.

#### *Original Copies of Say's American Conchology*

Perhaps the most important copy of this work is the one presented by Mr. Say's widow to the Academy of Natural Sciences, the date of acquisition being prior to 1840. The covers, text, and plates are intact, though the covers are bound in at the back. The Academy possesses another copy, which was presented to the institution by J. S. Phillips subsequent to 1862, since the accession slip is in the handwriting of Dr. Nolan, who was not connected with the Academy until 1862. One of the copies recently discovered in the Academy storeroom, and now the property of Dr. Irene McCulloch, of the University of Southern California, is complete, but the covers have been bound in at the back. The other copy found at the same time is also complete, and in the original sheets and covers. It was purchased by Mr. J. R. LeB. Tomlin, of St. Leonards-on-Sea, England.

Sabin's *Bibliotheca Americana* attributes a copy of the Seventh Part to the New York State Library, Albany, N. Y. This particular copy must have perished in the great fire of 1912, for the copy now owned by the Library does not contain the concluding signature. It lacks also the Glossary and the original covers. The Union Library Catalogue attributes a copy to the Library of Harvard College. This copy was located in the Library of the Museum of Comparative Zoology, Cambridge. It is complete, though the copy has been broken up in rebinding, the text and the plates being arranged to suit a classification agreeable to the original owner. The covers have not been retained, and the copy is minus the Glossary. Other copies containing Part VII are in the John Crerar Library, Chicago; the Library of the Uni-



versity of Michigan, which copy was originally in the library of the late Bryant Walker; and the Historical Society of Pennsylvania, Philadelphia. All three copies lack the original covers and the Glossary.

There is a bound copy in the Library of the University of Chicago, containing the six parts, with the original covers, and the Glossary. The Boston Public Library, the Franklin Institute, Philadelphia, and the Library of Congress all have bound copies, lacking Part VII and the covers. The Boston Public Library has also the Glossary; the others probably have the Glossary either bound in or preserved separately.

The Indiana State Library has two copies, each containing the six parts without covers. One is known as the Holliday copy, and has the Glossary; the other has the Glossary but the plates are bound in at the end of the volume.

The copy originally owned by Roswell Marsh is now in the writer's collection. It is bound in order, but the covers are missing, though the Glossary accompanies the volume, being inserted as a separate. Roswell Marsh was a pioneer surveyor west of the Mississippi River, who had to execute some of his commissions under military protection. Marsh's copy was bequeathed to his nephew, Charles E. Udell, of Dubuque, Iowa, and bears the autograph of both owners.

A bound copy, containing six parts, but no covers, and possibly the Glossary, is in the Workingman's Library, New Harmony, Indiana, where Say lived and where he is buried.

Finally, there is the copy originally owned by W. G. Binney, containing all seven parts, the text, plates, and covers in their original order, though the Glossary is not included. This copy is now in the possession of the writer.

Records show that there was once a copy of Say in the Library of the Smithsonian Institution, but it cannot be located now. Inquiries failed to find a copy in the libraries of Dr. William H. Dall or John B. Hendesron, Jr., both of which are in the Department of Mollusks in the National Museum. The Library of Western Reserve Historical Society, Cleveland, Ohio, and the Boston Public Library, each possess a copy of Part I.

*Summary.*—Of the eighteen copies of Say's *American Conchol-*

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Since the pages are not numbered, and the several parts do not have any distinguishing title pages, it is impossible without the covers in place to make sure of the original collation. A single part consisted usually of forty pages, and, with the exception of the Seventh Part, of ten plates. Two of the completely assembled copies preserve the original order. Most binders, unless specifi-

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The third American edition, published in 1819-21, contains, in Vol. 4, the same article, revised and enlarged to 20 pages, together with the four plates, and this is well known to be the work of Say. A paragraph from the revised article reads as follows: "We think it proper to state, in addition to the above remarks, which are annexed to the descriptions in the first and second editions of this work, that several species and three new genera are now added, which, with the exception of a small number of new species now first published, we have previously given to the world, in several detached essays, in the pages of the Journal of the Academy of Natural Sciences, in the collection of which Academy all the species are preserved."

In the London edition of *Nicholson's Encyclopædia*, published in 1809, in Vol. 2, there is a seven page article on Conchology, without plates, but this was certainly not the work of Say.

cally instructed, are almost sure to discard covers and advertising pages, though these materials are often rich in historic, and even scientific, data.

PART I comprises forty pages of text, which count includes the title and dedication pages. The cover is the same as the title page, except that the space given to the name and connections of the author and a familiar quotation from Young is used for a Table of Contents. This table, as on all subsequent covers except that for Part VII, is arranged in the alphabetical generic order. At the foot of both the title page and the cover is the date of publication, 1830. At the heading of the cover, in a single line, is the identification of the part: "Vol. I. No. 1. Price \$1.50 coloured."

The following thirteen species are treated in order: *Astarte castanea*, *Pandora trilineata*, *Oliva literata*, *Unio triangularis*, *Unio sulcatus*, *Unio ridibundus*, *Unio monodonta*, *Delphinula ? laxa*, *Melania nupera*, *Melania depygis*, *Lutraria lineata*, *Paludina decisa*, and *Paludina vivipara*. Four of these are for the first time described, and are indicated by italics. The ten plates, numbered 1-10, were engraved by C. Tiebout.

The other pages of the cover have no printing on them, save the last which carries an "Erratum," reading: "In the Observations on *Unio ridibundus*, for '*flagellatus*, Nob.' read *sulcatus*, Lea."

PART II consists of forty pages, the last two being blank, and ten plates, numbered 11-20. The species treated, thirteen in all, are enumerated as before in alphabetical generic order. The cover states that the number is Vol. I. No. II, and the date of publication, given at the foot, is April, 1831.

The species treated are: *Anodonta suborbiculata*, *Nucula limatula*, *Nucula laevis*, *Nucula concentrica*, *Helix albolabris*, *Helix thyroidus*, *Unio ellipsis*, *Unio subtentus*, *Unio undulatus*, *Unio abruptus*, *Solecortus costatus*, *Fulgur pyruloides*, and *Glandina truncata*. Of these only three are for the first time described, indicated as before by italics. On the last page of the cover there is an extended statement on the objectives of the work and an urgent appeal for the support of the project. The author promises a reduction in price of the parts from \$1.50 to \$1.00 as soon as a sufficient number of subscribers are enrolled, but gives any subscriber the privilege of withdrawing his name after con-

cluding his payment for the fourth number. It is feared that most of them availed themselves of this offer.

PART III consists of forty pages of text and ten plates, numbered 21-30. The typography of the cover is somewhat changed, a bolder type being used. The Section is designated simply as "No. III. Price \$1.50 coloured." It bears the date, September, 1830, but this was corrected on the last page of the cover of Part VI to read, 1831. On the last page of the cover there is a notice set in large type, in two lines, expressing a fear that because of the author's "insular residence" some errors of nomenclature may have crept in. "Judicious criticism" is solicited, which will be given space on the covers of succeeding issues.

Sixteen species are treated in this number in the following order: *Alasmodonta confragosa*, *Unio phaseolus*, *Unio tetralasmus*, *Sigaretus perspectivus*, *Sigaretus maculatus*, *Venus grata*, *Scalaria clathrus*, *Scalaria multistriata*, *Scalaria lineata*, *Amphidesma transversum*, *Amphidesma aequale*, *Fusus corneus*, *Fusus cinereus*, *Paludina ponderosa*, *Paludina subpurpurea*, and *Paludina intertexta*. Six of these described as new are indicated by italics.

Part IV, bearing on the cover the date of March, 1832, treats of fifteen species. As before there are ten plates, numbered 31-40. The table of contents arranged the genera in alphabetical order, but the textual order is as follows: *Limneus umbrosus*, *Limneus reflexus*, *Limneus reflexus*, *Limneus elodes*, *Unio ventricosa*, *Unio interruptus*, *Unio glebulus*, *Unio declivis*, *Arca staminea*, *Arca lienosa*, *Helix clausa*, *Helix elevata*, *Helix profunda*, *Siphonaria alternata*, *Bullina canaliculata*, and *Cardita tridentata*. Only two of these are described as new in this number, and both of these are fossils. The signature of a new engraver, L. Lyon, appears on five of the plates, that of Tiebout on three, and two are unsigned. On the last page of the cover, separated from other notes by a heavy black lead, is the statement that since the publication of the preceding number Mr. Tiebout had died.

Faithful to his agreement on the last page of the cover of Part III, Say published on the last page of the cover of Part IV a correction of an erroneous conclusion he had drawn as to the habitat

of a shell he had received from Mr. Barabino, a correspondent of his in New Orleans. He stated that his *Alasmodonta confragosa* was not found in the Mississippi River near New Orleans, but in Bayou Teche, Louisiana, "about two hundred miles N. N. W. from New Orleans." He also referred to the researches of another correspondent, Mr. O. Evans, which leave no doubt that *Ampullaria urceus*, published as a Mississippi River shell, is not an inhabitant of that stream; and made request for further information.

(To be continued)

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## THE SEASONAL LIFE HISTORY OF A LAND SNAIL, *POLYGYRA THYROIDUS* (SAY)<sup>1</sup>

BY HARLEY J. VAN CLEAVE AND THURAL DALE FOSTER<sup>2</sup>

After many years of collecting and field study of *Polygyra thyroidus*, the wooded flood plain of the Sangamon River about one and one-half miles northeast of White Heath in Piatt County, Illinois, was selected as a site for intensive study of this species of land snail. From 1931 to 1936 the junior author of this paper took a series of thirty-two population samples from this area and made extended field and laboratory observations. The collections included at least two representative samples for every month of the year and for most months three or even four samples were available for study. More than 2700 individuals of *P. thyroidus* were studied. Periods of flood and other circumstances prevented sampling at regular monthly intervals. The analysis of these collections yielded many points of interest concerning the biology of *P. thyroidus*, considered in a manuscript thesis prepared by the junior author. Two sections of this thesis have been published previously (Foster, 1936 and 1937). The present paper includes observations and conclusions relating to the seasonal life history of *P. thyroidus*. Rate of growth was determined by distribution curves prepared for successive samples and checked by observations on individuals and groups kept in terraria.

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<sup>1</sup> Contributions from the Zoological Laboratory of the University of Illinois.

<sup>2</sup> Mr. Foster died June 6, 1936.

In spite of prolonged observations, little information on mating in this species has been obtained. This is probably due to the fact that this species is largely nocturnal in habits and most of the field study was of necessity carried on in daylight. On November 2, 1931, a pair of these snails was found in copulation in the field just at twilight and on the evening of September 21, 1935, one pair was found in copula while a collection was being transported to the laboratory for study. These two instances give evidence that fertilization occurs in the fall. Collections of living snails brought into the laboratory in the fall have been kept under close observation for a period of five months, until eggs were laid, but the writers were not able to secure observations on copulation in these experiments.

In the laboratory, *P. thyroïdus* has been observed to deposit eggs as early as February 2, but in the field the earliest clutches of eggs were found on May 1 and other snails in the same area continued to deposit egg masses until August 15.

The eggs usually occur in small, shallow holes in excavations in the soil prepared by the snail. In the area studied, eggs have never been found in the debris or rotten wood. The masses encountered in the field contained 20 to 70 eggs each.

In terraria, at room temperature, 19 days has been the minimum time observed for hatching. However, eggs laid on the same day have shown as much as seven days' difference in incubation time when kept under the same general conditions of temperature and moisture. It is probable that there is even greater variability in incubation time under conditions of nature. The long egg-laying season, extending over several months, and the irregularity in time of hatching are factors which enable *P. thyroïdus* to maintain itself under the unstable conditions of the flood plain. Changes such as those produced by flood waters are usually of but short duration and could not wipe out an entire new generation as might be the case if all of the eggs were deposited at the same time.

There is extreme individual variation in growth rate in *P. thyroïdus*. In laboratory experiments it has been repeatedly noticed that young snails of this species hatched in a terrarium from the same clutch of eggs do not grow at a uniform rate even

when kept under similar environmental conditions. In a period of three months, individuals hatched at the same time and kept under identical conditions of light, moisture, temperature and food supply included some fully twice the shell diameter of others. Simpson (1901) noticed comparable differences in the growth rate of individuals of *P. albolabris*.

Individual variability in growth rate, the long period during which eggs are laid and highly variable seasonal and environmental conditions encountered by the young at the extremes of the reproductive season introduce a series of highly complex variables into the interpretation of population samples. As pointed out by one of the authors of this paper (Foster, 1936) the extremes in size of adult shells in this and other species of and snails are so conspicuously different that earlier writers attributed distinct varietal status to the extremes in shell size. Distribution of shell size in this species conforms to a normal distribution curve within which adult shells range from 18.5 to 24.5 mm. in greater diameter.

That growth rate is largely influenced by environmental conditions, as well as by individual peculiarities, has been shown by comparing rate of shell growth in specimens in terraria at room temperatures with individuals confined in enclosures out of doors. Previous observations based on analysis of successive samples had given evidence that *P. thyroïdus* makes little growth during the winter months. This species seems to be restricted to woods nettles (*Laportea canadense*) and possibly other succulent vegetation as food, for in nature there is little evidence of growth during the fall, winter and early spring. During the period from February 6 to April 3 forty-nine immature individuals of *P. thyroïdus* were placed in a screened outdoor enclosure in ground cover from their original habitat. In eight weeks these individuals added on the average but 0.09 mm. to the greater shell diameter. In the same period a comparable series kept in a terrarium at room temperatures and fed in lettuce showed an average increase of 1.3 mm. in greater diameter. On several occasions, young at room temperatures have shown an increase of more than 2 mm. in greater diameter per month and one individual grew 3 mm. in greater diameter in one month.



Upon hatching the young of *P. thyroidus* are approximately 3.5 mm. in greater diameter. Individuals of this size are found only with greatest difficulty in the loose soil and floor cover of the flood plain habitat.

Collections of immature individuals taken in the winter months have a mode of lesser diameters falling at 7.5 mm. Similar collections taken in spring months have a mode for lesser diameter of the shell at 8.5 mm. Woods nettles, the chief food plant of *P. thyroidus* begins to appear in late April or early May. Thereafter growth is rapid and by August the mode for immature shells is about 16.5 mm.

Practically all of the snails that pass one winter as immature young attain full growth, form a reflexed lip on the shell and are recognizable as mature adults by the following fall. Typically, the first breeding season is in the third year.

In the attainment of mature form individuals show marked differences. During summer and fall, when growth rate is most pronounced, the largest juvenile shells are as much as 4 mm. greater in diameter than the smallest adult shells living with them. Growth rate tends to be relatively slow in the first season after hatching. One millimeter increase in diameter is about normal during the four summer and early fall months following hatching. Small snails that enter the winter season with a diameter of only about 7.5 mm. show marked increase in growth rate when active feeding starts in late April or early May. For a short period in early spring the increase in diameter is at a rate of approximately 2.5 mm. per month.

Maturity requires more than one full year. The individuals which attain a lip in the fall of their second growing season produce eggs the following spring when they have just completed their second year or are entering on their third year. Three or possibly four years seems to be the usual length of life for individuals of this species.

#### REFERENCES CITED

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Simpson, G. B. 1901.—Anatomy and physiology of *Polygyra albolabris* and *Limax maximus* and embryology of *Limax maximus*. Bull. N. Y. St. Museum, Vol. 8, no. 40.

## A NEW *TURBONILLA* FROM MONTEREY BAY, CALIFORNIA

BY A. M. STRONG

In a reconnaissance survey of Monterey Bay, California, Dr. Tage Skogsberg of the Hopkins Marine Station of Stanford University has secured several specimens of an undescribed *Turbonilla*. These were submitted to Miss Myra Keen of the Stanford University Geology Department for identification; recognizing them as new she has in turn forwarded them to me for diagnosis and description.

Genus *TURBONILLA* Risso, 1826

Genotype by subsequent designation: *Turbonilla plicatula* Risso, 1826, not *T. plicatula* (Brocehi), 1814; (= *Turbonilla typica* Dall and Bartsch, 1903).

Subgenus *PYRGOLAMPROS* Sacco, 1892

Genotype: *Pyrgolampros mioperplicatulus* Sacco, 1892.

*TURBONILLA* (*PYRGOLAMPROS*) *SKOGSBERGI* Strong, new species.

Pl. 4, figs. 3.

*Holotype*: Stanford Univ. Paleo. Type Coll. No. 6054. *Paratype*: Stanford Univ. Paleo. Type Coll. No. 6055. *Type locality*: Monterey Bay, five miles north of Monterey, California, at a depth of 28 fathoms.

*Description*: Shell slender, acutely conic, shining, whitish, with, beginning on the third or fourth whorl, a brown band covering the anterior third of the whorls between the sutures and extending over the periphery to the middle of the base; nuclear whorls small, depressed, not immersed, having their axis at right angles to that of the following whorls; postnuclear whorls moderately rounded, sutures distinct; axial sculpture consisting of about 18 broad, nearly straight, slightly protractive ribs which extend

from suture to suture but fade out just below the periphery, with shallow, narrower interspaces; spiral sculpture of numerous, fine, closely-spaced striations over the entire surface; periphery well rounded; base rather short, well rounded; aperture subquadrate, posterior angle acute, outer lip thin, showing the brown color-band within; columella slender, nearly straight. The holotype has lost the nucleus and first postnuclear whorl, the remaining 8 whorls measure: length, 5.6, maximum diameter, 2.0 mm. The description of the nucleus was taken from an immature paratype of 5 whorls which measures: length, 2.5, maximum diameter, 0.8 mm.

*Comparison:* This species is nearest to *Turbonilla (Pyrgolampus) newcombei* Dall and Bartsch<sup>1</sup> from British Columbia, differing principally in the wider ribs and shorter base. *Number of specimens:* Two adults and six immature specimens, in addition to the type material, were dredged at the type locality. *Collector:* Dr. Tage Skogsberg; specimens collected in 1935. *Repositories of type material:* Holotype and paratype, Stanford Univ. Paleo Type Coll. Other specimens are deposited in the collections of the California Academy of Sciences, United States National Museum, and A. M. Strong.

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## SOME LAND MOLLUSKS OF THREE COUNTIES IN EASTERN OHIO

BY A. F. ARCHER

There has been very little published on the land mollusks of the extreme eastern section of Ohio, and from many aspects this area is still somewhat of a terra incognita. In November, 1936, a preliminary survey of the fauna was undertaken by myself in order to explore the possibilities of future research. As stated in another paper the whole region has been badly deforested due to a combination of grazing, small-scale agriculture, and particularly the heavy demands on local timber by industry and mining. The bluffs above the Ohio River have been almost entirely denuded of their forest cover. In other areas woodland remains only on steep ledges and in ravines. Beyond that woods exist in very small patches on other types of terrain. The pur-

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<sup>1</sup> Proc. U. S. Nat. Mus., vol. 33, 1907, p. 503, pl. 45, fig. 6.

pose of this paper is to furnish annotated lists of the fauna of four random localities within the confines of Jefferson, Belmont, and Guernsey counties.

**Steubenville, Jefferson County, Ohio.** This locality consists of a river bluff at the edge of the city. The rocky bluffs are covered with a rather rank growth of tall weeds and some shrubs, such as sumac and wild grape. A level area along the street is covered with grasses, burdocks and other weeds, and the ground is rather stony. The soil along this side of the Ohio River is impregnated with soot, and is somewhat acid. The snails live in the grass and weeds and under stones and rocks both on the bluff and along the street.

*Haplotrema concavum* (Say). Occasional.

*Retinella indentata* (Say) form *paucilirata* (Morelet). Not common.

*Mesomphix inornatus* (Say). Occasional.

*Mesomphix perlaevis* Pilsbry. Rare.

*Zonitoides ligerus* (Say). Very abundant.

*Zonitoides intertextus* (A. Binney). Rare.

*Polygyra tridentata* (Say). Very common.

*Polygyra profunda* (Say). Occasional.

*Polygyra albolabris* (Say). Not common.

**New Alexandria, Jefferson County.** This locality consists of a series of steep ledges, thinly wooded, above level open fields on either side of a small stream. The leaf mold is thick; logs are numerous; and the woods are composed of oaks, hickories and maples. The snails are not very common.

*Haplotrema concavum* (Say).

*Retinella wheatleyi* (Bland).

*Zonitoides ligerus* (Say).

*Zonitoides intertextus* (A. Binney).

*Polygyra hirsuta* (Say).

*Polygyra fraterna* (Say).

*Polygyra tridentata* (Say).

*Polygyra palliata* (Say).

*Polygyra profunda* (Say).

*Polygyra thyroidus* (Say).

*Polygyra fraterna* (Say). Like *P. clausa* this snail is notably rare in woods (except where fires have swept through). It is

common in grass along roads and in fields, and to some extent stones and boards. The adults tend to shun the deeper shade of shrubs (except during hibernation).

*Polygyra monodon* (Rackett). Common in meadows, orchards and on railroad embankments, in grass, weeds, and under boards.

*Anguispira alternata* is a very abundant culture snail in western and northern Ohio, and inhabits walls, roadsides, railroad embankments, etc. It is not very common in grass, and seems to require the adequate shelter of burdocks and other tall weeds, as well as boards, rocks, and shrubs. *Holcodiscus parallelus* is abundant in very rocky places in fields and in walls. *Gonyodiscus cronkhitei anthonyi* is abundant under stones and in weeds along roads, under stones, boards, and rubbish in fields and vacant lots. *Gonyodiscus perspectivus*, although rare in open country, occasionally lives under logs or in grass in fields. *Zonitoides ligerus* lives in grass in fields in large numbers, as well as in weeds, such as soapweed, on railroad embankments; *Z. demissus* is common in grass in fields; *Z. intertextus* lives in grass and weeds (especially on stony ground) in fields, and on rocky river bluffs in eastern Ohio, but is never common. *Z. arboreus* is fairly frequent in all types of culture zones, rural and urban. *Gastrocopta armifera* and *Pupoides marginatus* are rare or absent in woods, but abundant in fields, on railroad embankments, and also in rocky, open country. The other *Gastrocoptas* (*pentodon* and *contracta*) are rare in open country, except on stony or rocky ground. *Vertigo tridentata* and *V. ventricosa* have similar preferences, while *V. pygmaea* is less exacting, for it lives in the same habitats as *Vallonia pulchella* and *V. costata*. Both of the *Vallonias* are common in open country, at least on less acid soils. *Hawaiiia minuscula* is indifferent as far as the presence or absence of lime is concerned. It is partial to open grassy and stony country. *Cochlicopa lubrica* is certainly more common in open country than in woodland cover. *Retinella indentata* lives in grass and under stones in fields and other types of open country, and is quite often found buried in plant trash in shrubby thickets; *R. wheatleyi* has almost identical habits, while *R. electrina* is more partial to grass and weeds than to stony cover. Of the genus *Mesomphix* we find *inornatus* and *perlaevis*

living under stones on bare river bluffs and in vacant lots, all in eastern Ohio. Neither of the species are at all common in open country. *Agriolimax (Deroceras) laevis campestris* and *A. agrestis* live in open fields, in grass or under rocks and boards, and also occur in urban surroundings. *Haplotrema concavum* occurs sporadically in grass and weeds in company with its molluscan prey.

From all the evidence gathered so far, it seems clear that a very considerable and adaptive fauna is in the process of taking over the open country created by agriculture, industry, and human occupation in eastern Ohio. In many instances many species are now more abundant per square acre than they were under the old forest conditions. Other species are greatly limited by culture conditions, even though they do affect open country, while some are actually eliminated or locally extirpated. It is significant that the major part of this assemblage of culture species is of American and not of European origin, contrary to the predictions of some naturalists a few years ago.

The species listed above live in leaf mold, under bark, and under logs. The fields below the ledges contain only two less species. The vegetation consists of grasses, tall annual weeds, such as goldenrod, mint, and patches of wild grape. The species are:

*Haplotrema concavum* (Say). Under logs; in tall weeds. Not common.

*Zonitoides ligerus* (Say). In grass, tall weeds, and wild grape.

*Zonitoides intertextus* (A. Binney). Under logs. Rare.

*Polygyra hirsuta* (Say). In grass, tall weeds; in wild grape patches; under logs. The commonest species in the open.

*Polygyra fraterna* (Say). In grass. Uncommon.

*Polygyra tridentata* (Say). Under logs; in wild grape; in tall weeds. Next in abundance.

*Polygyra clausa* (Say). In mint patches.

*Polygyra thyroidus* (Say). In grass. Occasional.

**Lloydsville, Belmont County.** This locality is an area of pastured hills. One of the hills contains a patch of oak-hickory woods near the summit, some of the trees being white oak, yellow oak, shellbark hickory, rock maple, and beech. The soil is a

yellowish clay, and the outcropping rocks are sandstone and shale. The snails are concentrated in leaf pockets, around stumps, and under logs.

*Haplotrema concavum* (Say). Occasional.

*Helicodiscus parallelus* (Say). Rare.

*Zonitoides demissus* (A. Binney). Rare.

*Polygyra hirsuta* (Say). In leaf pockets occasionally, but commonest hibernating in brambles and around stumps.

*Polygyra fraterna* (Say). Around stumps. Rare.

*Polygyra tridentata* (Say). Under logs and stones. Occasional.

*Polygyra albolabris* (Say). Rare.

In contrast with the seven species in the woods, fourteen species were found in the open fields, and some of them are abundant. They live in grass and weeds as well as among stones, and are especially common on the lower slopes. The species are:

*Haplotrema concavum* (Say). Occasional.

*Anguispira alternata* (Say). Rare.

*Retinella wheatleyi* (Bland). Rare.

*Retinella electrina* (Gould). Rare.

*Zonitoides arboreus* (Say). Rare.

*Zonitoides demissus* (A. Binney). Common.

*Polygyra hirsuta* (Say). Abundant.

*Polygyra fraterna* (Say). Rather frequent.

*Polygyra tridentata* (Say). Common.

*Polygyra albolabris* (Say). Not common.

**Three miles west of Fairview, Guernsey County.** In this locality the woods are largely confined to deep ravines. The trees are white oaks and maples with an understory of seedlings, brambles, and wild grape patches. The humus has been trampled by cattle, and apparently in consequence of this the snails occurring belong mostly to small species. The snails live under fallen bark and logs, in leaf mold, and in wild grape. The species are:

*Anguispira alternata* (Say). Uncommon.

*Zonitoides ligerus* (Say). Rather frequent.

*Polygyra hirsuta* (Say). Quite common.

*Polygyra inflecta* (Say). Uncommon.

*Polygyra fraudulentata* Pilsbry. Uncommon.

In the shrubby, grassy roadsides and fields above the ravines four species are found:

*Anguispira alternata* (Say). In trash among shrubs. Uncommon.

*Polygyra fraterna* (Say). Common in grass, but avoiding the shrubs.

*Polygyra inflecta* (Say). In shrubs and grass. Occasional.

*Polygyra fraudulenta* Pilsbry. Mostly in shrubs. The commonest species.

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## A NEW RACE OF HELMINTHOGYPTA TRASKI FROM LOWER CALIFORNIA

BY E. P. CHACE

In the course of a trip to Ensenada fragments of a *Helminthogypsa* were found which we were unable to refer to any of the named races. Further search at the same locality by the writers and Mr. and Mrs. Geo. Willett in February, 1937, netted two live and two very good dead shells, one of the live ones not quite mature. Study of these specimens shows them to be a distinct race which is here named

**HELMINTHOGYPTA TRASKI MISIONA**, new subspecies. Pl. 4, fig. 2.

Shell low conic, umbilicate, umbilicus about 1/9 the greater diam. of the shell, permeable to the apex, nearly 1/3 covered by the reflected lip. Whorls  $5\frac{1}{2}$ , tumid, the last dropping so as to leave the dark peripheral band exposed for 1/3 of a turn. Aperture subcircular, moderately oblique. Lip slightly reflected throughout, more so at the umbilicus, white, faintly thickened within, ends connected by a very thin, transparent callus. Color, brownish-olive, slightly lighter on the base, with the usual light-bordered brown band at the periphery. Periostracum thin, very glossy. Growth lines regular, close and fairly strong. Under a 20X lens the nuclear and early whorls show a finely granular surface; parts of the later whorls show very faint incised spiral lines.

Dimensions.	(umbilicus to spire)		
of type greater diam.	26.9	—lesser diam.	21.7
altitude,			13.2 mm.
2nd. specimen,	“ 30.7		24.6      14.6 mm.
Mr. Willett's			
specimen,	“ 29.0		22.5      13.0 mm.



Lower California: A rock slide near the San Diego-Ensenada Highway in La Mision Valley. About 40 miles south of Tia Juana. Two live and one dead shell and several fragments collected by E. P. and E. M. Chace and one shell collected by Mr. Geo. Willett. The type No. 350a, in the collection of the writers. Paratype in the collection of Mr. Geo. Willett.

This shell resembles *H. traski phlyctaena* Bartsch from Santa Barbara Co. in shape, size, color and umbilicus, but is thinner and the spiral sculpture is very much weaker. It resembles *H. t. caelata* Bartsch, geographically its nearest relative, in the faintness of its spiral sculpture, but is larger, more widely umbilicate and is more highly polished. Another neighboring race, *H. t. isidroensis* Bartsch, is also smaller, more papillose, and less polished. The writers are indebted to Dr. Clinton G. Abbott, of the San Diego Society of Natural History, for the loan of the paratype of *H. t. isidroensis*.

A few specimens each of *Haplotrema transfuga* Hemp. and *Micrarionta stearnsiana* Gabb were found in the same rock slide.

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## HELIX POMATIA LINNÉ IN JACKSON, MICHIGAN

BY A. F. ARCHER

Up to the present time all attempts to establish the edible snail, *Helix pomatia* Linné, in different points in North America have ended in failure. This species has been reported in different localities in the United States, but in all cases the evidence at hand indicates that it did not perpetuate itself. It is very probable that its failure to do so is largely due to the unsuitable conditions of the environment in each place where the attempted introduction was made. *Helix pomatia* chiefly occurs in the mid-latitudes of central and western Europe, and does not appear to be adapted to rigorous climates in extreme northern Europe nor, again, to the semiarid conditions of the Mediterranean Region proper. It, therefore, seems reasonable to expect that in the humid, temperate portions of North America it would be able to establish itself successfully. However, there is also a definite soil requirement on the part of this species. In "The Habitats of Land Mollusca in Britain" (Jour. Ecol., 1934, Volume 22, p. 31)

A. E. Boycott states that it is an obligatory calcicole. In other words, it requires a fairly high calcium content in the soil. This fact in itself would explain the failure to persist in the various localities where it has been introduced.

In the spring of 1937, Dr. Phil Marsh of Jackson, Michigan, brought me some specimens of *Helix pomatia* which he said were found in a garden in that city. In June both of us, in company with a member of the state agricultural department, investigated the locality in order to find out the condition of the colony, and also to investigate complaints that it was doing damage to garden plants. It was found that it had been introduced into Jackson by a Mr. Maddalena who some five years ago, on returning from a visit to New York City, had released six snails in his lettuce garden. He had bought the specimens in New York, and intended to propagate them for food, as is the custom in his native Italy. Since then they have thriven well, and have spread into all the gardens of the Union Street block, between Third and Fourth Streets, Jackson. The feelings of his neighbors toward this strange snail are rather mixed, and in a few cases we found specific complaints of its effect on garden plants, although on the whole the local attitude is one of puzzlement or perplexity rather than hostility. I was skeptical from the start as to its harmful activities, for it is not regarded as a garden pest in Europe, nor is it more than a casual inhabitant of gardens.

The following are the results of our investigation of this and other garden mollusks in this locality:

1. *Helix pomatia* has become abundant in the gardens and small orchards of the Union Street block, but at present has not spread to neighboring blocks. In the course of several hours, we turned up a total of nearly 200 specimens of various stages of growth in all the gardens from which samples were taken. Inasmuch as Jackson is located on soils that are slightly on the acid side, its abundance is a little puzzling. However, the area now occupied by houses was until recently swamp land which has now been filled in. The sources of the soil are unknown. Moreover, the gardens are limed, so that the soil tends to be improved by cultivation. The gardens themselves consist of flower gardens, vegetable gardens, and apple and cherry orchards.

The damage imputed to the snail was traced specifically to reports of harm done to zinnias and morning-glories in one garden only. The work, however, was done by cut-worms, and the snails probably ate the wilted leaves. *Pomatia* here as in Europe is mainly a scavenger, and seldom attacks living plant tissues, unless the quantity of mycelia eaten be included in this category. It is harmless at the worst, and may well be beneficial. There are at least two introduced slugs that are certainly more harmful in nature than it is.

The habitats of *H. pomatia* include the following plants under whose leaves it seeks shelter: Lettuce, fall chrysanthemum, lilacs, oriental poppy, currants, and various species of grass. It seems to avoid rhubarb, wood sorrel, and sheep sorrel. It is very exploratory, climbing wire fences, apple and cherry trees up to at least six feet. It aestivates in sand boxes, drain pipes, under cement blocks, and at the foundations of houses.

2. *Limax maximus* Linné. In lettuce, oriental poppy, and lilacs. It invades garbage pails. This slug is not very abundant, but is potentially harmful.

3. *Deroceras agreste* (Linné). If this slug were more abundant, it would undoubtedly do much damage to garden plants.

4. *Cochlicopa lubrica* (Müller). Nearly everywhere.

5. *Zonitoides arboreus* (Say). In grass and under boards.

6. *Vallonia pulchella* (Müller). In grass and under garden plants.

The small number of species in the Union Street gardens as compared with other parts of the city is probably explicable on the grounds of the recent origin of the surface soil. Other species in city gardens and back lots include *Helicodiscus parallelus*, *Vallonia costata*, *Succinea avara*, and *Polygyra albolabris*.

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## MONADENIA SEMIALBA HENDERSON

BY WALTER J. EYERDAM

On August 21-22nd, 1937, Mr. and Mrs. Chace and I made a special excursion to Rosario beach, Fidalgo island, Skagit County, Washington, which is only about a quarter of a mile from the Deception Pass steel bridge which connects the highway with

Whidby island, Island county. The object of this trip was to try to find *Monadenia semialba* Henderson which Dr. Henderson described as a new species from a single specimen obtained at Rosario beach by his assistant Mr. Elvin C. Nelson in the summer of 1928.

On July 6th, 1936, while collecting plants I found a second live specimen of *M. semialba* Hend. at Rosario beach together with several of the more typical *M. fidelis* Gray. As I did not have much time for a more thorough search I resolved to look for them at a later date.

There has been but little rain during this summer so the *Monadenias* are mostly buried or inactive. On this excursion the weather looked rather uncertain so we were lucky to have a good rain during the night of August 21st as we slept in a tent.

During the morning low tide we collected marine shells in the vicinity of Deception Pass and then we spent the entire afternoon scouring the steep rocky wooded slope between Reservation Bay and Rosario beach in an area of about  $\frac{1}{4}$  mile long by 250 yards wide.

The rain brought out the active snails and we were soon picking them up at frequent intervals.

Together we took well over 100 specimens, the majority of which were *M. semialba* including several off-color forms. The rest of the snails were the more typical *M. fidelis* Gray of both the dark and the light banded forms.

The average *M. semialba* has the characters of *M. fidelis* except that the broad dark brown band encircling the umbilicus is separated from the upper half of the shell by a broad yellow straw colored band about one-fourth of an inch in width. Several specimens have this band colored a brownish yellow and in three specimens that I have collected the broad band is white with only a trace of straw color. The largest of these *semialba* that I have is 1 inch high and  $1\frac{3}{8}$  inches wide. An albino specimen taken from this colony has a light straw colored base and the upper half is pure white without any bands. It is  $1\frac{3}{8}$  inches in width and  $1\frac{1}{8}$  inches high. This albino specimen is very unlike the form *flava* in height and in color.

*Monadenia semialba* seems only to be found in the limited space of its area but further explorations in the vicinity on both

Fidalgo and Whidby islands may reveal its presence in a more extended range. It is found mostly amongst the large rocks and in the grass and underbrush amongst the rocks. No specimens could be found in the adjacent deeper forest. The typical form is found intermingled in the same habitat along with *M. semialba* which is very limited in its range. The color of the living animals of both forms seems to be identical.

Four distinct color forms besides the typical *M. fidelis* Gray have been collected.

*Monadenia semialba* is not a distinct species but is a subspecies of *M. fidelis* Gray. As a race it is quite different than all the other known color forms. It should be called *Monadenia fidelis semialba* Henderson.

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## FURTHER NOTES UPON TERTIARY AND RECENT MOLLUSKS FROM FLORIDA TOGETHER WITH DESCRIPTIONS OF NEW SPECIES

BY MAXWELL SMITH

In the Clewiston, Belle Glade and Loxahatchee areas of Florida a number of interesting tertiary shells have been collected during the past year. Certain of these were obtained in very limited numbers, often solitary examples. It appears that eventually there will be further additions especially among the small or minute species.

**LORIPINUS SCHRAMMI** Crosse. A single valve was secured by Mrs. Rodney Procter. This species is new to the Tertiary of the United States. It has been reported from the Antilles. The specimen, possibly immature, is rather small but agrees otherwise with living examples from Biscayne Bay (Royce collection) and Sanibel, Florida. The species lives deep in sand or mud and is dislodged by large scale commercial dredging. Pliocene, Clewiston, Florida.

**SPISSULA SOLIDISSIMA PENINSULAE**, n. subsp. Shell large, valves more trigonal than in *M. similis*; lateral teeth comparatively short, pallial sinus deep and narrow, pallial line nearest to posterior adductor describing a wide, regular, circular course which in *M. similis* is often broken or comparatively straight. The posterior slope, emanating from the umbo, is very distinct and

leaves a broad area adjacent to the margin. Holotype, a single valve, in the writer's collection. Length of left valve 87 mm. Pl. 6, fig. 3. Pliocene, Clewiston, Florida.

*TELLINA* (*TELLINELLA*) *PERRYAE* Smith. (Naut. XLIX, p. 136). A perfect left valve has been found and the description may be supplemented in consequence. The lunule is narrow, rather deeply impressed, cardinal teeth small with a restricted excavated area on each side, the posterior tooth the larger; lateral teeth long and raised slightly at their extremities away from umbo; interior of shell lustrous. Pliocene, Clewiston, Florida.

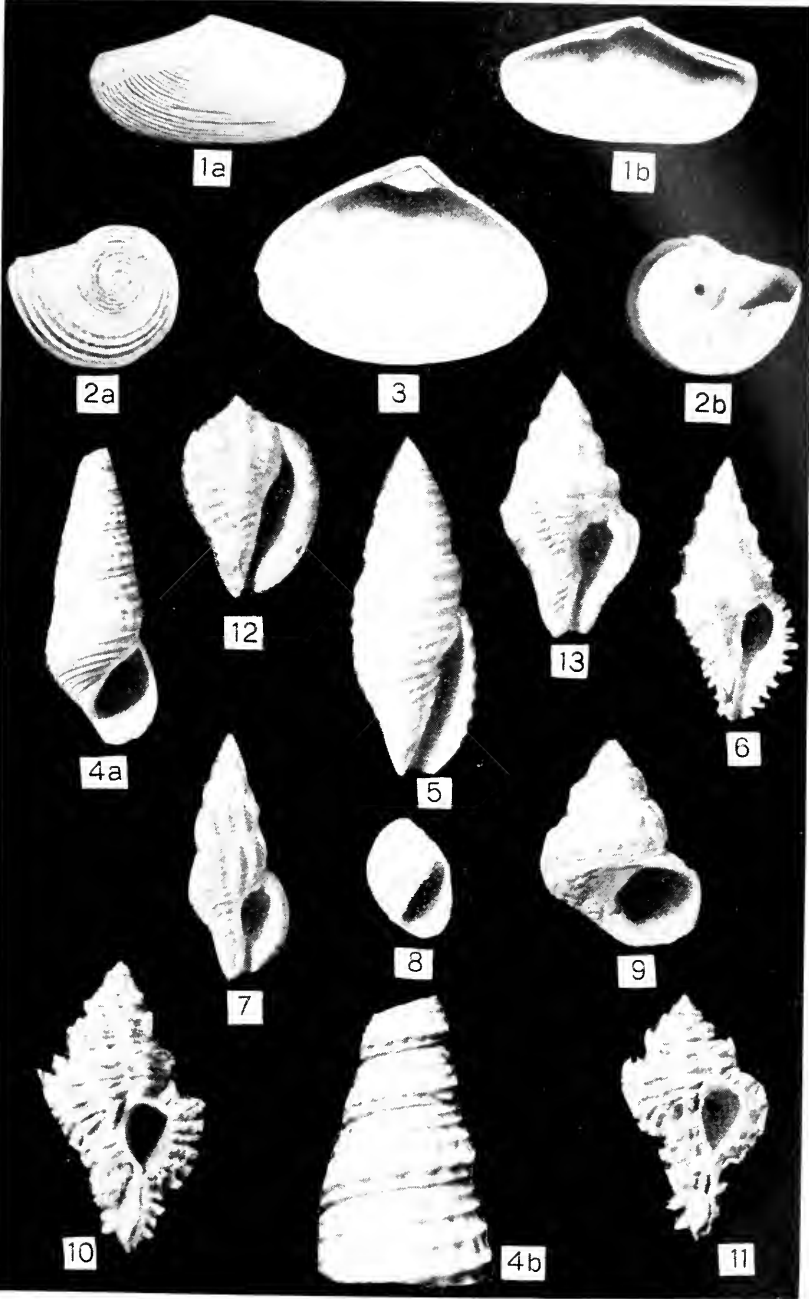
*TELLINA* (*PHYLLODINA*) *CALA*,<sup>1</sup> n. sp. Shell solid, subequilateral, description based upon a right valve; umbo low, nepionic shell smooth; anterior end only moderately rounded; posterior end slightly rostrate, with an incurved dorsal slope, the terminal slightly truncate; surface with low distinct concentric waves, less regularly placed posteriorly, not so strong anteriorly; lunule inconspicuous; hinge not unusual; pallial sinus V-shaped, deep, approaching margin of shell. Length 16.5 mm.

This shell recalls *T. dodona* Dall from the Oligocene sands of Oak Grove, Santa Rosa County, Florida. It differs in the shape of the posterior dorsal slope, the concentric sculpture and the larger more extended pallial sinus. Pl. 6, fig. 1a, 1b. Pliocene, Clewiston, Florida.

*TURBO CASTANEUS TIARA*, n. subsp. Shell elongated, spire high and conspicuous, aperture comparatively small, arrangement of spiny processes similar to *T. castaneus* Gmelin. When the operculum is found it doubtless will afford additional characters upon which to base further study. This form may be entitled to specific identity. Length 33.5 mm. Holotype to be placed in the Museum of Comparative Zoology. Paratypes in the Smith and McGinty collections. Pl. 6, fig. 9. Pliocene, Clewiston, Florida.

*NERITINA* (*SMARAGDIA*) *FLORIDANA*, n. sp. Surface of shell covered with fine spiral striae, axial growth lines almost as distinct, the two forming a network, surface with a silk-like sheen; surface of body whorl partly covered with numerous broken irregular brownish longitudinal lineations which are replaced near the suture by a few long brownish ill-defined blotches; inferior whorls hardly shining; nucleus brilliant, whorls well rounded; callus very broad and prominent, whitish, shining, one prominent denticle about two-thirds of wall length measured from anterior end, about six others on anterior side and four upon the posterior. Length of shell 7 mm.

<sup>1</sup> cala, beautiful.



M. Smith:—Tertiary Mollusks of Florida.





Compared with the recent *N. viridis* the new species differs in the much coarser teeth and quite different spire. In the recent shell the spire is larger and more tumid, the nuclear whorls usually less elegant. Pl. 6, fig. 8. Pliocene? Loxahatchee, Florida.

*EPITONIUM COCHLEA* Sowerby. Several specimens of this species have been found, one very large and in excellent preservation. It apparently has never been reported from the tertiary of the United States.

The shell has been taken living in deep water well of Cape Hatteras, North Carolina. In the Lesser Antilles it is a littoral shell. During July, 1937, a fine living specimen was collected by Paul L. McGinty in Lake Worth, Florida, a new addition to the fauna of this country. He reported it as being found in swift running water near the South Inlet, mixed bottom. The black operculum is a characteristic feature of *E. cochlea*. Miocene? Belle Glade, Florida.

*CIRCULUS STIROPHORUS*,<sup>2</sup> n. sp. Shell rather thick, large, umbilicus wide and deep; spiral sculpture consisting of strong, wide, rounded spiral threads of which there are five on body whorl, in addition a strong thread forming a keel at the periphery, numerous fine secondary spiral threads between these, occupying a wider concave area adjacent to the suture; base with four primary spiral threads, the two inner being less defined, the intermediate spiral sculpture lightly impressed. Greater diameter 12 mm., lesser diameter 10 mm., height 5.5 mm.

Woodring has pointed out the identity of *Circulus bicarinatus* Guppy which occurs in the Miocene of Jamaica. That species possesses four spiral threads, above, on the body whorl and only two on the base. The neotype of *bicarinatus* measures 7.5 mm. in diameter.

*Circulus beaui* Fischer the large recent species living from Florida to Guadalupe, is mentioned by Dall in his work upon the southern tertiary mollusks with the suggestion that it be searched for together with other fossils. In *A. beaui* the upper spiral threads are numerous, fine, low; the intermediate threads upon the spire often approaching the primary ones in size. Also there is only one keel below the periphery and the umbilicus is much narrower than in *A. stirophorus*.

The holotype is to be placed in the M.C.Z. Pl. 6, fig. 2a, 2b. Pliocene, Clewiston, Florida.

*MORUM MACGINTYI* n. sp. Shell of moderate size, whorls angulated above, above the shoulder finely spirally striated, below

<sup>2</sup> *stirophorus*, keeled.

shoulder about nine spiral ribs which form blunt nodules at their intersection with the axial ridges, the latter not continuous, the interstices squarish, the axial ridges forming short slightly re-curved spines upon the shoulder of spire and body whorl, the spines also present upon the exterior of the well thickened peristome. The aperture is rather wide, callus extending well over parietal wall, granulated with long irregularly placed independent raised lines, outer lip coarsely denticulated, posterior end reflexed, canal distinct. Length 25 mm.

One of the most attractive little shells to turn up in the marls of Florida. It is named for its discoverer Paul L. McGinty of Boynton, Florida. Holotype in the McGinty collection. Pl. 6, fig. 12. Pliocene, Clewiston, Florida.

*(To be continued)*

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**THE SEVENTH ANNUAL MEETING OF THE AMERICAN MALACOLOGICAL UNION IN THE MUSEUM OF ZOOLOGY, UNIVERSITY OF MICHIGAN, AUGUST 3 TO 5, 1937**

It was an innovation for the American Malacological Union to hold its seventh annual meeting in midsummer instead of spring, but the dates of August 3 to 5, 1937, will be remembered by all who attended the meeting in Ann Arbor as among the most enjoyed of the year. During the morning of Tuesday, August 3, visitors registered in the lobby of the Museums Building of the University of Michigan, while the Council of the Union held a meeting in Mr. Calvin Goodrich's laboratory, Mr. Goodrich being the active host of the Union on the occasion of this year's convention.

The regular sessions were opened Tuesday afternoon with an address of welcome by Mr. Frederick M. Gaige, Director of the Museum of Zoology, who extended an invitation to a luncheon on Wednesday as a memorial from the University for Dr. Bryant Walker. Mr. Joshua L. Baily, Jr., president of the Union, responded, thanking Mr. Gaige and the University for their cordial greetings. This was followed by the presentation of scientific papers. The titles Tuesday afternoon were "Some New Light on Bolten's Catalogue" by Dr. Harald A. Rehder; "Notes on Martyn's Universal Conchologist" by Dr. Rehder; "The Discovery of Living *Pyrgulopsis letsoni* (Walker)" by Dr. Elmer G. Berry, "Certain Pectens of the Pacific Coast" by Mrs. Ida S. Oldroyd;

“Problems of Distribution” by Dr. Paul Bartsch; “Goniobasis Breeding” by Dr. Bartsch; “Post-Glacial Repopulation of an Area of the Huron River Valley of Michigan” by Mr. Calvin Goodrich. Dr. Rehder’s first paper elicited the passing of a motion made by Dr. Paul Bartsch and seconded by Dr. Pilsbry, That Dr. Rehder be asked to petition the International Commission of Nomenclature to suppress Bolten’s specific names.

The presidential address was given Tuesday evening in the Museum, Mr. Baily taking for his topic “The Colony of *Helix nemoralis* at Burlington, New Jersey.” Several hundred specimens were displayed in illustration.

On reconvening on Wednesday morning the following papers were presented: “The Relationship of Gravid Periods of Certain Mussels in Michigan to the Pearl Button Industry” by Dr. Henry van der Schalie; “Successors to Timothy Abbott Conrad” by Dr. H. E. Wheeler; “Distribution of California Land Shells” by Dr. Henry A. Pilsbry; “A Colony of *Helix pomatia* in Jackson, Michigan,” by Dr. Phil L. Marsh.

Papers in the afternoon were four in number: “Habitats of Some Land Mollusks in Eastern North America” by Dr. Allan F. Archer; “Fossil Molluscan Fauna of the Ortona Lock Excavation of Florida” by Mr. W. E. Lincoln; “Is It Environment?” by Dr. Paul Bartsch; “Cuban Liguus” by Dr. Carlos de la Torre.

At the general business meeting held before the reading of the papers on Wednesday afternoon, the report of the Council meeting on Tuesday morning was read by the financial secretary with the following recommendations which were unanimously adopted:

That members in arrears for dues for two years be dropped.

That the Council shall consist of the officers, honorary and past presidents and members at large not to exceed four.

That members of the Council present at any annual meeting shall constitute a quorum.

The invitation of Dr. Carlos de la Torre to hold the 1938 meeting in Havana, Cuba, was accepted for the Easter vacation.

Members of the Council were elected as follows: President, Dr. Carlos de la Torre; Vice-President, Dr. Maxwell Smith; Corresponding Secretary, Mr. Norman W. Lermond; Financial Secretary, Mrs. Harold R. Robertson; Councillors at large, Dr. Henry

van der Schalie, Dr. Fred Baker and Dr. Horace B. Baker. Honorary and past presidents, Mrs. Ida S. Oldroyd, Dr. Henry A. Pilsbry, Dr. Paul Bartsch, Prof. Junius Henderson, Mr. William J. Clench, Mr. Calvin Goodrich, Mr. Joshua L. Baily, Jr.

It was moved by Mr. A. La Rocque, and unanimously carried, That a standing committee of fifteen or more be appointed by the president of the Union for the purpose of compiling a check-list of the Mollusca of North America north of Mexico. Mr. Baily named to this committee, Mr. William J. Clench, Dr. G. D. Hanna, Dr. Frank Collins Baker, Dr. Stanley T. Brooks, Mr. Calvin Goodrich, Dr. Elmer G. Berry, Dr. Henry van de Schalie, Dr. Fred Baker, Mrs. Ida S. Oldroyd, Prof. Junius Henderson, Mr. A. LaRocque, Mr. J. P. Oughton, Dr. Henry A. Pilsbry, Dr. Paul Bartsch, and Mr. E. G. Vanatta.

It was moved by Mr. Harold R. Robertson, seconded by Mr. Paul P. McGinty and carried unanimously, That a Committee of Nomenclature be appointed by the president of the Union to consist of five members, and to act in a purely advisory capacity on questions of nomenclature submitted to it. This committee consists of Dr. Henry A. Pilsbry, Dr. Paul Bartsch, Mr. William J. Clench, Dr. Horace B. Baker and Dr. S. Stillman Berry.

Greetings were read from Prof. and Mrs. Junius Henderson and from Mr. Norman W. Lermond who also sent an invitation to the Union to meet in Thomaston, Maine, for its ninth annual convention. Mr. J. P. Oughton brought greetings from the Royal Ontario Museum of Toronto and an invitation to come to that city in 1939. These invitations as well as one of long-standing from the San Diego Shell Club will be considered at the next meeting.

It was moved by Dr. B. H. Bales, seconded by Mr. Harold R. Robertson and carried unanimously, That Mr. Norman W. Lermond be especially invited to attend each annual meeting of the American Malacological Union and that a check for traveling expenses accompany each such invitation; this action being taken in recognition of Mr. Lermond's successful efforts in starting the American Malacological Union.

Dr. de la Torre expressed his gratitude to the Union for honoring him with the presidency and promised to do all in his power to make the convention in Cuba next year a pleasant one.

In tribute to the memory of members lost by death during the year Dr. Bartsch asked for a moment of silence while the assembled company stood with bowed heads. Those thus remembered were Herbert N. Lowe, Mrs. Clifford L. Blakeslee, Prof. B. Shimek, Miss Theodora Willard and Mrs. Burr H. Nicholls.

At the conclusion of the business session resolutions were adopted thanking the faculty of the Museum of Zoology of the University of Michigan for the use of meeting rooms and other acts of hospitality in connection with the 1937 convention.

Wednesday evening was devoted by many of the visitors to selecting duplicates from the Bryant Walker collection, a privilege extended by the University through Messrs. Goodrich and Gaige. This was a rare opportunity to obtain land and fresh-water shells and one which was much appreciated.

The social features of the convention contributed largely to its enjoyment and success. The first of these was the Bryant Walker Memorial Luncheon given by the University on Wednesday noon. This was served in the Michigan League and was attended by over thirty-five appreciative guests. The picnic on Thursday was equally delightful. The day was all that could be desired for the thirty mile drive through beautiful country to the Edwin S. George Reserve, where there was ample opportunity for collecting in various types of habitat. While many availed themselves of the chance to relax under the shade trees on the lawn others scattered to the wooded areas and to Paterson Lake to return in time for luncheon at two o'clock. This was a delicious repast prepared by Mrs. Calvin Goodrich and Mrs. Henry van der Schalie. After a further hour or more of pleasant social intercourse, fleeting time forced the saying of farewells to friends old and new, and the parting from the most hospitable of hosts, Mr. and Mrs. Goodrich, and their tireless assistants.

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### NOTES

HELMINTHOGLYPTA AYRESIANA ON SAN MIGUEL IS., CAL.—I mailed a box of *H. ayresiana* which I collected on San Miguel Island. You will see several living snails and also some fossil or subfossil specimens from a kind of travertine or "caliche" which exists on the top of the island, and must be of considerable an-

tiquity, though not, I believe, so old as that in which elephant (mammoth) remains have been found. This formation presents numerous projecting cylindrical objects which are really concretions formed around roots. They are exactly like the concretions at Caniçal, Madeira. I do not see that it is possible to distinguish the fossil shells from the recent, though they may average a bit larger and higher in the spire. The living snails are found under and on bunches of *Astragalus miguelensis* Green, a very characteristic endemic of the northern group of islands. This astragalus acts as a "loco-weed" on the sheep, and they let it alone; a circumstance which favors the snails.

Hemplill (Zoe 1:330) says of the San Miguel form of *H. ayresiana* "frequently bandless." I must have examined a thousand or more, and there was *always* a band, though on some shells long dead it was not apparent on casual inspection.

I think that one reason I found no *small* snails on San Miguel is the constantly drifting sand, which would smother them.—THEO. D. A. COCKERELL (in letter, Aug. 20, 1937).

A CONCENTRATED POPULATION OF *LYMNAEA PALUSTRIS NUTTALLIANA* Lea.—While on a shell collecting excursion with Mr. and Mrs. E. P. Chace on Aug. 21st, 1937, Mr. Chace and I discovered a concentrated assemblage of *L. palustris nuttalliana* Lea in a pond about  $\frac{1}{2}$  mile west of Mount Vernon, Skagit County, Washington. This pond has an area of about  $\frac{1}{2}$  acre, shallow depth with sticky blue clay bottom and without a trace of growing vegetation. Dead willow leaves blow into the water in the fall and various decaying weeds from the surrounding meadows also fall into the pond and are reduced to slime which furnishes the snails with food.

The only species of mollusk found was this *Lymnaea*, which was floating just under the surface of the water film. Nearly the entire population had been blown to one corner of the pond where they lived in a solid patch about ten feet square. Estimating five live adult shells to the square inch there were at least 70,000 in this mass. With a dip net, nearly all of them could have been scooped up in ten minutes. These snails were all doomed to perish in a short time because of lack of sustaining food.—WALTER J. EYERDAM.





JUNIUS HENDERSON



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## REVIEW OF FLORIDA CHAMIDAE

BY H. A. PILSBRY AND TOM MCGINTY

“The existing literature on the shells of Chamidae is so confused that a thorough investigation from a critical point of view is necessary in order to solve the problems and lead towards a satisfactory knowledge of the matter.”—*Odhner*.

This inquiry began on the Atlantic beach at Boynton, Palm Beach County, where large chamias are rather abundant on ledges of coquina rock in about 3 to 10 feet of water. As usually happens, the shells and the books essential for their determination were not available in the same place, so that the consultation of literature became the senior author's task in Philadelphia, while the junior author continued to supplement the material with specimens and observations bearing on the matter.

The chief difficulties are (1) the perplexing literature, redundant with badly described “species.” Nils Hj. Odhner's “Studies on the morphology, the taxonomy and the relations of recent Chamidae” (in *Kungl. Svenska Vetenskapsakad. Handlingar*, vol. 59, 1919), is a bright spot on a dark road. (2) The second difficulty is the remarkable transformations these shells undergo in response to varying ecologic conditions. On open shores exposed to surf, only those young which attach to a heavy or immovable substratum survive. They acquire a broad base of attachment, nearly as extensive as the shell, which is erect only along the upper margin, the whole being somewhat triangular in section. In such exposed places the sculpture proper to the species is greatly reduced and blunted, usually covered with a coat of algae, but sometimes clean, as in *C. congregata* on Pinnas at Sanibal Island, though even here foliations are repressed. In some places, such as Harrington Sound, Bermuda, where there is not much wave action, the attachment may be wholly lost in adults, but lime-depositing algae and other organisms coat the shell with a very thick dense layer, impossible to remove, as in

*Chama sinuosa bermudensis* Heilprin. Where the conditions permit attachment to small objects, dead shells, bits of coral and the like, the attachment may remain small, the attached valve being convex and often as profusely sculptured as the free valve, the characteristic sculpture being fully developed. In some cases it is not possible off-hand to tell whether the characteristics of a lot are wholly due to their ecologic setting, or may mean racial divergence; and it is sometimes convenient to have a name for such forms until their status can be fully exposed. We have therefore admitted such names as *variegata* Rve. and *firma* P. & M.

Although Lamarek had divided the Chamas into those with the beaks turning from right to left (attached by left valve, "regular" chamas), and those with beaks turning from left to right (attached by right valve, "inverse" chamas), this distinction was disregarded by later authors, who, even up to the time of Dall, thought that the same species could attach by either valve. This question has been investigated thoroughly by Odhner, who by a study of the anatomy of both regular and "inverse" chamas, the protoconchs, and the hinge teeth of very young stages, has shown conclusively that two strongly distinct stocks are involved. To the "inverse chamas" he gave the generic name *Pseudochama*.

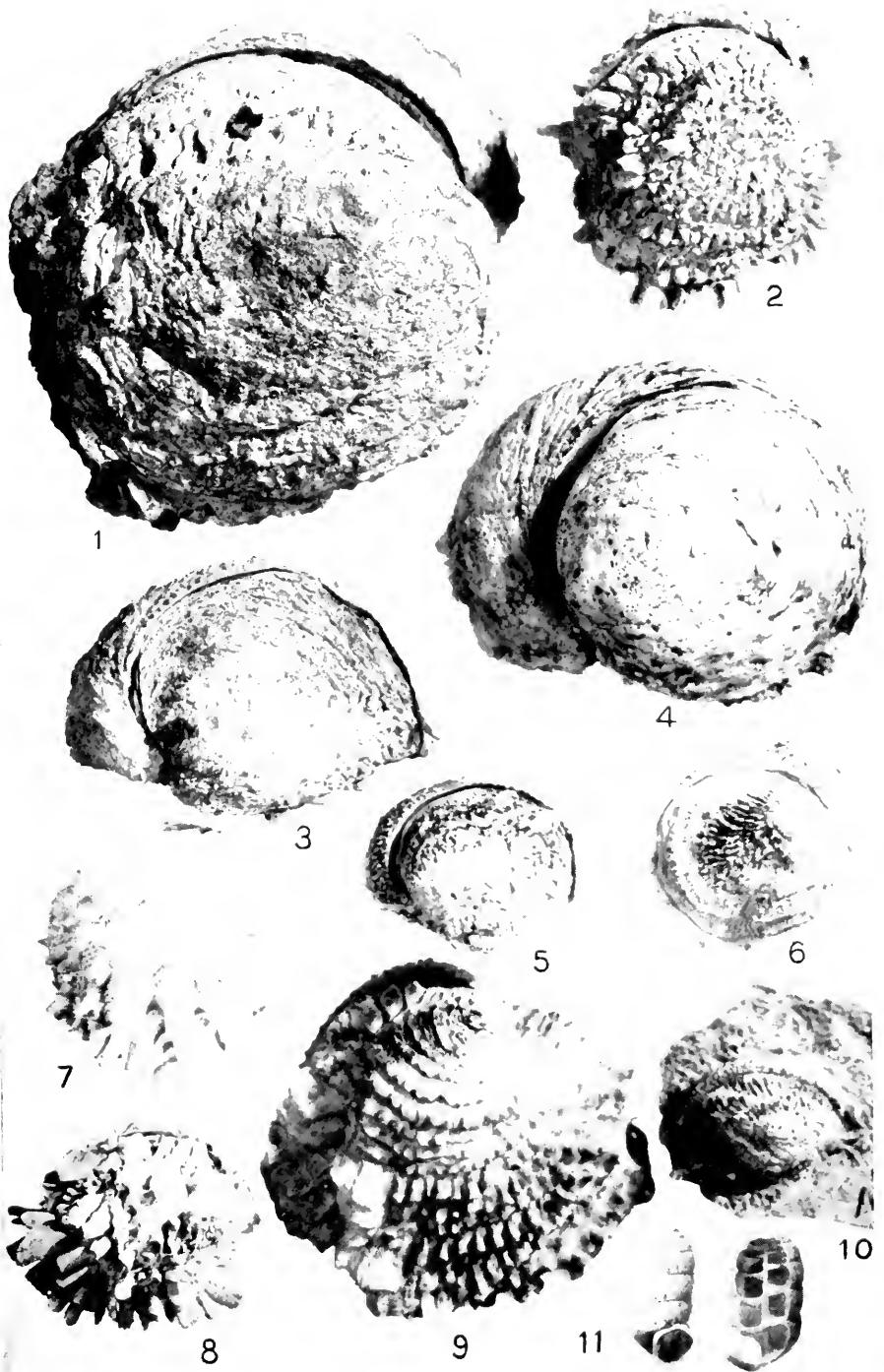
*Chama sarda* Reeve has been reported from the Florida Keys by Dall, Johnson and Smith. We do not know exactly what shells these authors had, but we have not seen any Chamas referable to *sarda* from Florida, though there seems no reason why it should not occur there. It occurs in the West Indies and on Central American coasts. Probably *C. sarda* is not separable from the West Indian *C. florida* Lam.

*Chama lactuca* Dall, 1886, reported by Dall from North Carolina to Barbados in 63-100 fathoms, appears from its smooth internal margins and other characters to stand near *C. sinuosa* Brod. It is sculptured with radiating and concentric series of very small, short spines, each grooved underneath. It has not been figured and we have not seen specimens.

#### *Key to shallow water Chamas of Florida*

1. Shell nearly equivalve, the valves strongly convex with a large lunule, and sculpture of erect tubular spines on radial ribs ..... *Echinochama arcinella*.
- Valves strongly unequal, the attached one larger; no lunule. 2.





FIGS. 1-10, Florida Chamidæ. 11, *Urocoptis marwelli* Pils.

2. Apices of valves turning from right to left; attached by left valve (*Chama*) ..... 3.  
Apices turning from left to right; attached by right valve (*Pseudochama*) ..... *Pseudochama radians variegata*.
3. Inner border of valves crenulated; pallial line passing around end of anterior adductor scar, joining at outer (anterior) margin of the scar ..... 4.  
Inner border of valves smooth; pallial line joined to lower extremity of anterior adductor scar, *Chama sinuosa firma*.
4. Larger; sculpture of profuse foliations, *Chama macerophylla*.  
Smaller; sculpture of fine radial corrugations, with or without short foliations on concentric ridges ..... *Chama congregata*.

CHAMA MACEROPHYLLA Gmel. Pl. 7, figs. 2 (Key West), 8 (Boynton).

This is the commonest West Indian species, known by its copious foliation, the crenulate internal border, and by having the pallial line run to the outer (anterior) limit of the anterior adductor scar. The color is various, reddish brown or dull purplish hues, yellow or white. Some specimens from exposed places have the foliation much reduced. Very handsome lemon-chrome to mustard yellow shells were taken opposite the first groin south of Boynton Inlet, east Florida, the interior white and yellow, or white and liver brown or hessian brown. Length 40 to 55 mm., rarely to about 65 mm. In the West Indies it grows larger, length 65-70 mm., or even up to 90 mm. At Boynton it seems to prefer deeper water than *C. sinuosa firma*, about 3 to 10 feet.

CHAMA CONGREGATA Conrad. Pl. 7, figs. 6 (Boynton), 10 (Sanibel).

A rather small chama, not often over 36 mm. in greatest dimension, related to *C. macerophylla* by the crenulate inner margins and the pallial line aligned with the anterior outline of the anterior adductor impression; but it differs in external sculpture. Typically there are rather low concentric ridges on the free valve, often with short laminae posteriorly, and crossed by a fine radial corrugation. There is often, but not always, a shallow furrow from beak to posterior-basal extremity. In its finest development, when the point of attachment is small, the attached valve is strongly convex with spiral umbo and sculpture like the free valve, but with fewer, more prominent and rougher concentric sculpture and similar fine radial corrugation, or the latter may

be obsolete. Interior white, or with more or less purplish-brown stain.

When growing attached to a flat surface the lower valve has the usual triangular section. The fine corrugations of the liver-brown surface are often hardly interrupted by concentric ridges or foliations. A specimen from Boynton is figured, fig. 6. They appear to prefer to live under stones and in crevices.

A small form of *C. congregata* is common growing on *Atrina rigida* (Dillw.), on the Gulf side of Sanibel Island; also occasionally found on arks or other shells. The usual size is 16 to 22 mm. long. They are reddish brown of various shades, radially corrugated, with but little trace of concentric sculpture. The broadly attached left valve is rather shallow, the free valve flattened posteriorly, or with a shallow sulcus from beak to posterior-basal extremity (fig. 10).

CHAMA SINUOSA Brod. Pl. 7, fig. 9.

The shell is only moderately thick, whitish, uniform or marked with tawny, suffused or concentrated on the foliations. Sculpture of many concentric ruffles of hood-shaped scales. Fixed valve more coarsely and irregularly flounced and foliated than the free valve, the attachment small. A rather deep open furrow runs from beak to posterior-basal extremity. It is distinguishable from *macerophylla* at once by the entire *absence of crenulation* of the inner margins of the valves. The pallial line runs into the lower extremity of the anterior adductor scar at about the middle (not running past the end as in *macerophylla*). West Indies.

Nothing like typical *C. sinuosa* is yet known to us from Florida, but the following form is apparently not specifically separable.

CHAMA SINUOSA FIRMA n. subsp. Pl. 7, fig. 1.

The shell is very much thicker than *sinuosa*, with far heavier teeth. The external color is dirty whitish, but on shells "cleaned" with acid there are some inconspicuous rusty brown flecks. Sculpture is largely effaced, but consisting of irregular, coarse concentric laminae more prominent posteriorly, with sometimes a little radial corrugation in places. There is a small furrow from beaks to posterior basal end, much less emphatic than that of *C. sinuosa*. Interior white with more or less green suffusion, and often a touch of liver brown at the lower edge. All of the specimens

were attached to coquina rock by the whole lower surface of the left valve. Greatest diam. 70, least 59 mm., to 84 × 66 mm.

Beach opposite 1st groin south of Boynton Inlet (of Lake Worth), Palm Beach Co., Florida. Type 168432 ANSP., paratypes in McGinty collection. The specimens were taken in about 3 to 5 ft. depth. They are much alike, since all found were seated on rock. At that depth any young settling on stones or shells would be carried away by the waves. The full characters and significance of this form will be revealed when they are fished from below wave action where they can attach to small objects. At all events, they differ from *C. sinuosa* so much in appearance that a special name seems convenient, either as a race or only an ecologic *forma*. The name *firma* alludes to the strength of the shell.

*C. s. firma* and *P. r. variegata* prefer the main reef of very large, flat rocks. This reef is covered with a heavy growth of moss-like algae, in which only fairly large shells can be seen. This accounts for the absence of young ones in the lots collected.

*C. sinuosa bermudensis* Heilprin, 1889, has a strongly spiral left valve, both valves are more deeply cupped, and of a dirty cream-buff tint inside. It seems to have laid on the bottom unattached, and as all the specimens have a very heavy calcareous algal incrustation, the sculpture is not visible.

#### PSEUDOCHEMA RADIANIS (Lam.).

A rounded species, typically whitish with a broad ochraceous-tawny or cinnamon ray, often divided, down the posterior slope, but sometimes this is absent, or the color may be more diffused over the valve. Typically there is little sculpture, but usually some traces of two series of flattened foliations are seen on the posterior slope, and sometimes they are rather well developed, with also some irregular foliations anteriorly. Such specimens lead to *C. ferruginea* Rve., which appears, as Odhner noted, to be merely a strongly foliated form of Lamarck's species. The internal margin is more or less crenulated. Both *radians* and the form *ferruginea* are West Indian.

In the Florida form, which we are calling PSEUDOCHEMA RADIANIS VARIEGATA (Rve.),<sup>1</sup> pl. 7, figs. 3, 4, 5, the shell is covered with

<sup>1</sup> Originally described from Honduras.

small foliations of the close concentric laminae, and the two posterior series of larger, flattened foliations are present, distinctly or merely as traces. There is also more or less *fine radial corrugation*, much as in some specimens of *C. congregata*, the ridges and raised points being white on a deep maroon-purple ground. Figs. 3, 4, 5 are specimens from Boynton; length of fig. 5, 30 mm. These rather small east Floridan *P. r. variegata* look like mirror images of *C. congregata*.

There is a larger form, usually 50 to 60 mm. long, which lives on the coquina ledges in 3 or more ft. of water, opposite the first groin south of Boynton Inlet, together with *C. sinuosa firma*. The shell is quite heavy and the sculpture and external color are more or less completely effaced (fig. 4), though some sculpture and color are visible on occasional shells (fig. 3), and a few have good color and perfect sculpture, up to 52 mm. long. The interior is usually white and green, with more or less maroon-purple at the edge, or sometimes hazel to chestnut-brown at border and on muscle scars. The submarginal crenulation is rarely wanting, but usually it is weakly developed within the posterior margin. The largest seen measures 64 mm.

These "inverse chamas" are astonishingly like mirror-images of the specimens of *C. sinuosa firma* found with them, but there are several differences besides their different direction of coil. *C. s. firma* reaches a larger size; the anterior adductor scar in the free valve is wider, its width more than half of its length.

In *P. r. variegata* this scar is narrower and longer, its width half the length or less. *C. s. firma* never shows any crenulation of the inner margin, such as is nearly always to be seen in *P. r. variegata*; though in a few examples of the latter it is not present. The dark triangle at the end of the hinge ligament is more prominently developed in *C. s. firma*.

Like all chamas on the Boynton beach reef, these are very broadly attached to the rock and the sculpture is more or less obsolete. A few have been found retaining rather weak sculpture and dilute ocher-red color up to mature size (57 mm. long).

#### ECHINOCHEMA ARCINELLA (L.).

While this shell generally shows only a very small scar of attachment near the beak of the right valve, and usually becomes



free of attachment when adult, yet occasional examples have a larger, strong attachment, and remain fixed up to adult size. This is also the case with the West American *E. californica* Dall.

The typical form of *E. arcinella* is the West Indian race with many (about  $16 \pm$ ) spinose radial ribs, the spines profuse, slender and tubular. In the same lots there occur specimens with the spines mostly reduced to nodules on the ribs, which remain numerous.

The Florida race of *arcinella* (Pl. 7, fig. 7, Gasparilla I.) has fewer radial ribs, usually 7 to 9, and generally stouter, shorter spines. If a valid subspecies it will bear the name *Echinochama arcinella cornuta* (Conrad). The Pliocene specimens are rather intermediate between these races, as might be expected.

In some places, as in the south end of Lake Worth, only small ones, about 20 mm. long, have been found. A large valve from the near-by ocean beach measures 57 mm.

We regret that the photograph is poor, not showing the pitted intercostal sculpture.

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### THREE NEW SUBSPECIES OF *HELMINTHOGLYPTA ARROSA* (GOULD)

BY ALLYN G. SMITH

Recent investigation into the variation of the common northern California land snail *Helminthoglypta arrosa* (Gould) leads to the conclusion that there are at least three races so different from any of those already named as to warrant description. They are as follows:

*HELMINTHOGLYPTA ARROSA WILLIAMSII*, new subspecies. Pl. 8, figs. 1, 2, and 3.

*Diagnosis:* Shell of medium size for the species, thin; spire high in relation to the diameter, which gives the shell an unusually elevated appearance, the apical angle being about  $95^\circ$ ; whorls  $6\frac{3}{4}$ , closely coiled, the last globose, descending sharply from the suture to a point near the periphery, below which it is well-rounded, terminating in a subcircular aperture; lip simple, not thickened; peristome only slightly reflected except at its basal termination, where it partially covers the umbilicus; terminations of peristome connected with a thin callus wash. Umbilicus small,

contained about 13 times in the major diameter of the shell. Nuclear whorls nearly 2, smooth but not glassy. The sculpture of the post-nuclear whorls consists of low, irregular growth-ridges, which, on the upper portion of the last three whorls, are cut into round or somewhat elongated granules following a general spiral arrangement. These granules become obsolete below the periphery of the body whorl and disappear in the vicinity of the umbilicus and within it, giving the base of the shell a more polished appearance than the upper portion. Color, cinnamon-brown to buckthorn-brown, with occasional short irregular streaks or flecks of lighter color, encircled with a narrow but well-defined band of liver-brown. The above is a description of the holotype, a fully mature specimen that measures: max. diam. 25.6; min. diam. 21.0; alt. 20.6 mm.

*Holotype*: Cat. No. 7204, Calif. Acad. Sci. Type Coll. *Type locality*: Hog Island, a small islet in Tomales Bay, Marin Co., California. The type lot consists of about 100 shells collected in 1936 and 1937 by Woodbridge Williams, for whom the subspecies is named. *Paratypes*: Specimens so designated have been placed in the collection of the California Academy of Sciences, the Academy of Natural Sciences of Philadelphia, the Los Angeles Museum, the San Diego Society of Natural History, and in the private collections of Dr. S. S. Berry, E. P. Chace, W. Williams, and A. G. Smith.

*Remarks*: This unusually high-coned subspecies of *arrosa* is distinguished by the entire absence of malleations that are present on all other forms of this species that have been described. Individuals range in altitude from 18.1 to 23.1 mm., and in maximum diameter from 22.8 to 28.3 mm. An extremely tall shell measures  $23.1 \times 25.0$  mm. (h/d), while a low-coned shell measures  $18.1 \times 22.8$  mm. The number of whorls varies between  $6\frac{1}{4}$  and  $7\frac{1}{8}$ , the average being  $6\frac{3}{4}$ . The umbilicus is partly covered normally although in one individual it is entirely open, and in another it is almost completely closed. The nuclear whorls of the holotype are somewhat worn but on another specimen there is a faint suggestion of the wrinkled structure normal in *arrosa* and its described subspecies.

*Williamsi* is related most nearly to *H. a. stiversiana* (J. G. Cooper), from which it is distinguished by smaller size, much darker color, and lack of malleations. It has the high cone of

*H. a. miwoka* (Bartsch), but is a larger, dark-colored, and smoother shell. The shells are found under brush and weeds on the lower slopes of the island. Although the colony is a strong one at present it could be severely decimated, if not completely wiped out by indiscriminate collecting. It is therefore sincerely to be hoped that this will not occur, for this form probably exists nowhere else, and it represents an interesting variation in an extremely variable species of California land snails.

HELMINTHOGLYPTA ARROSA POMOENSIS, new subspecies. Pl. 8, figs. 4, 5, and 6.

*Diagnosis:* Shell large and heavy; spire low, with an apical angle of  $130^{\circ}$ . Whorls  $6\frac{3}{4}$ , the last large, full, and evenly-rounded. Aperture subovate; lip simple, not thickened, the upper part descending slightly from the horizontal axis of the shell, hardly reflected above but more so at the periphery and along the basal portion, the amount not being especially prominent. Umbilicus 0.4 mm. in diameter, permeable to the apex, cylindrical, only slightly covered by the basal reflection of the peristome. Nuclear whorls  $1\frac{3}{4}$ , somewhat eroded and not exhibiting any marked structure. The first two and one-half post-nuclear whorls are relatively smooth, marked only by subobsolete irregular growth-ridges. On later whorls the growth-ridges become stronger until on the last whorl they dominate the sculptural characters of the upper part of the whorl above the periphery. Except on the early whorls the growth-ridges are cut irregularly into round or elongate granules, which appear strongest only upon the upper portion of the body whorl. Fine malleations are superimposed on this transverse sculpture at about the beginning of the last whorl and these rapidly become larger until they are the most prominent structural feature of the shell, extending over the periphery and on to the base, where they gradually grow weaker and disappear in the immediate vicinity of the umbilicus. The result of this combination of sculptural characters serves to give the shell a heavily malleate appearance, which, on closer inspection, is also finely granular. The base is highly polished and shining. Color a dark cinnamon-brown, covered with an irregular network of maize-yellow markings that generally follow the raised edges of the malleations. This light-colored network is interrupted in places by occasional stripes of basic ground-color and is lacking also immediately behind the lip and on the early whorls. Shell encircled with a clean-cut, liver-brown band, 1 mm. wide. Color within the aperture reddish-violet, showing the band and other evidences of external coloration. The above is a description of the holotype,

an unusually fine, fully mature individual measuring: max. diam. 39.3; min. diam. 32.1; alt. 25.0 mm.

*Holotype*: Cat. No. 7208, Calif. Acad. Sci. Type Coll. *Type locality*: Big River, near the mouth of Daugherty Creek, Mendocino Co., California, under redwoods, 2 adults and one broken shell collected May 31, 1930 (A. G. Smith). *Paratype*: A single specimen, so designated, is No. 3929, A. G. Smith Coll.

*Remarks*: This remarkable subspecies of *arrosa* can be recognized immediately by its huge size, heavy malleations, and unique coloration (for the species) of a yellowish network on a dark background. Other examples of this same race have been collected on the Navarro River at the mouth of the North Fork, and in Russian Gulch, both in Mendocino Co. Apparently it is found only near the coast in heavily timbered redwood canyons and is not common, being found so far in pairs or singly. With it has also been collected a smaller but totally different race close to *arrosa* s.s., with which it evidently does not intergrade.

*Pomoensis* is not closely related to any other described *arrosa* subspecies. However, *H. arrosa* is so variable, taken as a whole, it is possible that more careful collecting will turn up intergrades between *pomoensis* and a medium-sized, low-coned race of *arrosa* referable to the subspecies described as *rubicunda* (Rowell).<sup>1</sup>

An indication of the large size of the adult specimens collected may be obtained from the following table of measurements:

Big River,	Diam. 39.3 mm.,	alt. 25.0 mm.,	whorls 6 $\frac{3}{4}$ .	Type.
Mendocino Co.	“ 40.5 “	“ 25.7 “	“ 6 $\frac{5}{8}$ .	Para-
				type.
Navarro River,	“ 40.7 “	“ 25.5 “	“ 6 $\frac{3}{4}$ .	
Mendocino Co.	“ 36.5 “	“ 22.6 “	“ 6 $\frac{1}{2}$ .	
Russian Gulch,				
Mendocino Co.	“ 37.3 “	“ 25.1 “	“ 6 $\frac{3}{4}$ .	

Named for the Pomo, a tribe of Indians formerly living in the vicinity where this snail is now found, who may have used it for food.

<sup>1</sup> Rowell described this as a subspecies of *H. exarata*, which is obviously an error as the latter is known only from the Santa Cruz Mts. north to Pescadero, in San Mateo Co. and Los Gatos in Santa Clara Co., California.

HELMINTHOGLYPTA ARROSA MATTOLENSIS, new subspecies. Pl. 8, figs. 7, 8 and 9.

*Diagnosis:* Shell large, globose, of fairly heavy texture; spire moderately elevated, the apical angle being  $113^{\circ}$ ; whorls  $5\frac{3}{4}$ , the last rapidly expanding, effuse and evenly rounded, terminating in a capacious aperture; lip not quite mature and therefore thin, slightly expanded above but more so below, where its basal termination half obscures the umbilicus, connected between terminations by an exceedingly thin wash of callus. Umbilicus rather small for the size of the shell, being contained about 16 times in its major diameter. Nuclear whorls 2, smooth but not shining under a magnification of  $\times 40$ . Sculpture of the post-nuclear whorls composed of low, irregularly spaced growth-ridges that gradually increase in size until on the last three whorls they become the most prominent sculptural feature. On the body whorl there are several broad malleated areas or bands, extending from suture to base, being wider at the periphery. The last of these areas lies just behind the lip and covers about one-eighth of the body whorl. On this the malleations are large and coarse, but on two similar but smaller areas preceding it the malleations are smaller and finer. The malleated areas are also sculptured with transverse ridges, much lower than the growth-ridges and spaced so closely that from two to six or seven lie between each major pair. These finer ridges are cut by spiral striations that vary considerably in strength but are sufficiently incised to produce a marked granular appearance above the periphery, the granules, where prominent, being much elongated. The spiral striations can be seen only under a magnification of about  $\times 14$  and are stronger above than below where they are more closely spaced on portions of the base where they are visible. Color yellow-brown with occasional cinnamon-brown streaks, the most heavily malleated area being of the darker color and marked with lighter colored flammulations. Shell encircled with a clean-cut liver-brown band about 2 mm. wide. The above is a description of the holotype, a fine but recently matured individual measuring: max. diam. 36.7; min. diam. 28.6; alt. 27.2 mm.

*Holotype:* Cat. No. 7209, Calif. Acad. Sci. Type Coll. *Type locality:* On the coast between Cape Mendocino and the mouth of the Mattole River, Humboldt Co., California, living shells being found among the fallen leaves of madrone trees (*Arbutus menziesii*). The type lot consists of 18 adult specimens, mostly dead and bleached, and 16 nearly half-grown young shells, living when collected. G. Dallas Hanna, coll., June 13, 1928. *Paratypes:*

Specimens so designated have been placed in the collections of the California Academy of Sciences, the Academy of Natural Sciences of Philadelphia, the Los Angeles Museum, the San Diego Society of Natural History, and the private collections of E. P. Chace, Dr. S. S. Berry, and A. G. Smith.

*Remarks:* It was altogether astonishing to discover another large race belonging to the *arrosa* group at a locality so far north in California, where one would expect to find *H. a. expansilabris* (Pilsbry) or a low-coned form referable to *H. a. rubicunda* (Rowell). In fact, a single dead shell of this latter subspecies was collected along with the larger shells of *mattolensis*, which is at least partial proof that the two occupy the same habitat. No evidence of intergradation is to be seen in the material at hand.

*Mattolensis* is variable in size, as shown by the following table:

Largest shell .....	Diam. 38.6 mm.;	alt. 31.2 mm.;	whorls $6\frac{1}{8}$
Smallest shell .....	“ 29.5 “	“ 22.2 “	“ $5\frac{1}{2}$
Average of 18 adults.....	“ 32.9 “	“ 25.9 “	“ $5\frac{3}{4}$

The number of whorls ranges from a maximum of  $6\frac{1}{8}$  to a minimum of  $5\frac{1}{2}$ . The umbilicus of most of the shells in the type lot is almost unobscured by the basal reflection of the peristome, while in several it is half covered; one individual is imperforate.

Young living specimens vary in color from light horn to cinnamon-brown, and one has the dark band bordered by broader bands of lighter color. The nuclear characters are well shown in these young shells, the nucleus being semi-polished and generally rather smooth except for a crimping of the shell at the tip and along the suture. The presence of occasional papillations leads to the supposition that embryonic shells may be sparsely hirsute.

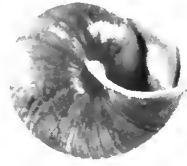
This new subspecies of *arrosa* may be recognized at once by its large size, tall spire, and more especially by its exceedingly globose body-whorl and large subcircular aperture. *H. arrosa* s.s. from San Mateo Co. and from the region of Mt. Tamalpais in Marin Co. are equal in size but have an average of one more whorl and do not have as globose a body-whorl. In spite of being at least double the size, it appears to be more closely related to *expansilabris* than to any other described subspecies inasmuch as it has approximately the same ratio of height to major diameter, the



1



2



3



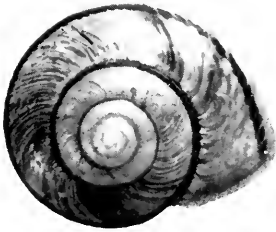
4



5



6



7



8



9



10



11



12

1-3, *Helminthoglypta arrosa williamsi* A.G.S. 4-6, *H. a. pomocensis* A.G.S. 7-9, *H. a. mattolensis* A.G.S. 10-12, *Helminthoglypta tudiculata rex* Church & Smith.





same average number of whorls, and a habitat that lies within the range of this subspecies. However, in addition to size, it differs from *expansilabris* in being at least partially umbilicate and in several sculptural characters as well.

Named for the Mattole River, in the general vicinity of which this snail was discovered. An additional lot was collected this summer by Mr. and Mrs. E. P. Chace at a point ten miles south of Cape Mendocino, in Humboldt Co.

Thanks are due to Dr. Leo G. Hertlein and to Dr. G. Dallas Hanna of the California Academy of Sciences for their cooperation in making accessible the excellently arranged and widely representative Academy collection for study purposes, and for furnishing photographs for reproduction; and also to Dr. H. A. Pilsbry of the Philadelphia Academy for advice and helpful comments.

Berkeley, California, December 1, 1937.

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## NOMENCLATURE OF ONCHIDIIDAE

BY H. BURRINGTON BAKER

The following generic, subgeneric and sectional names have been proposed in this family:

*Onchidium* Buchanan, 1800, Trans. Linn. Soc. London 5: 132; type (only species) *O. typhae* Buchanan, *loc. cit.*, from Ganges River, India.

*Onchidion* Froriep, 1806, Dumeril's Anal. Zool.: 164; emendation of *Onchidium* and taking same type.

*Onchyidium* Blainville, 1817, Jour. de Phys. 85: 438, misspelling.

*Peronium* Blainville, 1818, Dict. Sci. Nat. 12: 285, nude; not used in 1817 (*loc. cit.*) although differences between *Onchidium peronii* and *O. typhae* are discussed.

*Orchidium* Gray, 1821, London Med. Rep. 15: 230; misspelling or emendation of *Onchidium*; same type.

*Onchis* Férussac, 1822 (probably March), Hist. Nat., livr. 15, Tabl. gén.: p. xxxi; substitute for and taking same type as *Onchidium* "Cuvier" Férussac, 1821, Tabl. Syst. Fam. Limaces: 8, defined and with type by original designation, *Onchidium peronii* Cuvier, 1804, Ann. Mus. H. N. (Paris) 5: 37, from Mauritius.

*Peronia* Fleming, May, 1822, Encycl. Brit., suppl. to 4-6 ed., vol. 5: 574; type (only species) *Peronia peronii* (Cuvier); also Blainville, 1825, Dict. Sci. Nat. 38: 519.

*Buchanania* Lesson, 1831, Voy. Coquille, Zool. II (1): 296; type (only species) *B. onchidioides* Lesson, *loc. cit.*, from shores of Chile.

Onchidae Swainson, 1840, Treat. Malac.: 56; misspelled plural of *Onchidium*.

*Oncidium* Agassiz, 1846, Nom. Zool., Index Univ.: 259; emendation of *Onchidium*; type *O. typhae*.

*Oncus* Agassiz, 1846, *loc. cit.*; emendation of *Onchis*; type *O. peronii*.

*Oncis* Herrmannsen, 1847, *op. cit.*: 149, 150; emendation of *Onchis*; type (designated p. 149) *Onchidium peronii* Cuvier.

*Onchidia* "Swainson" Gray, 1847, Proc. Zool. Soc. London 15: 179; misspelled singular of Swainson's Onchidae; type *Onchidium typhae*.

*Buchannia* Gray, 1847, *loc. cit.*; misspelling of *Buchanania*; type *B. onchidioides*.

*Buchanaania* Gistel, 1848, Natur. Thierr.: p. viii; another misspelling.

*Ephrada* Gistel, 1848, *loc. cit.*; substitute for *Buchanaania*; type *B. onchidioides*.

*Eudrastus* Gistel, 1848, *op. cit.*: p. x; substitute for *Peronia* Quoy, 1834, Isis: 287 (a review of Quoy & Gaimard, 1832, Voy. Astrolabe, Zool., vol. 2); type now designated *Onchidium tonganum* Q. & G., 1832: 210, from Tonga.

*Onchidella* M. E. Gray in J. E. Gray, 1850, Fig. Moll. Animals 4: 117; type not designated by Herrmannsen, 1852, *op. cit.*, suppl.: 96; type by subsequent designation of Fischer & Crosse, 1878, Miss. Mex., Rech. Zool. 7 (1): 687, *Onchidium nigricans* Quoy & Gaimard, 1832, *op. cit.*: 214, from Tasman Bay, New Zealand.

*Peronella* Mörch, 1863, Jour. de Conch. 11: 43; type (only species) *Onchis armadilla* Mörch, 1863, *loc. cit.*, from St. Thomas, West Indies; not *Peronella* Gray, 1855, Cat. Rec. Echin. Brit. Mus.: 13.

*Oncida* "Swainson" Paetel, 1875, Fam. Gat. Moll.: 143; emended singular of Swainson's Onchidae; type *O. typhae*.

*Oncidiella* Fischer & Crosse, 1878, *loc. cit.*; emendation of *Onchidella*; type *O. nigricans*.

*Onchidina* Semper, 1882, Reis. Arch. Phil. 3 (6): 287; type (only species) *Onchidella australis* "Gray" Semper, 1880, Reis. (5), pl. 19, f. 11, 14, 15; 1882, *loc. cit.*, from Brisbane, Australia.

*Oncidina* Plate, 1893, Zool. Jahrb., Anat. 7: 166, 208; emendation of *Onchidina*; type *O. australis*.

*Peronina* Plate, 1893, *op. cit.*: 166, 210; type (only species) *P. alta* Plate, 1893: 210, from India.

*Oncis* Plate, 1893, *op. cit.*: 164, 190; type by subsequent designation of Woodward, 1894, Zool. Rec. 30: Moll. 57, *O. coriacea* Semper = *Onchidium coriaceum* Spr., 1880, Reis. (5): pl. 19, f. 1, 16; 1882: 271, from Philippine Islands; not *Oncis* Herrmannsen (1847).

*Arctonchis* Dall, 1905, Harriman Alaska Exped. 13: 112; type by original designation *Onchidella borealis* Dall, 1871, Amer. Jour. Conch. 7: 135, from Sitka, Alaska.

*Watsoniella* Hoffmann, 1928, Zool. Jahrb., Syst. 55: 56, 102; type (only species) *W. lesliei* + *Orchidium lesliei* Stearns, 1892, Nautilus 6: 87, from Albemarle Island, Galapagos; not *Watsoniella* Berg, 1898, Communic. Mus. Buenos Aires I: 42.

*Occidentella* Hoffmann, 1929, Zool. Jahrb., Syst. 57: 269; type (now designated) *Oncidiella obscura* Plate, 1893, *op. cit.*: 207, from Urville Island, New Zealand (a subjective synonym of *O. nigricans*).

*Hoffmannola* Strand, 1932, Folia Zool. Hydrobiol. (Riga) 4 (2): 194; substitute for *Watsoniella*; type *W. lesliei*.

*Paraperonia* Labbé, 1934, Ann. Inst. Oceanogr. Paris 14: 187, 196; without type designation, but including *P. fidjiensis* Labbé, 1934: 197, from Fiji Islands.

*Lessonia* Labbé, 1934, *op. cit.*: 187, 213; only species *Onchidium ferrugineum* Lesson, 1831, *op. cit.*: 300, from New Guinea; not *Lessonia* Swainson (1832) nor Eydoux & Souleyet (1852).

*Scaphis* Labbé, 1934, *op. cit.*: 187, 207; without type designation, but including *Onchidium punctatum* Quoy & Gaimard, 1832, *op. cit.*: 215, from New Guinea.

*Quoya* Labbé, 1934, *op. cit.*: 187, 228; only species *Q. indica* Labbé, 1934: 216, from Indian Ocean; not *Quoya* Agassiz (1862) nor Deshayes (1843).

*Paraonchidium* Labbé, 1934, *op. cit.*: 187, 228; type not designated but including *Onchidium chameleon* Brazier, 1886, Proc. Linn. Soc. N.S.W. 10: 729, from Port Jackson, Australia.

*Semperella* Labbé, 1934, *op. cit.*: 187, 236; type not designated but including *Onchidium glabrum* Semper, 1880, Reis. (5): pl. 19, f. 3, 12; 1882: 263, from Camiguin de Luzon, Philippine Islands; not *Semperella* Gray, 1868, Ann. Nat. Hist. ser. 4, vol. 2: 376.

Accepting Hoffmann's classification, which seems to be founded on the most careful consideration of the morphological data, the following nomenclature results:

*Onchidina* is the original spelling of his 6th genus (the most

primitive according to Plate), with *Oncidina* as an absolute synonym.

His 5th genus is *Peronina* and his 4th is *Hoffmannola* (+ *Watsoniella*, preoccupied).

*Onchidella* is the original spelling of his 3rd genus, with *Oncidella* as an absolute synonym. Because his "Ostgruppe" is the typical group, *Occidentella* is a subjective synonym. Since *Peronella* is preoccupied, *Arctonchis* is the proper name for his "Westgruppe."

**PLATEVINDEX**, new name for *Oncis* Plate, 1893, *op. cit.*: 164, not *Oncis* Herrmannsen, becomes the name of Hoffmann's 2nd genus, unless some available name has been missed; *Semperella* is a subjective, invalid and preoccupied synonym. The name of the type species is *Platevindex coriaceus* (Semper, 1880), which is prior to *Vaginulus stuxbergi* Westerlund (1883).

*Onchidium* is the original spelling of his first genus, with *Onchidion*, *Onchyidium*, *Orchidium*, *Oncidium*, *Onchidia* and *Oncida* as absolute synonyms and *Paraonchidium* as an invalid, subjective one. If the "dendrobranchiate" species, for which Labbé described a "suborder," 2 "families" and 4 "new genera," require a sectional name, *Onchis* is the first vested one (although the nude *Peronium* is prior), with *Peronia*, *Oncus* and *Oncis* as absolute synonyms, and *Eudrastus*, *Paraperonia*, *Scaphis*, *Lessonia* and *Quoya* as subjective ones, although, according to article 25, c, 3, of the International Rules, all Labbé's generic names are invalid except (?) those proposed for single species (preoccupied, anyway).

*Buchanania*, with *Buchannia*, *Buchanaania* and *Ephrada* as absolute synonyms, remains a misspelled *nomen dubium*.

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## FURTHER NOTES UPON TERTIARY AND RECENT MOLLUSKS FROM FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES

BY MAXWELL SMITH

(Concluded from p. 68)

**MUREX MACGINTYI** n. sp. Whorls five, plus smooth shining nucleus of about two whorls, suture impressed; about seven

spiral raised ridges with slightly branching terminations which are recurved, hollow inside near the tips; aperture moderately large, oval in shape; canal slightly oblique, partially closed, recurved at terminus.

This species is allied to *M. glyptus* Smith. One very characteristic feature is the pinched appearance of the posterior portion of the body whorl. Beyond this pinched portion is a pair of axial ridges which are somewhat separated from the others. Length 22.5 mm. Holotype in the Paul McGinty collection, Boynton, Florida. Named for its discoverer Thomas L. McGinty. Pl. 6, fig. 11. Pliocene, Clewiston, Florida.

*MUREX GLYPTUS*<sup>3</sup> n. sp. Nucleus of holotype imperfect, whorls about seven; suture well impressed; spiral sculpture consisting upon the body whorl of about twelve rounded ribs, arranged as shaped from axial rib to rib, often marked with a division line in the center, the major termination of the axial sculpture turned backward from the direction of growth, openings beneath away from the recurved points. The eight axial eminences are sharp and largely formed by foliated processes. Aperture small, oval in shape; canal slightly oblique, almost closed. Length of holotype 26 mm., in the author's collection.

From the young *M. rufus*, an abundant shell in the same beds, the new species differs in the more generous spire, the distinct shoulder, the recurved processes, smaller aperture and mature aspect. The extraordinary sculpture suggests certain *Coralliophilas*. Pl. 6, fig. 10. Pliocene, Clewiston, Florida.

*MUREX HEXAGONUS OXYTATA* n. subsp. Sculpture fine, spiny processes sharp; shell inclined to be rather slender when compared with West Indian recent examples which are more rudely sculptured. The new subspecies appear to agree with living specimens from the Florida east coast and which may also bear the same name. Holotype deposited in the Museum of Comparative Zoology 22 mm. long; paratypes in the author's collection 26 mm. long. Pl. 6, fig. 6. Pliocene, Clewiston, Florida.

*ILYANASSA (PARANASSA) FLORIDANA* Smith (Naut. XLIX, p. 138). Additional specimens of this shell, better preserved, exhibit low, rounded spiral ribs which are visible below the suture chiefly near the short canal. There is also rough oblique sculpture upon the later whorls of the spire. Pliocene, Clewiston, Florida.

*ENGINA TURBINELLA* Kien. The Pliocene examples are exceptionally well developed, and as adult specimens are difficult to obtain upon the Florida Keys the illustration may prove useful.

<sup>3</sup> *glyptus*, carved.

Usually the recent specimens, which lack character on account of immature aspect are inhabited by hermit-crabs. This species apparently lives a little below low tide mark. Length of specimen figured 21 mm. Pl. 6, fig. 13. Pliocene, Clewiston, Florida.

*PHOS ROYCEI* n. sp. Whorls six, in addition a smooth bulbous nucleus of  $1\frac{1}{2}$  whorls; suture well impressed; about 11 axial ribs upon body whorl and a heavily expanded rib adjacent to the outer lip; about 14 strong spiral ribs upon body whorl and which also cover the axial ribs, occasional finer ribs between the former; posterior canal short but distinct; anterior canal moderately wide, deflected anteriorly; interior of outer lip grooved a short distance, parietal wall provided with irregularly placed short grooves or pustules. Length 13 mm.

This new *Phos* is related to *Phos parvus intricatus* Dall. In that species the sculpture differs considerably; the spiral ribs are much less uniform in size. On *intricatus* the spiral sculpture is dominant, on *P. roycei* the axial the most evident. The aperture of *P. parvus* is roughly half the length of the shell, relatively much longer and larger than in the new species. Viewing the two upon a plane surface *P. roycei* shows much greater deflection at the anterior end plus a longer canal.

In making comparisons a long series of living *Phos parvus intricatus* obtained by Winifred Royce at Key Largo, Florida, provided material for study. The new tertiary shell is associated with his name. The holotype is to be placed in the Museum of Comparative Zoology. Pl. 6, fig. 7. Pliocene, Clewiston, Florida.

*MITRA COMPSA*<sup>4</sup> n. sp. Shell of moderate size, slender, seven whorls, base of body whorl constricted, three folds on columella and an indistinct twist below, parietal callus thin; suture well impressed. The sculpture consists of three strong oblique spiral cords on whorls of spire, the anterior one with the tendency to merge with the suture half way around, about eleven primary cords upon the body whorl, a finer but distinct cord below suture and often similar sized cords between primary ones of body whorl and in addition smaller ones; fine axial threads between the spiral cords, often a little oblique; inner margin of outer lip crenulated opposite primary cords. Aperture narrow, nearly half length of shell. Length 23 mm. Holotype to be placed in the Museum of Comparative Zoology.

This species is related to *M. henekeni* Sowerby from the Gurabo formation in the Dominican Republic and *M. stephensoni* Mansfield from the Choctawhatchee formation of Florida. It may readily be separated from these by the presence of four instead of three primary cords upon the whorls of the spire and in the

<sup>4</sup> *compsa*, neat.

arrangement of plaits upon the columella. *M. stephensoni* has four plaits upon the columella against three in the new species and the suture is less impressed. In *M. henekeni* the primary cords are not so oblique, the aperture narrower and less extended.

Undoubtedly this species has escaped notice on account of its superficial resemblance to the young *M. lineolata* Heilprin, a common shell in the Caloosahatchee marl. Pl. 6, fig. 5. Pliocene, Clewiston, Florida.

*GONIOBASIS EFFOSA*<sup>5</sup> n. sp. Shell elongated, whorls regularly placed and five in number exclusive of the eroded nucleus; suture moderately impressed, deeply cut in part and forming a groove; body whorl with about eleven spiral lirations which are closely placed below the periphery, on the inferior whorls one more prominent than the others and forming a slight keel shortly above the suture, the keel separated from the suture by a raised line of the usual size; the lirations crossed throughout with wavy raised growth lines which on the body whorl do not extend below the periphery; aperture large and with thin lip which is sinuous. Length of holotype, 24 mm., aperture 10 mm. Paratypes are smaller and in the author's collection.

Dall in his work upon the southern Tertiary mentions that Mr. Willcox secured a *Goniobasis* in the Florida Tertiary, subsequently lost before a description could be prepared. He states its resemblance to *G. hallenbecki* Lea. The present new species does not recall that one but rather the recent *G. troostiana* Lea, but the sharp carina is dominant in that species.

At Belle Glade, the type locality for *Fusinus watermani*, there appears to be a mixture of Pliocene deep water shells and possibly some Miocene. The new *Goniobasis* possibly belongs to the latter formation. Associated with it was a specimen of *Architectonica granulata* Lam., which never before has been reported from the marls in this portion of the state. Pl. 6, fig. 4a, 4b. Tertiary, Belle Glade, Florida.

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NOTES ON "AMERICAN CONCHOLOGY" BY THOMAS  
SAY, WITH SPECIAL REFERENCE TO THE  
SEVENTH PART, EDITED BY  
T. A. CONRAD

BY H. E. WHEELER

(Continued from p. 50)

PART V treats of sixteen species, listed on the cover as before in alphabetical order by genera. The cover is dated August,

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<sup>5</sup> *effosa*, suggested by excavated suture.

1832. There are again forty pages of text, and ten plates, numbered 41-50, all of which were engraved by Mr. L. Lyon. The species treated are, in the order presented in the text, as follows: *Unio lapillus*, *Unio camptodon*, *Unio lugubris*, *Crepidula plana*, *Modiola papuana*, *Helicina orbiculata*, *Helicina occulta*, *Melania virginica*, *Melania multilineata*, *Melania semicarinata*, *Melania lacqueata*, *Ranella caudata*, *Cerithium muscarum*, *Cerithium septemstriatum*, *Cerithium ferrugineum*, *Mytilus hamatus*. Four of these are for the first time described, and so italicized in our list.

The last page of the cover carries several important notes. The first reads: NOTICE. With this number we send gratis to those who have paid for the preceding Nos., a copy of a work which we have recently printed, entitled "Glossary to the American Conchology," explanatory of the terms made use of in the science of Conchology. A copy will also be presented to each subscriber who shall transmit by mail, free of postage, his respective sum now due, within one month after having received this number. We hope at a future day to be able to present our subscribers with an "Introduction to the science of Conchology," with plates, on the same terms.

The Glossary, then, was not a coordinate part of the *American Conchology*, but used as an inducement to subscribers to bring up their arrears. As it was partially distributed with this number, it is proper to associate the two and to bind them together.

Say authorizes the placement of his *Sigaretus perspectivus* in the genus *Cryptostoma*, and promises a characterization of the genus in his next number. This promise is fulfilled at the end of Part VI. Say also refers his *Sigaretus maculatus* to *Cryptostoma*, but retains the genus *Sigaretus* until he can publish a species that satisfies its diagnosis.

In a footnote on this cover Say credits his brother with the finding of a *Venericardia*, which came from New Jersey, and which he described under the name of *cribraria*. The description is here repeated, but since the specimen was imperfect he does not consider it entitled to recognition. The name *Venericardia cribraria*, then, has perhaps no other status in conchological literature than this brief diagnosis on a cover which bookbinders have so thoughtlessly scrapped.



PART VI consists of forty-eight pages of text, and ten plates, numbered 51-60. The eighteen species reviewed are found in the text in the following order: *Unio nexus*, *Unio apiculatus*, *Unio quadrulus*, *Planorbis lentus*, *Planorbis trivolvus*, *Planorbis bicarinatus*, *Limneus emarginatus*, *Limneus catascopium*, *Limneus decidiosus*, *Pecten islandicus*, *Pecten dislocatus*, *Nassa uncinata*, *Nassa vibex*, *Nassa acuta*, *Ostrea equestris*, *Cytherea albaria*, *Petricola pholadiformis*, and *Petricola dactylis*. Those in italic are new; and one, the *Cytherea*, is a fossil.

Following the plates there is a characterization of the genus *Cryptostoma* and a two-page Synonymy of the Western North American species of *Unio* and *Alasmodonta*. Forty-eight species of the former, and three of the latter genus are validated, ninety-five names being thrown into the synonymy. This little piece of work is the precursor of a flock of synonymies over which Isaac Lea and Timothy Conrad wrangled for many years.

The cover of Part VI is in every way similar to that of the preceding number, both of which bear the statement that the printing was done "at the M. Press," other covers showing that they were issued from the School Press. The "M." probably stands for Maclure, the patron of the author, and one of the founders of the New Harmony Community. The date on the cover is April, 1834.

On the fourth page of the cover Say attributes the delay in publication, an interval of twenty months, to the protracted illness and death of Mr. Lyon, the engraver. In the notes following *H (elix) irrorata* is made a variety of *H. lactea* Müll., *Melania acuta* is added to the synonymy of *M. semicarinata*. Say feels that *Valvata arenifera*, previously described in the *Transactions of the American Philosophical Society*, is in reality the follicle of a *Phryganea*. *Caracolla helicoides* is made a synonym of *Helix palliata* Say, and *Helix carolinensis* is made a variety of *Helix appressa*. *Melania tuberculata* is considered a variety of *M. stygia* Say, and *Melania elongata* is suggested as a probable variety only of *M. elevata*. Two corrections of dates are made. Attention is called to the fact that Plate 53 had been printed and colored with Barnes' name *Unio rugosus* instead of Rafinesque's name, *quadrulus*, which should stand. In the Binney copy of Say this plate has been corrected; but in the Marsh copy, which

is also before me, the plate carries the uncorrected name as originally engraved.

PART VII. This posthumous work of Say comprises sixteen pages of text and eight colored plates. Four of these plates were engraved by L. Walker, but whoever engraved the others failed to sign the coppers. The species treated are as follows: *Donax variabilis*, *Donax fossor*, *Cyrena carolinensis*, *Venus alveata*, *Tellina brevifrons*, *Tellina mera*, *Tellina alternata*, *Tellina polita*, *Tellina tenta*, *Tellina tenuis*, *Arca zebra*, *Unio truncatus*, and *Unio lineolatus*. Those italicized are new to science. The table of contents on the cover lists these species in the order in which they appear, not alphabetically as heretofore.

Following the text there is an Appendix, printed on one side of the last two pages, which publishes Say's manuscript description of *Chiton apiculatus*, but without a drawing. On the same page the editor, Conrad, quotes Say's observation that his *Venus alveata* is to be considered a variety of Dillwyn's *cingenda* (*cancelata* Lam.).

The cover of this rare part is similar to those of the foregoing numbers, save that it is printed on blue paper, the price of the number is omitted, and there is nothing to show when or where the number was published. The character of type would indicate that it was done in New Harmony, but that is by no means certain. Conrad's name does not appear either in the text or on the cover, and the parts for which he was responsible are indicated by the subscription "Editor," or simply "Ed." There are five of these editorial notes, but in addition the characterization of *Tellina tenuis*, and the observation as to the occurrence of *Unio lineolatus* in the Warrior River and elsewhere is undoubtedly Conrad's work.

It should also be noted that one of the species in this number is a fossil, *Venus alveata*, which was previously described by Conrad himself. The cover contains no announcement of the continuation or suspension of the work.

William G. Binney<sup>6</sup> states that Conrad brought out this Seventh Part after Say's death "which occurred in September, 1833." On December 12, 1834, George Ord, read a Memoir on

<sup>6</sup> Binney, W. G., *The Complete Writings of Thomas Say on the Conchology of the United States*, New York, 1858, p. 226 foot note.

the life of Say before the American Philosophical Society, in Philadelphia, in which he gave the true date of his death, namely, October 10, 1834.<sup>7</sup>

### *Republications*

In 1856 W. G. Binney brought out his first republication of Say's writings on Conchology. It consisted of 40 pages and was limited to the land shells described by Say. This was made the first part of a later work, entitled, *The Complete Writings of Thomas Say on the Conchology of the United States*, the original title page of which was used in place, but another title page prepared for the whole work. This included, also with an appropriate title page, a second part, pages 41-252, entitled, *Descriptions of Fluvial and Marine Shells of North America by Thomas Say*. The title page of the first part was *Descriptions of Terrestrial Shells of North America by Thomas Say*, but bears the date 1858.

This republication does not reprint the Glossary to *American Conchology*. It does not reprint in the second part such descriptions of land shells as properly belong there, since they had appeared in the first part. The article in the second and third editions of Nicholson's *American Encyclopedia* are reprinted, with facsimiles of the plates, and Binney believed that the same article was printed in the first edition, but he had not succeeded in finding it. The several editions were dated 1816, 1818, and 1819 respectively.

All of the plates in the *American Conchology* were reproduced from the original coppers. Plate 75, the concluding one, is a colored illustration of *Ampullaria rotundata*, identified by Halde- man, which Say had described in the *New Harmony Disseminator* on August 12, 1829, but no figure had been published. Tiebout's original number for this plate "2" was left on it, the new number assigned (75) being placed at the top.

As far as the matter contained in the *American Conchology* is concerned, it is all reproduced in Binney's republication; but, as has been previously stated, not consecutively. Some copies of

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<sup>7</sup> Binney, W. G., *The Complete Writings of Thomas Say on the Entomology of North America*, New York, 1858, Vol. I, p. xii.

Present Depository	Original owner or name by which copy is known	Seven parts—plates and covers complete	Seven parts—no covers	Complete—seven parts— covers—original order preserved	Six parts—and covers	Six parts—no covers	Has Glossary—Bound in or separate	Part one only
Acad. Nat. Sci. Phila. ....	Mrs. Say	*					*	
Acad. Nat. Sci. Phila. ....	J. S. Phillips	*						
University of Southern California, Los Angeles, Dr. Irene McCulloch .....	Acad. Nat. Sci. P.	*		*				
Library of J. R. LeB. Tomlin, England	" "	*		*				
Library of H. E. Wheeler .....	W. G. Binney	*						
Museum Comp. Zoology, Cambridge			*					
John Crerar Library, Chicago .....			*					
Hist. Soc. of Pa., Philadelphia .....			*					
University of Michigan, Ann Arbor .....	Bryant Walker		*		*		*	
University of Chicago .....	Ebenezer Lane		*		*		*	
Library of H. E. Wheeler .....	Roswell Marsh		*		*		*	
N. Y. State Library, Albany, N. Y. ....								*
Boston Public Library .....								
Franklin Institute, Philadelphia .....								
Library of Congress .....								
Indiana State Library .....	U. P. James' Copy						?	
Indiana State Library .....	Holliday Copy						?	
Workingman's Library, New Harmony, Indiana .....								
British Museum .....		*						
Western Reserve College .....								
L. C. Glenn, Vanderbilt Univ. ....		*						*

Binney's Republication contain the extensive catalogues of the publishers, Messrs. H. Bailliere, bound with them in the back. From this catalogue of 1858 we learn that a copy of Say's *American Entomology*, a "very scarce" work, could be had for \$30.00; that copies of Binney's *Republication of Say's Conchological Works* were available at \$12.00, with coloured plates; but that the continuation section, just issued in 1858, was available for \$5.50 to subscribers to the first part, issued in 1856.

In 1840 Mrs. Lucy Say issued a reprint of some forty-eight species of land and fresh-water shells which her husband had published at various times between 1829 and 1831 in the *New Harmony Disseminator of Useful Knowledge*, and in the *Transylvania Journal of Medicine*, Lexington, Kentucky. This work is occasionally incorporated with copies of the *Conchology*. Mrs. Say states in the preface to this pamphlet that all these species would have appeared in the forthcoming numbers of the *Conchology*, with illustrations, had Say lived to realize his ambition. She regrets that she cannot furnish the illustration now. She states that many of the shells described had been already deposited in the Academy of Natural Sciences, and that others were in her own cabinet.

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## JUNIUS HENDERSON

BY T. D. A. COCKERELL

Junius Henderson died, after a long and painful illness, on the night of Nov. 4, 1937. He was born at Marshalltown, Iowa, in April, 1865. Iowa, when it was still something of a frontier state, gave birth to a remarkable series of naturalists, such as Eastman, Evermann, Springer and Pilsbry. There must have been something stimulating in the atmosphere, sowing the seed in Henderson's mind which was to produce such an abundant crop during the last thirty years of his life. I remember him in the early years of this century, when he was still thought of as the county judge, learned in the law, and in all sorts of unobtrusive ways rendering service alike to the public and to private individuals. It will never be known how many people he wisely counselled, preventing them from making mistakes, or guiding

them to wise decisions. This being a mining region, he was the more efficient in all these matters because of his knowledge of geology, and later on he was constantly consulted by workers in Economic Geology, men who were presumed to be experts, but who had to depend on Henderson's wide knowledge for the determination of the various strata. Many years ago, I received from the editors of the New International Encyclopedia a copy of their article "Colorado," with a request to revise it for a new edition. Running through it, I at once saw that it was greatly in need of revision, but where was the man whose knowledge was comprehensive and exact enough to do it? I could think of only one such man, and those who have the latest edition will see that the article on Colorado is credited in large part to Junius Henderson. Henderson was honorary curator of the University of Colorado Museum at a time when the whole collection would have gone into a good sized wagon, and was of no great value. Fortunately, for all concerned, the University was at length able to adopt him as a professor, in charge of the Museum, and today we can see the results. Although the Museum has had neither space nor money to develop large exhibits, such as may be seen elsewhere, it has no rival in the Rocky Mountain region if we regard the vast number of species represented, and the opportunities presented for research. Although Henderson worked and wrote on geology, mammals, birds, amphibia, reptiles, and anthropology, so that had he done nothing else his fame would have been secure, it was the study of mollusca which always attracted him most, and to which his major effort was directed. He was not content to merely investigate such shells as might fall in his way, but through a system of exchanges built up a magnificent collection of specimens in the Museum. He corresponded with many people, some of whom developed a strong regard for him, though they had never seen him. I recall in particular a letter which came from John Ponsoy, of London, who was dying, and sent a last affectionate message to his correspondent Henderson. As he organized the great collection of shells, he also organized the literature, and prepared for his guidance large typewritten volumes, giving the original descriptions (with photographs of figures) of all the western species. His volumes on the land and

fresh-water mollusca of the west are comparable to those of Mrs. Oldroyd on the marine shells of the Pacific Coast, and could they be published would at once become indispensable source-books for conchologists. So much for the background of his researches, but he travelled widely in Colorado, California, Utah and the northwest, and accumulated the materials which enabled him to revise the molluscan faunas of these regions, his revisions including a great deal of critical and original work. Keen to examine every reference in the literature, he never lost his critical eye, and was often able to correct erroneous statements and misunderstandings. In the long history of the University of Colorado, there will never be a man who stands where Henderson stood, as—let us say—the Baird of Colorado. Others will do valiant work, but they will build on the foundations laid by Henderson, and those foundations will remain secure as long as the University stands.

Junius Henderson leaves a widow, Bess Green Henderson, who was his companion in the field, and of whose devotion, during the long period of his illness, it is impossible to adequately write. Herself a trained zoologist, she understood his work, and took over, in large measure, his activities in the field of ornithology.

[Professor Cockerell allows me to add a brief note of appreciation of the work of our departed friend. Prior to Henderson's publications, what was known of the molluscan fauna of the Rocky Mountain States was scattered through scores of books and periodicals. The records were of unequal value and greatly in need of revision. In "The Mollusca of Colorado," "Mollusca of Colorado, Utah, Montana and Wyoming," "Non-marine Mollusca of Oregon and Washington," practically all of the published data was collated and critically discussed, together with a great mass of new information from his own field work and that of his colleagues, and from unpublished material in museums. Together with two papers on hunting mollusks in Utah and Idaho, published in collaboration with L. E. Daniels, these publications total over 500 pages. I make use of them very frequently in my own work. They make the knowledge of mollusks of these mountain and northwestern states accessible and reliable, and form a broad foundation for further work.—H. A. Pilsbry.]

EXTENDED RANGES OF SEVENTY-FIVE SPECIES  
OF NORTH PACIFIC SHELLS COLLECTED  
BY WALTER J. EYERDAM AND  
INGVARD NORBERG

BY WALTER J. EYERDAM

During 12 trips to Alaska and 2 trips to Kamchatka and the maritime province of East Siberia, I have made one of the largest and most extensive collections of shells from the North Pacific to be found outside of the U. S. National Museum. Most of the shells I have taken myself but some notable additions were made by Ingvard Norberg on Akutan, Chichagof and Hinchinbrook islands during Summers of 1931, 1932, 1934 and 1936. My own activities in collecting shells in these northern waters started in 1917 at Port Armstrong, Baranof Island, while engaged as cooper for the U. S. Whaling Co. In subsequent years I went to Alaska and Siberia engaged in whaling, fishing, mining and in biological collecting for several American and European museums.

In checking up all of the North Pacific shells in regards to known geographical ranges the following 75 species were found to have been taken beyond the limits as reported in Bulletin 112—"Summary of the Marine Shellbearing Mollusks of the Northwest Coast of America, from San Diego, California, to the Polar Sea, mostly contained in the Collection of the United States National Museum," by William H. Dall.

Most of the shells in the following report were identified by Drs. Dall, Bartsch and Mrs. Oldroyd. The new species are not included.

*Yoldia ensifera* Dall. Dredged July, 1922—Izhut Bay, Afognak I., Alaska. Former range—S. E. Alaska to San Luis Obispo, California. Extended range—about 700 miles westward.

*Cuspidaria pectinata* Cpr. 10 fathoms—muddy bottom—Smith's Cove, Puget Sound.—1921. Former range—Monterey, California to Panama. Extended range—about 1000 miles northward.

*Phacoides californicus* Conrad. Sandy Beach—1906—Alki Point, Seattle, Washington. Former range—Crescent City, California, to San Ignacio Lagoon, L. Calif. Extended range—about 500 miles northward.



*Limatula subauriculata* Montagu. 20 fathoms—sandy—1922—Izhut Bay, Afognak I., Alaska. Former range—Br. Columbia to San Quentin Bay, Lower Calif., also Atlantic. Extended range—about 700 miles.

*Parapholas californica* Conrad. In rocks—low tide—1908—Newport, Oregon. Former range—Monterey to San Diego, California. Extended range—about 700 miles northward.

*Musculus discors* Linn. Not previously reported from this coast?

*Platydodon cancellatus* Conrad. 1926—low tide—sand and gravel—Clallam Bay, Str. of Juan de Fuca, Wash. Known range—Baulinas Bay, Calif., to San Diego, Calif. Extended range—northward about 1500 miles.

*Kennerlia bilirata* (Conrad). Dredged 15 fms. muddy bottom. Drier Bay, Prince William Sound, Alaska. October, 1924. Former range: Forrester Island, Alaska, south to Point Abrejos, Lower California. Extended range: about 700 miles.

*Cadulus hepburni* (Dall). Dredged 20 fms., sandy bottom. Drier Bay, Knight Island, Prince William Sound, Alaska. July, 1923. Former range: Victoria, B. C., to Monterey, Calif. Extended range: about 1000 miles northward.

*Admete couthouyi* var. *gracilior* (Cpr.). Dredged 10 fms., mud. Izhut Bay, Afognak Island, Alaska, Aug., 1922. Former range: San Diego, Calif. (Gabb, Pal. Cal. Vol. 2, p. 50). Identified by Dall. Extended range: about 2600 miles.

*Admete californica* (Dall). Dredged 15 fms., stony bottom. Elrington Island, Alaska, July, 1924. Former range: Tillamook, Oregon, to Lower Calif., in deep water. Extended range: about 1200 miles northward.

*Tritonalia lurida* (Midd.). On stones on beach—Port Armstrong, Baranof Island, Alaska, July, 1917. Former range: Forrester Island, Alaska, to Catalina Island, Calif. Extended range: about 200 miles northward.

*Melanella micans* (Cpr.). Dredged 25 fms., sandy bottom, Drier Bay, Knight Island, Prince William Sound, Alaska, Sept., 1923. Former range: Vancouver Island, B. C., to Todos Santos Bay, Lower Calif. Extended range: about 1000 miles northward.

*Odostomia (Amaura) kennerlyi* (Dall and Bartsch). Dredged

15 fms., mud. Izhut Bay, Afognak Island, Alaska, Aug., 1922. Former range: Nanaimo, B. C., to Monterey Bay, Calif. Extended range: about 1200 miles northwestward.

*Odostomia (Amaura) sanjuanensis* (Bartsch). Among stones on beach. Drier Bay, Knight Island, Prince William Sound, Alaska, July, 1923. Former range: San Juan Islands in the Gulf of Georgia. Extended range: about 1200 miles northward.

*Odostomia (Amaura) talpa* (Dall & Bartsch). Among stones on beach. Drier Bay, Knight Island, Prince William Sound, Alaska, July, 1923. Former range: Mole harbor and Sitka harbor, Alaska. Extended range: about 600 miles northward.

*Odostomia (Evalca) stephansae* (Dall & Bartsch). Among stones on beach. Drier Bay, Knight Island, Prince William Sound, Alaska, July, 1923. Former range: Bear Bay, Peril Strait, Alaska, to Barclay Sound, British Columbia. Extended range: about 500 miles northward.

*Odostomia (Evalca) willetti* (Bartsch). Among seaweed on stony beach. Drier Bay, Alaska, July, 1923. Former range: Prince of Wales Island, Alaska. Extended range: over 600 miles northward.

*Odostomia (Evalca) skidegatensis* (Bartsch). Among seaweed on sandy beach. Drier Bay, Alaska, July, 1923. Former range: Skidegate, Queen Charlotte Island, Alaska, to Trinidad, Calif. Extended range: About 800 miles.

*Odostomia (Evalca) quadrae* (Bartsch). Among seaweeds, on stony beach, Drier Bay, Knight Island, Alaska, July, 1923. Former range: Barclay Sound, Vancouver Island. Extended range: About 900 miles.

*Odostomia (Evalca) unalaskensis* (Bartsch). Under stones, Shuyak Strait, Alaska, Aug., 1924. Former range: Captain's Harbor, Unalaska Island, Alaska. Extended range: About 600 miles.

*Cerithiopsis (Cerithiopsidella) oneilensis* (Bartsch). Under stones on the beach, Drier Bay, Knight Island, Prince William Sound, Alaska, July, 1923. Former range: Oneil Island, San Juan group, Washington. (*Type locality.*) Extended range: About 1200 miles northward.

*Cerithiopsis (Cerithiopsis) charlottensis* (Bartsch). Among stones on beach, Drier Bay, Knight Island, Alaska, July, 1923. Former range: Queen Charlotte Islands to Puget Sound. Extended range: About 700 miles northward.

*Cerithiopsis (Cerithiopsis) stejnegeri* (Bartsch). Under rocks at low tide mark, Puget Sound, Washington, July, 1920. Former range: Sitka, Alaska. Extended range: About 600 miles southward.

*Bittium (Semibittium) vancouverensis* (D. & B.). Among stones on beach, Drier Bay, Knight Island, Alaska, Aug., 1923. Former range: Barclay Sound, Vancouver Island, B. C. Extended range: About 1000 miles northward.

*Spirogyphus lituellus* (Mörch). Common on dead shells, Ishut Bay, Afognak Island, Aug., 1922. Former range: Forrester Island, Alaska, to San Diego, Calif. Extended range: About 800 miles northwestward.

*Velutina cryptospira* (Midd.). On rocks at low tide, July, 1925, Gulf of Kronotsky, Kamchatka. Former range: Gulf of Alaska. Extended range: About 2500 miles westward.

*Calliostoma costatum* (Martyn). Under stones at low tide, July, 1922, Ishut Bay, Afognak Island, Alaska. Former range: Sitka, Alaska, to San Diego, Calif. Extended range: About 700 miles northwestward.

*Cidarina cidaris* (A. Adams) 1864. Dredged 25 fms. muddy bottom, July, 1922, Izhut Bay, Afognak Island, Alaska. Former range: Kasaän Bay, Alaska, to Cape San Quentin, Lower Calif. Extended range: About 700 miles northwestward.

*Retusa semen* (Reeve). On roots of eel grass, July, 1923, Coll. no. 694, Drier Bay, Knight Island, Alaska. Former range: Off Point Collinson, Arctic Ocean (also Atlantic Ocean). Extended range: About 700 miles southward.

*Retusa harpa* (Dall). On roots of eel grass, Drier Bay, Knight Island, Alaska, July, 1923. Former range: Queen Charlotte Islands, B. C., to San Diego, Calif. Extended range: About 800 miles northward.

*Cypraeolina pyriformis* (Cpr.). On nullipores at low tide mark, July, 1923, Drier Bay, Knight Island, Alaska. Former range: Peril Strait, Alaska, to Mazatlan, Mexico. Extended range: About 400 miles northward.

*Haminoea olgae* (Dall). On roots of eel grass, July, 1923, Drier Bay, Knight Island, Alaska. Former range: Olga, San Juan Islands, Wash., to San Quentin Bay, Lower Calif. Extended range: 700 miles northward.

*Lora mörchi* (Dall)-(Leche). Dredged 20 fms. stony bottom, July, 1923, Drier Bay, Knight Island, Alaska. Former range: Nova Zembla, Arctic Ocean, to Bering Strait. Extended range: About 800 miles southward.

*Columbella tuberosa* (Cpr.). Dredged 20 fms., July, 1924, Elrington Island, Prince William Sound, Alaska. Former range: Forrester Island, Alaska, to Gulf of California. Extended range: About 800 miles northward.

*Barleiea sanjuanensis* (Bartsch). On stony algae at low tide, July, 1924, Elrington Island, Alaska. Former range: San Juan Islands, Puget Sound, Washington. Extended range: About 1100 miles northward.

*Plicifusus kroyeri* (Möller). On sandy beach, July, 1925, near mouth of the Kamchatka River, Kamchatka. Range: Point Barrow, Alaska (Circumboreal). Extended: to Kamchatka. (Vladivostok also in 1928.) Coll. by W. J. Eyerdam.

*Micranellum oregonensis* (Bartsch). Dredged 20 fms. shelly bottom, Drier Bay, Knight Island, Alaska, July, 1923. Range: Forrester Island, Alaska, to Monterey, California. Extended range: About 700 miles northward.

*Fartulum occidentale* (Bartsch). Dredged 20 fms. on roots of eel grass, Drier Bay, Knight Island, Alaska, July, 1923. Range: Gulf of Georgia to Lower California. Extended range: About 1000 miles northward.

(To be continued)

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## NOTES

XESTA AND TROCHONANINA.—Nevill, 1878, Hand List Moll. Ind. Mus. 1: 50, designated *Nanina citrina* (Linné) as the type of *Xesta* Albers; his action is earlier than Kobelt's (1880) choice of *Nanina stuartiae* (Pfr.) [Cf. H.B.B., 1936, Naut. 50 (1): 30]. *Xesta* thus becomes a synonym of *Naninia* Sowerby, and *Asperitas* Gude may be used for the group of *Elaphroconcha inquinata* (Busch). Nevill, 1878: 45, also designated *Nanina mozambicensis* (Pfr.) as

the type of *Trochonanina* Mousson, which agrees with Kobelt's later choice [Cf. H.B.B., 1936, Naut. 50 (2) : 70]. *Trochonanina* is a genus of the African Trochozonitinae Iredale, 1914, Proc. Mal. Soc. London 11 : 122.—H. BURRINGTON BAKER.

AN INSECT "XENOPHORA."—During the summer and fall of 1937 I have found on four occasions a rare larval stage of an insect (7.0 mm. in length) carrying empty snail shells on its back. Dr. H. P. Löding, of Mobile, Alabama, informs me that it is the larval stage of a species of *Chrysopa*, Family *Chrysopidae*, Order *Neuroptera*, an aphid-lion, or lacewing fly. It would be necessary to rear this larva to the adult stage in order to determine its specific position. It is evidently carnivorous, possessing hollow mandibles, adapted for sucking. When taken alive it appears to be a clump of small shells. What its relation with the snails it carries on its back is, one cannot accurately guess. However, its burden is an effective disguise.

It lives in dry leaf mould in woods of the oak-hickory type, where snails are abundant. On a knob at Hayesville, North Carolina, one specimen was collected, carrying on its back about six specimens of *Retinella indentata paucilirata*, and *R. carolinensis wetherbyi*. The second specimen was found on the Robbinsville Road in extreme northwestern Macon County, North Carolina, and carried five juveniles of the same two species. The third *Chrysopa* from Clay, Jefferson County, Alabama, carried no snails. The fourth specimen was taken near the Fort Payne Cave, Fort Payne, DeKalb County, Alabama. Attached to its dorsum by fine threads, apparently silk, was the following load: Two specimens of juvenile *Polygyra rugeli*, one *Hawaiiia minuscula*, two *Euconulus sterkii*, one *E. chersinus*, two *Vertigo gouldii*, a fly cranium, and a caterpillar cranium.—A. F. ARCHER.

NOTES ON SOME LAND MOLLUSKS OF A PALMETTO PASTURE IN NORTH-CENTRAL ALABAMA.—The occurrence of the palmetto (*Sabal minor*) in north-central Alabama has excited some interest, because it was formerly supposed to be limited to more favorable climatic areas further to the south. At the suggestion of Dr. R. M. Harper of the Alabama Museum of Natural History, I investigated one of the palmetto localities near the McCalla post-

office, Jefferson County, Alabama, in November, 1937. This locality is favorable for the palmetto, being low, open, and calcareous. The area is very open and pastured, with a scattering of red cedar, scaly-bark hickory, hackberry, willow oak (*Quercus phellos*) and elm (*Ulmus alata*). The palmetto is rather common, and the ground is covered in places with limestone outcrops. The mollusks found, with number of specimens of each, follow.

<i>Helicodiscus parallelus</i> (Say) .....	2	<i>Polygyra pustuloides</i> (Bland) .....	15
<i>Deroceras laeve campestre</i> (Say) .....	3	<i>inflecta</i> (Say) .....	26
<i>Euconulus chersinus</i> (Say) .....	2	<i>thyroidus</i> (Say) .....	8
<i>Mesomphix perlaevis</i> (Pilsbry) ...	1	<i>Strobilops floridana</i> Pilsbry .....	7
<i>Retinella indentata paucilirata</i>		<i>Gastrocopta procera</i> (Gould) .....	1
(Morel.) .....	7	<i>contracta</i> (Say) .....	2
<i>Hawaiiia minuscula</i> (A. Binney) ...	5	<i>armifera</i> (Say) .....	14
<i>Zonitoides demissus</i> (A. Binney) ...	29	<i>Pupoides marginatus</i> (Say) .....	46
<i>arboreus</i> (Say) .....	20	<i>Succinea avara</i> Say .....	1
<i>Polygyra auriformis</i> (Bland) .....	4		

The numbers cited above would need re-checking by subsequent collections in order to be significant, but nevertheless the relative numerical importance of certain species is fairly evident. The species favoring cedar glades, prairies, and cleared country are the most abundant. Of these the species of *Gastrocopta* and also *Pupoides marginatus* are either true xerophiles or facultative xerophiles. The latter is rare or absent from either dry forests or cedar glades, but favors open country. It has less preference for calcareous soil than does *G. armifera*. Probably the most significant feature in this palmetto habitat is the presence of two species of the Floridian area. *Strobilops floridana* has been found before now in north-central Alabama, but its maximum of abundance is reached in the Gulf Coastal Region. It is more truly a xerophile than are the other species of the genus in Alabama. *Polygyra auriformis* has not been found hitherto north of the Selma Chalk prairies of central Alabama, and it too is at its maximum on the Gulf Coast. Both of these species are as peculiar to the warmer latitudes of the state. Their extension northward may have come about by way of the swamp forests of the southern type, or else were coincidental with the spread of the palmetto.—A. F. ARCHER.

ACRORBIS PETRICOLA is a new genus and species of Planorbidae from the state of Santa Catharina, Brazil, recently described by Dr. Nils Hj. Odhner.<sup>1</sup> It lives in damp moss on rocks over which water trickles. The shell resembles *Parapholix* (*Pompholix* Lea, *Pompholycodea* Lindh.) in the ultrasinistral coil, but is umbilicate. However, we do not believe it to be related to that North American genus. *Parapholix* has recently been shown to belong to the Helisomatinae. It has a large gland in the lower sac of the penis, a massive prostate gland, and other characteristics of that subfamily. *Acrorbis* has the uniserial prostate of *Tropicorbis*; the penis and its long, slender verge are as in *Tropicorbis* and *Drepanostoma*. By having a blunt flagellum at apex of the penis it is like *Drepanostoma*, but it differs in the teeth. It appears, therefore, to be another genus of this South American series. We have elsewhere shown *Tropicorbis* to be directly related to African Planorbidae, not to North American.—H. A. P.

A GEOGRAPHIC DIGEST OF "THE NAUTILUS."—VOLUMES 1-50, A PERIOD OF ABOUT FIFTY YEARS.—The study of mollusks assumes a different aspect when approached from an ecologic viewpoint, especially the pulmonates. When followed from a geographic or faunistic angle two definite courses may be adopted by the student. First type localities may be established and visited; second unworked districts may be searched to extend the known range of existing species and to discover new ones.

In order to clarify the immense number of habitat records contained in the pages of "The Nautilus" and present them in a usable form the writer has compiled the more important data bearing upon the subject which is to be arranged collectively beneath the various states, provinces, islands and countries. Under each geographic title there are to be five further subdivisions covering in turn land mollusks, fresh water mollusks, marine mollusks, fossil mollusks and articles of a general nature. Within these groups each subject will be introduced in the form of the author's name, the title of paper or condensed form of same, in some cases the name of a species, always the exact locality and frequently the type locality. The volume and page numbers of "The Nautilus" are to be included which will also embrace "The Conchologists

<sup>1</sup> Arkiv för Zoologi Bd. 29B, No. 14.

Exchange," constituting the first two volumes. Unusual habitats, either new records for a given region or otherwise significant, are noted. Widely dispersed species which may readily be found in the older publications are not included.

The frequent and highly valuable reviews of contemporary literature, within the pages of "The Nautilus," are to be referred to in the digest. With all of these aids grouped together the student may at a glance have access to practically all the literature which has appeared over a period of fifty years and covering a given area within a single state or country. Provided that the common genera are recognizable to the student it should be possible, in many cases, to contact certain species locally without actually referring to "The Nautilus" or other publications. Identifications may be checked at some future time. It is hoped that the digest will stimulate exploration of neglected areas and make a little easier the path of those taking the molluscan census.

In the first part of the work all of North America is to be included together with Panama and the Territory of Hawaii. Although all records of the other continents have also been compiled, as they appear in "The Nautilus," it appears best to defer their publication. It might be possible to supply data pertaining to South America or elsewhere to order.

The undersigned invites correspondence and will welcome suggestions. The replies will largely determine the number of copies to be printed. It is hoped that the price may be kept well under five dollars. Please write at once and fully state your views.—MAXWELL SMITH, Lantana, Florida.

ANOTHER COPY OF "AMERICAN CONCHOLOGY."—In connection with the article "Notes on 'American Conchology' by Thomas Say," published by H. E. Wheeler (*Naut.*, 51: 43-50, 1937) it may be of some value to record the presence of a copy in the University of Colorado Museum library. This copy contains all seven parts, including the covers, but not the Glossary. The 68 colored plates are assembled and follow the text, and the covers are bound in at the back. The work has been recently bound in a green cloth library binding and the edges have been trimmed. The condition is excellent except for a few age-stained pages and one which has been repaired. The copy was obtained from Gerhard in 1917 for \$12.00.—HUGO G. RODECK, University of Colorado Museum.



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## A NEW SPECIES OF OLIVA FROM SANTO DOMINGO, WITH NOTES ON OTHER MARINE FORMS

BY WILLIAM J. CLENCH

During the past summer (1937) a little over two months were spent along the northern coast of Santo Domingo. Though our interest was mainly devoted to a study of the land mollusks of this region, considerable time was spent at a limited number of marine stations. These places were located at Monte Cristi, Puerto Plata, Puerto Sosua and Santa Barbara de Samana.

The northern coast of Santo Domingo is exposed to the easterly trades and to the somewhat frequent winter storms from the north. In addition, deep water prevails along this entire coast with a consequent lack of protection from strong wave action. A few little harbors exist, and these possess only small areas that are sheltered during any severe blow. As a consequence, the marine fauna is limited throughout most of this area. Protected places, however, in the lee of points of land, or little coves in the harbors yielded a large number of species.

The region at Monte Cristi is thus favored by a small peninsula and a six-mile stretch of coast line that runs north and south, forming a fairly large bay, which is somewhat protected from the trade winds. Shallow water extends from the end of the peninsula completely around the bay, broadening to about three miles near the center. The beach is astonishingly rich in drift material which would indicate exceedingly favorable offshore conditions.

From "El Morro" at Monte Cristi east to Old Cape Frances, the coast is mainly rocky and composed of the "diente de perro" limestone, forming cliffs in some places 20 to 50 feet high. Small beaches are to be found at irregular intervals along this section of the coast with a fairly long stretch some 20 miles east of Puerto Sosua. Easterly, beyond Old Cape Frances, the coast is mainly

sandy, giving way to rock again towards the tip of the Samana peninsula. We found the few outer beaches investigated along this northern coast to be exceedingly poor in material. The ricks of shells were thin, scattered, and composed generally of fragments of the rock-inhabiting species.

The harbors at Puerto Plata and Puerto Sosua are small and have but limited protected areas; these proved, however, to be quite rich. The inner portions of both are margined by sandy beaches, the sides by weathered limestone. A small coral reef is located in the center of Puerto Sosua harbor, the bottom elsewhere being composed mainly of sand. The bottom of Puerto Plata harbor is mainly a bluish clay. At the time of our visit, a suction dredge which was operating, enabled us to obtain many more species from this locality.

Santa Barbara de Samana is a small village located on the south side of the Samana peninsula and about five miles from the entrance of Samana Bay. Conditions here for most forms of marine life are ideal. Three small keys protect the little harbor and offer in addition to the mainland a remarkable series of habitat stations. A small stream empties into the harbor on the western end of the village, and it has created a fairly extensive sand bar which proved to be exceedingly rich in bivalves. Both east and west of the settlement are several spurs from the main mountain ridge which composes the peninsula. These project into the bay, forming points between which are small bays with sandy or shingle beaches.

Samana Bay proper is a deep reach of water, approximately 25 miles long and about 9 miles wide. The inner or western end of the bay is brackish and muddy, due to the silt brought down by the Rio Yuna which empties into the bay at this point. The easterly trade winds in addition cause the plant debris to drift to this end of the bay, which is there impounded along with the silt to form the shore. This western shore is advancing rather rapidly, to judge by the conditions noted and the statements of many of the inhabitants. Gabb's map indicates about a four-mile advance since 1873, and one resident told us of a saw-mill which formerly existed on the shore, receiving the saw logs at tide water, the foundations of which are now more than a mile inland.

We are deeply indebted to His Excellency Presidente Rafeal Leonidas Trujillo for every kindness and courtesy that could be extended to us. Without his aid much would have been left undone. Through his officers, Colonel Charles McLaughlin and Mr. Harry Hurst, a host of favors were granted that enabled us to see and visit many localities otherwise inaccessible. Their friendship and their interest in our work became invaluable. To Mr. and Mrs. C. L. Bennett, the resident manager and his wife of the United Fruit Company Plantations at Puerto Sosua, we are more than grateful for a real home during our month's residence at this place and for an unlimited number of kindnesses during our stay.

Our visit at Santa Barbara de Samana was made far more productive through the kindness of Señor Fortunato Beretta, who not only made arrangements for our several local trips but became a charming friend and companion during our all-too-short three weeks at this beautiful spot.

Our party consisted of Mr. Henry D. Russell, Mr. Richard A. McLean and the writer. The trip was made possible by a grant from the Milton Fund of Harvard University and the generosity of several friends of the Museum.

The following notes are based on certain of the material that seems worthy of immediate record. The marine collections as a whole are to be considered at a later date in a review of what is hoped to be a more or less complete study of the entire West Indian region.

We take pleasure in naming the following *Oliva* after President Trujillo:

*OLIVA TRUJILLOI*, new species. Plate 9, figs. 3-5. *Description*.—Shell solid, rather heavy, polished, with the greatest width just above the mid region. Ground color somewhat grayish, to reddish-brown, overlaid with fine and numerous reddish brown checks, intensified above and below the mid area to indicate two somewhat obscure bands. The general appearance of the shell is a decided reddish brown, a few specimens only retaining a grayish cast. Whorls 7 to  $7\frac{1}{2}$ . Spire short, descending *slightly* to the sixth whorl, the last whorl being formed along the margin of the preceding whorl. Parietal wall thinly glazed with fairly strong basal plications. Mid-parietal plications fairly strong,

short and developed to near the superior portion of the aperture. Aperture long and narrow, flaring slightly at the base. Palatal lip thick. Sculpture of only exceedingly fine growth lines. Suture deeply channeled. Interior of aperture a flat white.

Length	40.2	Width	16.3	Aperture	36.8 × 2.8 mm.	Holotype.
	40.4		16.9		35.5 × 3.0	Paratype.
	37.6		17.0		33.9 × 2.8	“
	35.1		15.0		30.0 × 2.0	“

*Holotype*.—Mus. Comp. Zool. no. 57240, Puerto Plata, Santo Domingo. Clench, Russell, McLean and Hurst, collectors, July, 1937. Dredged at about 5 fathoms. Many paratypes from the same locality. Additional records from Ponce, Puerto Rico, and Bay of Santiago, Cuba.

*Remarks*.—This species appears to be rather distinctive and rather remarkable because of its peculiar color, a color rarely equalled or approximated in this variable family. Morphologically it appears to be nearest to *O. sayana* (*O. litterata* auct., non Lamarek) but differs in color, much smaller size, the deeply channeled suture and the reduced spire.

The only species with which it can at all be confused is *O. caribacensis* Dall, originally described from Mayaguez Harbor, Puerto Rico. It differs from this species in its reddish-brown coloration, the development of the last whorl, which in *O. caribacensis* is descending, and in lacking the purplish coloration within the aperture which is described for this latter species. The proportions of the shell are slightly different, this new form being somewhat slenderer. Two specimens of *O. caribacensis* Dall (Bull. United States Fish Commission (1900), 1, p. 391, pl. 56, fig. 9, 1901) were found occurring with *O. trujilloi* at Ponce, Puerto Rico, in the dredgings from the harbor obtained at approximately 30 feet.

*O. caribacensis* appears to be more nearly allied to *O. reticularis* Lam. rather than to *O. sayana* as stated by Dall. *O. reticularis* was quite abundant at Puerto Plata in the dredgings, though it did not occur in our material collected at Ponce, Puerto Rico. At both stations it had a decided reddish cast.

PHALIMUM ERINACEUM VIBEX Linné.—In a previous paper<sup>1</sup> ref-

<sup>1</sup> 1937. Proc. New England Zoological Club, 16, p. 60.

erence was made to this species as one of the few definitely known to occur in both the tropical Atlantic and the Indo-Pacific region. A single specimen of this rare form was found alive at Puerto Sosua among the loose rocks in a protected cove.

*SANGUINOLARIA SANGUINOLENTA* Gmel.—This appears to be an exceedingly rare West Indian bivalve. We found it at Santa Barbara de Samana in a small protected cove one half mile west of the village on a sand bottom in from 1 to 2 feet of water. Live shells were rare; dead single valves, however, formed a conspicuous element in the drift at high water line.

*LITORINA MINIMA* (Wood).—(*Turbo minima* Wood 1828, Index Test. Suppl. pl. 6, fig. 9). *New records*.—Puerto Sosua; El Canal, Cabo Macoris, 6 miles N. E. of Puerto Sosua; Punta Chiva, 7 mi. E. of Santa Barbara de Samana. This supposedly rare West Indian species turned up in considerable numbers from Puerto Sosua east to Cape Samana. It frequents the "splash pools" that are found in the coastal limestone from high tide line to 6 or 7 feet above.

*L. minima* is closely allied to *L. mespillum* (v. Muhlf.), this latter species being a deep reddish brown to a blackish brown, *minima* differing in possessing a peculiar spotting with black dots over the entire surface of the shell. The description of *minima* indicates only a grayish white ground color with black dots. In our present series, however, the shells are nearly all yellowish-brown, a limited number of the grayish shells were found only at Puerto Sosua. *L. mespillum*, though far more widespread, would appear to be a variety of *L. minima*.

Dall and Simpson do not list this species in their "Mollusca of Porto Rico" but inasmuch as they list "San Juan (Gundlach)" as the only locality for *Litorina mespillum*, a very widely distributed species in the West Indies, occurring only in the splash pool habitat, it is quite possible that it was overlooked. Dr. Aguayo reports only eight known specimens of *L. minima* from Cuba, though it is to be understood that little or nothing is known relative to the marine mollusks of the extreme eastern end of the island.

*Litorina minima* did not occur in the northern Bahamas where these splash pools were investigated nor did we encounter it at

Cienfuegos and the Guantanamo Naval Base, both on the south coast of Cuba, where the same habitats were carefully searched.

TEREBRA FLAMMEA Lamarck, Plate 9, figs. 1, 2. (*Terebra flammea* Lamarck 1822, An. s. Vert. 7, p. 284). This species was probably our most noted "find" in Santo Domingo. To judge entirely by the few specimens in our American museums, it is a very rare form, and has heretofore been reported only from the western Pacific. Our present new series establishes this as the first West Indian record. Some twenty specimens were found, both by ourselves and Mr. Harry Hurst, in the dredgings from Puerto Plata Harbor at depths of approximately 30 feet.

We possessed but a single specimen with the data as "China" (M. C. Z. no. 74746) and Dr. Pilsbry kindly loaned us the only two specimens possessed by him, which were also localized as China and originally received from H. Cuming through Dr. T. B. Wilson (A.N.S.P. no. 33,512). A careful comparison between the three western Pacific specimens and our present Santo Domingo series fails to disclose any differentiating characters, other than a little more diffusion of the brownish-orange spots on the Pacific forms (plate 9, fig. 1).

All of our present series were collected dead, though most of them are in perfect shape and possess strong color markings.

Known part		Spire portion lost (calculated)		Locality
Length	Whorls	Length	Whorls	
46 mm.	19	2.5 mm.	4	Puerto Plata
121	22	7	9	" "
120	16	16	15	China (A.N.S.P.)
125	22	6	8	" "

Many other species that we collected are still too imperfectly known relative to their distribution to be considered in these notes, though mention might be made of *Trigoniocardia ceramidum* Dall which we found quite abundant at Puerto Plata, and Monte Cristi, Santo Domingo, as well as Ponce, Puerto Rico. We failed to find it in the northern Bahamas, a region very rich in the Cardiidae.

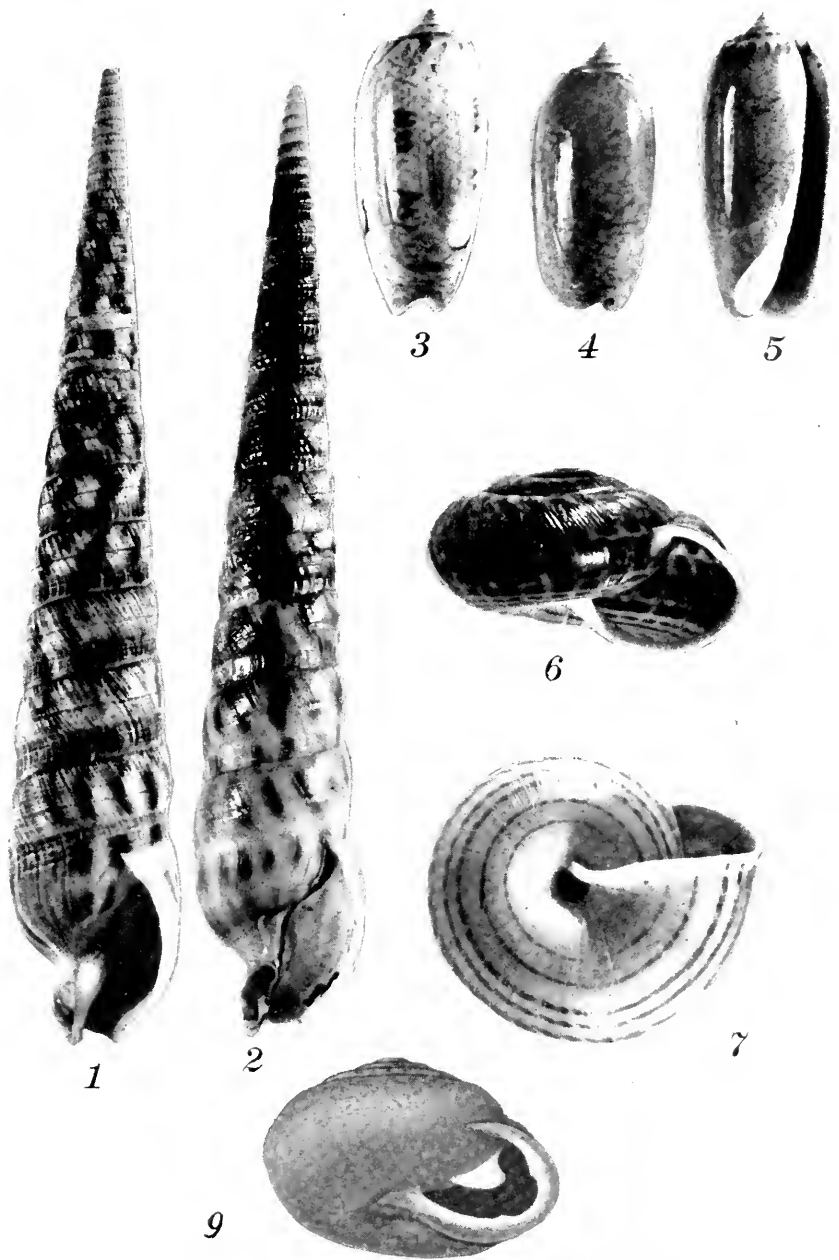


FIG. 1, *Terebra flammea* Lam., China, A.N.S.P. 2, *T. flammea*, Puerto Plata, M. C. Z. 3, 4, *Oliva trujilloi* Clench, Puerto Plata, paratypes. 5, same, holotype. 6, *Solaropsis gibboni fairehildi* Beq. & Cl., holotype. 7, same, paratype. 9, *Polygyra jonesiana* Archer. Figs. 1-7 natural size, fig. 9 - 3.





**A NEW SUBSPECIES OF *SOLAROPSIS GIBBONI*  
FROM BRASIL**

BY JOSEPH BEQUAERT AND W. J. CLENCH

*SOLAROPSIS GIBBONI* FAIRCHILD new subspecies. Plate 9, figs. 6-7.

*Description*.—Shell solid, somewhat depressed with only a slight indication of a peripheral keel. Whorls 5, nearly rounded and strongly convex. Color somewhat darker than the typical form with the pattern arrangement similar.

Gt. diam. 43	Less. diam. 36.6	height 23 mm.	Holotype.
45.5	38.7	25.5	Paratype.
43	35.6	23.5	“
41	34.5	22.5	“

*Holotype*.—Mus. Comp. Zoöl. no. 57240. Anapolis, Goyas, Brasil. G. B. Fairchild collector, July, 1936. Three adult and one immature paratype from the same locality.

*Remarks*.—This subspecies differs from the typical form by being much smaller and proportionally less depressed. A specimen from Bogotá, Colombia, of *S. gibboni* measures 61 mm. in greater diameter with a height of 27.5 mm. The peripheral keel of *S. gibboni* is generally quite sharp and prominent, while in our new form it is nearly obsolete. All other characters appear to be similar to those of the typical form.

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**ON THE HISTORY AND STATUS OF *LORA* GISTEL**

A recent inquiry from the West Coast caused us to examine the credentials of the genus *Lora*, which has been introduced into our catalogues as generic name for the boreal Turridae formerly known as *Bela*. The data are as follows. In all cases they are taken from the original sources.

Johannes Gistel, 1848, in his *Naturgeschichte des Thierreichs für höhere Schulen*, proposed many generic names as substitutes for names he did not like, giving a list of them in the *Bevorwortung* of his volume, pp. viii-xi. This entry is found on p. ix:

“*Defrancia* (Millet, Gastrop. *D. viridula* O. Fabr.): *Lora* Gistel.”

Thus, Gistel obviously proposed *Lora* as a substitute for *Defrancia*, and cited “*D. viridula* O. Fabr.” simply as an example,

but without designation of type. It was not in Millet's original list of *Defranciae*. In such cases, the first type subsequently designated for either of the names becomes automatically the type of both (International Rules, Art. 30, II, f).

The first type designation for either is that of Dall (1908, Bull. M. C. Z. 43: 260), who chose for *Defrancia*, *D. pagoda* Millet. As *Defrancia* is a homonym, the genus will stand as *Pleurotomoides* Bronn, 1831, of which *Defrancia* Millet and *Lora* Gistel are synonyms.

Later type designations for *Lora* itself involve *Tritonium viridulum* O. Fabricius, 1780, which was described in *Fauna Groenlandica*, p. 402, from Greenland. While there are no figures in this work, the description is good, for the time, and the species, as *Admete viridula* (O. Fabr.), is everywhere accepted. However, H. P. C. Möller, 1842, mistakenly identified *T. viridulum* with a somewhat similar "*Bela*," and redescribed Fabricius' species as *Admete crispa* (*Index Molluscorum Groenlandiae*, p. 15). The (new) genus *Admete* he ascribed to Kröyer. *Admete viridula* (O. Fabr.) has a wide distribution in northern seas. A closely related form, perhaps not specifically separable, *A. couthouyi* Jay, occurs off New England from a few fathoms depth down to over 800 fms. It is extremely variable. The most fully developed forms of *Admete* show one or two weak columellar folds, which caused it to be referred to the Cancellaridae; other specimens show none, the columella smooth and conspicuously but obliquely truncate.

In the above-mentioned paper of 1842, p. 14, Möller described *Defrancia viridula*, which he identified with *Tritonium viridulum* O. Fabr. He did not regard it as a new species, but merely as a transfer of Fabricius' species to another genus. The true identity of Möller's shell seems to have remained unknown until G. O. Sars (1878, *Mollusca Regionis Arcticae Norvegiae*, p. 235) found it to be identical with *Bela kobelti* Verkrüzen,<sup>1</sup> from Vadso,

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<sup>1</sup> The specific name cannot stand as *Bela viridula* Möller, however, as he was not proposing a new name for it, but considered it to be Fabricius' species. It will stand as *Bela kobelti* Verkrüzen; or, since *Bela* is no longer tenable for this boreal group, it will probably be called *Oenopota kobelti* (Verkr.). See International Rules, Art. 31.

Norway, by a comparison of Norwegian specimens with Möller's material in Copenhagen.

Dall perpetuated Möller's confusion by his statement under *Lora* (1918, Proc. U. S. N. Mus. 54: 328): "sole example *Tritonium viridulum* Fabricius, which is a *Bela*, probably *B. exarata* Möller, according to the type specimen." This is about as misleading as it could be, since *Tritonium viridulum* Fabr. is not a *Bela* but an *Admete*. His "probably *B. exarata*" can be ignored, since we have so good an authority on northern mollusks as Sars, who positively states that Möller's *viridula* is *Bela kobelti*, a species allied to *exarata* but quite distinct.

Grant and Gale (1931, Mem. San Diego Nat. Hist. Soc. 1: 512), relying upon Dall, say: "Type (by subsequent designation, Dall 1918), *Tritonium viridulum* O. Fabricius 1780, + *Bela exarata* Möller according to the type specimen (fide Dall), not *Defrancia viridula* Möller, 1842." This includes "*Bela*" in one clause and excludes it in the next.

The only type designations for *Lora* exclusively appear therefore to be hopelessly muddled, since they include two species of two genera. Dall's statement would make *Lora* a synonym of *Admete*, since we cannot accept his conclusion that *Tritonium viridulum* "is a *Bela*, probably *B. exarata* Möller." This error invalidates his statement under *Bela* in Proc. U. S. N. M. 54: 318.

Of course Gistel did not know that more than one genus was involved. He thought that he was citing Fabricius' species, as he does not mention Möller.<sup>2</sup>

The synonymy of PLEUROTOMOIDES will stand as follows.

*Defrancia* Millet, 1827, Mém. Soc. Linn., Paris 5: 437. Proposed for five species, including *D. pagoda* Millet, which was designated the type by Dall, 1908, Bull. M. C. Z. 43: 260. Not *Defrancia* Bronn, 1825, Syst. Urwelt. Pflanzenth. pp. 13, 42 (Polyzoa).

*Pleurotomoides* Bronn, 1831, Ital. Tert.-Gebilde p. 47. Substitute for *Defrancia* Millet not Bronn, and taking the same type, *D. pagoda*.

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<sup>2</sup> Probably Möller was the source of Gistel's information, but this is only inference.

*Lora* Gistel, 1848 (see above). Substitute for *Defrancia* Millet, and taking the same type, *D. pagoda*.

The boreal "*Belas*" for which *Lora* has been used, will be known as *Oenopota* Mörch, type *Fusus pleurotomarius* Couthouy.

H. A. PILSBRY

Dr. H. B. Baker, Dr. Paul Bartsch, Dr. S. S. Berry and Dr. Wm. J. Clench, members of the A. M. U. Committee on Nomenclature, agree with the above conclusions.

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**PECTEN PUGETENSIS AT NEWPORT BAY,  
CALIFORNIA**

BY WENDELL O. GREGG

The entrance of Newport Bay, California, is guarded on the east by a rocky point and on the west by an artificial breakwater. This entrance is rather narrow in comparison with the size of the bay and consequently the current here is very swift on changing tides. The incoming tides bring in many deep-water forms which have been found along this rocky point and on sand bars within the entrance of the bay.

In March, 1926, while collecting along the rocks on the east side of the entrance of this bay at very low tide, a single specimen of *Pecten pugetensis* Oldroyd was found. It was attached to a rock by a byssus as noted by Oldroyd<sup>1</sup> in the specimens taken at Puget Sound at low tide. The specimen was moderately spinose over the left valve and delicately so over the distal four millimeters of the right valve, the spines occurring over a much wider area over the posterior third of right valve. The measurements were: height, 29.3 mm.; length 25.0 mm.; convexity, 10.7 mm.; hinge line, 16.3 mm.

Oldroyd<sup>2</sup> originally described this pecten as a subspecies of *P. islandicus* Müller, making brief comparisons with *islandicus*. The latter does not now occur on the Pacific Coast of North America south of Bering Sea, but is said to have occurred on the Pacific Coast as far south as Deadman Island, San Pedro,

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<sup>1</sup> Publications, Puget Sound Biological Station, vol. 4, p. 18.

<sup>2</sup> NAUTILUS, vol. 33, p. 136.

during the Pleistocene.<sup>3</sup> Grant and Gale<sup>4</sup> placed *pugetensis* as a subspecies of *hastatus*. It certainly has a superficial resemblance to *hastatus*, but the ribs differ in shape with wider interspaces which are covered by a minute reticulate sculpturing. This sculpturing is characteristic of *islandicus* and its allies and does not occur in *hastatus*. Unfortunately this minute sculpturing is not mentioned in Oldroyd's description. This *Pecten* forms a link in the intergrading series between *islandicus* and *hastatus* but for the present at least I do not prefer to consider it as a subspecies of either.

I have examined specimens of *pugetensis* in the George Willett collection which were taken by Mr. Willett at Craig and at Ketchikan, Alaska. This would give it a known range extending from Craig, Prince of Wales Island, Alaska, to Newport Bay, Orange County, California. I have fossil specimens, presumably Pliocene, which were taken at Deadman Island, San Pedro, Calif.

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## A GIANT RACE OF *HELMINTHOGLYPTA* FROM TULARE CO., CALIFORNIA

BY CLIFFORD C. CHURCH AND ALLYN G. SMITH

*HELMINTHOGLYPTA TUDICULATA REX*, new subspecies. Plate 8, figs. 10-12.

*Diagnosis*: Shell helicoid, very large for the species, moderately thick; spire low, with an angle of  $125^{\circ}$ ; whorls 6, the last well-rounded and rapidly expanding to form a sub-circular aperture of unusually large proportions; lip simple, not thickened, moderately reflected except at the base where the reflection is sufficient to conceal about one-half of the umbilicus, connected between terminations by a thin wash of callus; umbilicus rather small, being contained about 14 times in the major diameter of the shell. Nuclear whorls 2, finely granular under a lens of medium power except for the nucleus itself, which is glassy at the tip followed by a short wrinkled zone, the remainder of the nuclear whorls being relatively smooth. Sculpture of the early post-nuclear whorls consists of low but well-developed, closely spaced, growth ridges of unequal strength. Weak malleations begin to show on the second

<sup>3</sup> Catalogue of the Marine Pliocene and Pleistocene Molluses of California, p. 162.

<sup>4</sup> *Ibid.*, p. 168.



whorl from the last, becoming rapidly stronger until on the last whorl they are so exceedingly large and coarse that they dominate the entire appearance of the shell. They cover the last whorl except in the umbilical region and for a short distance behind the lip, where they become obsolete. Color much as in *tudiculata* s.s. but darker and with a more greenish cast, especially on the body whorl; the raised edges of the malleations are considerably lighter in color than the pits, thus making them stand out more sharply. The dark brown revolving band is nearly 2 mm. wide and is set off by two light-colored zones, each having almost the same width. The above is a description of the holotype, a fully mature specimen that measures: max. diam., 39.1 mm.; min. diam., 30.8 mm.; alt., 27.2 mm.

*Holotype*: Cat. No. 7189, Calif. Acad. Sci. Type Coll. (Collected by C. C. Church).

*Type Locality*: Under granite boulders along the tree-shaded initial terrace above the bed of the Middle Fork of the Tule River, about 2 mi. above and East of Springville, at the boundary of the Sierra National Forest, Tulare Co., California. *Paratypes*: Specimens so designated have been placed in the collections of the Academy of Natural Sciences of Philadelphia, the San Diego Society of Natural History, the Los Angeles Museum, and the private collections of E. P. Chace, S. S. Berry, and A. G. Smith. Two are in the California Academy of Sciences Type Collection, Nos. 7190 and 7191.

*Material Studied*: The type lot, consisting of 17 adult and 6 immature or broken shells (C. A. S. No. 28121) collected in July and October, 1933, by C. C. Church and G. D. Hanna. Also a second lot (C. A. S. No. 28181), consisting of 4 living adults and many immature specimens, which was collected 8 mi. East of Porterville, Tulare Co., Calif., on March 31, 1935, by the same collectors.

*Remarks*: The most striking characters of this subspecies are its uniformly great size, the extremely heavy malleations on the body whorl, and the light color of the edges of the malleations in comparison with the much darker color of the pits. While it is not believed that mere size should be the sole criterion in naming a new species or subspecies, it is believed that this shell exhibits a sufficient number of other different characters to warrant giving

it a name. As to size, we have seen occasional specimens of *Helminthoglypta arrosa* (Gld.), *Monadenia fidelis* (Gray), and *M. infumata* (Gld.) that are as large as a good-sized specimen of *H. tudiculata rex*, but we believe we are safe in the assertion that this represents the largest known California land snail.

It is most nearly related to *H. tudiculata kernensis* Berry<sup>1</sup> but in addition to larger average size it has a heavier shell, is more conspicuously and coarsely malleated, is darker and generally more greenish in color, and lacks the wide open umbilicus of *kernensis*. Some smaller adult specimens of *rex* approximate *kernensis* in size, however, so it is possible that with additional collecting in intervening territory an intergrading series linking the two subspecies may be found.

The range in size of *H. tudiculata rex* from the type locality is shown by measurements in the following table:

	Max. Diam.	Min. Diam.	Alt.	No. Whorls
Largest shell .....	42.6 mm.	33.2 mm.	28.6 mm.	6
Smallest shell .....	33.3 "	26.2 "	23.0 "	5-7/8
Average of 17 adults	38.4 "	30.2 "	26.7 "	6

*Note:* Of the 17 adults measured 5 had a maximum diameter of 40 mm. or more, and 9 were larger than 38 mm.

Land snails of the *tudiculata* group seem to be fairly abundant in the Tulare Co. foothill region of California. Judging from the evidence they seem to vary considerably with the locality. Dr. H. A. Pilsbry informs us that the Philadelphia Academy has shells referable to *rex* from Visalia, Cramer, and the Tule Indian Reservation, and some smaller shells (30-31.5 mm.) from Porterville. In the University of California is a lot of 5 shells (Univ. Calif. No. 2503) labeled "Tulare Co., Calif., D. O. Mills (collection)" ranging from 34.8 to 37.8 mm. but which do not exhibit the coarse malleation so characteristic of *rex*. We have examined two lots of shells smaller than *rex* but larger than *kernensis* found by one of us (Church) beside the small canal 3 miles East of Porterville on the Tule River and also among weeds and willow and cotton-

<sup>1</sup> Berry, S. S. NAUTILUS, Vol. 43, p. 40 (October, 1929); also Vol. 43, p. 138 correcting a mis-spelling of the subspecific name from "kermensis" to "kernensis."

wood leaves near the dry bed of Deer Creek where it enters the valley. Shells collected near Porterville by Hemphill (C. A. S. Nos. 8802-8805, incl.) are identical with those from Deer Creek. Young shells of what appears to be this smaller race (A. G. S. No. 5495) were collected at Bartlett Park on the South Fork of the Tule River, 12 miles East of Porterville.

At the type locality of *rex* two specimens (C. A. S. No. 28121-A) of a much smaller, thin-walled race of *tudiculata* referable to *tularensis* (Hemp.) were found with the large shells. Examples of this were collected also at three other places farther down in the foothills: in the granite hills back of Porterville, north of the main road up the Tule River; one-half mile north of Lindsay in the low hills capped by a jaspery rock from which crysoprase has been mined; and at Bartlett Park (A. G. S. No. 4604).

*H. tudiculata tularensis* (Hemphill) is readily distinguishable from *rex* and *kernensis* in spite of the overlapping of range with the former subspecies and its variants. However, it is a snail of the higher foothills at medium altitudes, where it reaches its maximum development.

The authors are indebted to Dr. Henry A. Pilsbry and to Dr. G. Dallas Hanna for assistance and advice on this brief study of an interesting problem of variation.

Berkeley, California, September 17, 1937.

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## EXTENDED RANGES OF NORTH PACIFIC SHELLS

BY WALTER J. EYERDAM

(Continued from page 104)

*Lora nazanensis* (Dall). Dredged 10 fathoms, shelly bottom, Elrington Island, Prince William Sound, Alaska. Former range: Norton Sound, Alaska, to Aleutian Islands. Extended range: About 700 miles eastward.

*Lora becki* (Moller). Twenty fathoms (not common), stony bottom, Drier Bay, Prince William Sound, Alaska. Former range: Bernard Harbor, Arctic Coast and southward. Extended range: About 600 miles southward.

*Alvania alaskana* (Dall). On stony algae, low tide, 5 specimens. Shuyak Strait, Afognak Island, Alaska. Former range:



Nunivak Island, Bering Sea. Extended range: About 200 miles southward.

*Alvania carpenteri* (Weinkauff) (syn. = *Alvania reticulata* (Cpr.)). On stony algae, low tide mark, Elrington Island, Prince William Sound, Alaska. Former range: Forrester Island, Alaska, to Neah Bay, Wash. Extended range: About 700 miles northward.

*Cingula (Nodulus) kyskensis* (Bartsch). Shuyak Strait, Afognak, Alaska, under stones, between tides, rare, Shuyak Strait, Afognak Island, Alaska. Former range: Kyska and Atka Islands, Alaska. Extended range: About 1400 miles eastward.

*Cingula (Nodulus) cerinellus* (Dall). Under stones, between tides, rare, Shuyak Strait, Afognak Island, Alaska. Former range: Kyska and Amchitka Islands, Alaska. Extended range: About 1440 miles eastward.

*Beringius crebricostatus* (Dall). Low tide to 100 feet depth, rather common in some localities, Izhut Bay, Afognak Island, Alaska. Former range: Plover Bay, Aleutians, eastward to Shumagins. Extended range: About 300 miles eastward.

*Diadora aspera* (Esch.). On rocks at low tide, not common, Izhut Bay, Afognak Island, Alaska. Former range: Cooks Inlet, Alaska, to Magdalena Bay, Lower Calif. Extended range: About 100 miles westward.

*Euspira monterona* (Dall). Dredged 10 fathoms, Brier Bay, Knight Island, Alaska. Former range: Arctic Ocean to Aleutian Islands. Extended range: About 600 miles eastward.

*Mopalia ciliata* (Sowb.). Under rocks, Izhut Bay, Afognak Island, Alaska. Former range: Vancouver Island, B. C., to Lower Calif. Extended range: About 900 miles northwestward.

*Mopalia sinuata* (Cpr.). Dredged 25 fathoms, on stones, Drier Bay, Knight Island, Alaska. Former range: Forrester Island, Alaska, to San Francisco, Calif. Extended range: About 700 miles northward.

*Buccinum angulosum* (Gray). Washed on sandy beach, 1 specimen, Izhut Bay, Afognak Island, Alaska. Former range: Bernard Harbor, Arctic Coast, west to Point Barrow and south as far as Bering Strait. Extended range: About 700 miles southward and eastward.

*Acmaea limatula* (Cpr.). Between tides, on rocks, common, Newport, Oregon. Former range: Crescent City, Calif., to Cerros Island and Socorro Island. Extended range: About 400 miles northward.

*Acmaea scutum cribraria* (Cpr.). Venice, Calif. Former range: Neah Bay, Wash., to Santa Barbara, Calif. Extended range: Southward.

*Acmaea digitalis umbonata* (Reeve). San Pedro, Calif., on the breakwater. Former range: Saginaw Bay, Alaska. Extended range: About 2300 miles southward.

*Acmaea peramabilis* (Dall). Drier Bay, Alaska, Sand Point, Shumagin Islands, Alaska, on granite rocks and stones, very sparingly distributed. Former range: Shumagin Islands, Alaska, on granite rocks only. Extended range: About 600 miles eastward.

*Phytia setifer* (Cpr.). San Pedro Bay, Calif. Former range: Humbolt Bay to San Francisco Bay, Calif. Extended range: Several hundred miles southward.

*Crepidula onyx* Sowerby. Dredged, Sitkalidak Island, also Prince William Sound. Former range: Monterey, Calif., to Panama. Extended range: About 2500 miles northward.

*Thais emarginata projecta* Dall. On cobble stones at low tide, Zenith, Wash. Former range: Sitka, Alaska. Extended range: About 700 miles southward.

*Thais lamellosa hormica* Dall. On reefs at low tide, Port Orchard, Kitsap County, Wash. Former range: Inner Harbor of Sitka. Extended range: About 700 miles southward.

*Buccinum castaneum triplostephanum* Dall. Dredged, Sitkalidak Island, Alaska. Former range: Kyska and Amchitka Islands, Aleutians. Extended range: About 1000 miles eastward.

*Cerithiopsis frazeri* Bartsch. Feeding on sponges. Three Saints' Bay, Kodiak Island, Alaska.

*Turbonilla taylori* Dall and Bartsch. Dredged 15 fathoms, shelly bottom, Sawmill Bay, Prince William Sound, Alaska. Former range: Port Simpson to Vancouver Island, B. C. Extended range: About 900 miles northward.

*Panomya norvegica turgida* Dall. One specimen, sandy beach, Sitkalidak Island, Alaska. Former range: Unalaska to the

Shumagin Islands. Extended range: About 200 miles northeastward.

*Pecten jordani* Arnold. One specimen, dredged, Izhut Bay, Afognak Island, Alaska. Former range: Puget Sound and Strait of Georgia. Extended range: About 1200 miles northwestward.

*Pecten islandicus pugetensis* Oldroyd. Ten fathoms, shelly bottom, Hinchinbrook Island, Alaska (coll. Norberg). Former range: San Juan Island. Extended range: About 1000 miles northward.

*Astarte arctica* Gray. Fifteen fathoms, muddy bottom, Hinchinbrook Island, Alaska (coll. Norberg). Former range: Circumboreal, Bering Sea and Aleutian Islands. Extended range: About 600 miles eastward.

*Macoma yoldiformis* Cpr. Dredged, muddy bottom, Hinchinbrook Island, Alaska (coll. Norberg). Former range: Fuca Strait to San Diego, Calif. Extended range: About 1000 miles northward.

*Macoma quadrans* Dall. Dredged, Hinchinbrook Island, Alaska (coll. I. Norberg). Former range: Boca de Quadra Island, Alaska, south to the Coronado Islands, Calif. Extended range: About 500 miles northward.

*Macoma inquinata arnheimi* Dall. Sandy beach, Unalaska Island, Aleutians. Former range: Kodiak Island, Alaska, and south to San Francisco; also Pleistocene of San Pedro, Calif. Extended range: Westward about 500 miles.

*Colus (Aulacofusus) georgianus* Dall. Dredged, fifteen fathoms, Chichagof Island (coll. I. Norberg). Former range: Strait of Georgia, B. C. Extended range: Northward about 800 miles.

*Chrysodomus vinosus* Dall. Dredged, Gulf of Peter the Great near Vladivostok, Siberia. Former range: Western Bering Sea and Avacha Bay, sixteen fathoms. Extended range: Southward about 1200 miles.

*Liomesus ooides* (Midd.). In beach drift, False Pass, Unimak Island. Former range: Okhotsk Sea, also Pleistocene of Yesso (Hokkaido), Japan. Extended range: About 1500 miles westward.

*Buccinum angulosum transliratum* Dall. In beach drift, Sitkalidak Island, Alaska. Former range: Point Barrow and south-

ward to Bristol Bay. Extended range: Southward about 400 miles.

*Turbonilla eyerdami* Bartsch. Dredged, Hinchinbrook Island, Alaska (coll. Norberg). Former range: Drier Bay, Knight Island, Prince William Sound (*Type locality*).

*Retusa pertenuis* Mighels. On eelgrass roots, Hinchinbrook Island, Alaska (coll. Norberg). Former range: Arctic Ocean, Bering Sea (Krause), also Atlantic Ocean. Extended range: About 1000 miles southward.

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NEW LAND AND FRESHWATER MOLLUSCA FROM  
THE UPPER PLIOCENE OF KANSAS AND A  
NEW SPECIES OF *GYRAULUS* FROM  
EARLY PLEISTOCENE STRATA

BY FRANK C. BAKER

Pliocene Mollusca from freshwater deposits in the middle west are apparently rare. Henderson (Fossil Non-marine Mollusca of North America) does not list a single locality from this region and none has come under the writer's observation. It is with great satisfaction, therefore, that it is now possible to describe a rather large fauna of both land and freshwater species from Meade County, Kansas. The entire fauna will be treated in detail in a later paper. The deposit occurs 90 feet beneath the surface in a clay bed with lenses of sand, the fauna being in the clay. The deposit contained a large vertebrate fauna which will be described in due course of time. The material was collected by Mr. Claude W. Hibbard, Assistant Curator of Vertebrate Paleontology in the Dyche Museum of Natural History of the University of Kansas. Four apparently new species were observed which are diagnosed in this paper. My thanks are due Mr. Hibbard for the opportunity of studying this fauna.

*VERTIGO HIBBARDI* n. sp.—The shell has 5 whorls and is very ventricose over the body whorl. The sutures are impressed, the apex is obtuse and bluntly rounded. There is a conspicuous crest behind the outer lip, behind which are two pits showing the position of the palatal laminae. The body whorl is flattened laterally and the base of the shell is trumpet-shaped when viewed from

below. Base subumbilicate. Aperture more than half the length of the last whorl, the lips expanding outward. Outer lip biarcuate. Lamellae and plications 7 in number. The angular and parietal lamellae are long and extend some distance within the aperture, the angular emerging further than the parietal, the parietal curving spirally inward toward the left. Columellar lamella large and conspicuous, curving backward toward the base of the shell. The lower palatal fold is stout, nearly straight and somewhat flattened on top. The upper palatal is stout, high and lamellar and curves downward toward the lower palatal. Both palatal folds rest in front on a rounded callus and they terminate abruptly at an equal distance within the aperture and both increase in height as they extend backward. There is a strong, curved basal fold and a strong tubercular suprapalatal fold.

Length 1.9; diameter 1.2 mm. Holotype.

“ 2.1 “ 1.3 mm. Paratype.

“ 2.0 “ 1.3 mm. Paratype.

Holotype and paratypes, Museum of Natural History, University of Illinois, No. P6773. Paratypes, Academy of Natural Sciences of Philadelphia, No. 169883.

*Vertigo hibbardi* belongs to the group *Angustula*, apparently, as evidenced by the development of the palatal folds. It is much larger than *Vertigo milium* (Gould) and is very different in shape and size. It is totally unlike any described American species. It is named in honor of Mr. Claude W. Hibbard who collected the material.

*STROBILOPS SPARSICOSTATA* n. sp.—Shell broadly conic with somewhat elevated, dome-shaped spire. Whorls  $5\frac{1}{2}$ , the first  $1\frac{1}{2}$  smooth, the balance sculptured with distinct ribs, widely spaced, with frequently a faint riblet between. The umbilicus is contained about seven times in the diameter of the shell. Last whorl decidedly angular, the base of the shell smooth or with occasional faint riblets extending over it from the dorsal surface. Aperture with expanded, thickened peristome and a heavy palatal callus. There is a very heavy parietal lamella emerging to the edge of the callus and a weak infraparietal lamella which emerges within the aperture almost to the parietal callus in some specimens. This is often not developed outside of the aperture. The parietal lamella penetrates within the aperture more than three-fourths of a whorl. Half a whorl within the aperture there is a short, stout lamella on the axis. There are five baso-parietal folds, the first two basal folds are large and heavy, the first kidney-shaped, the second larger and lamellar, erect. The other three folds are low, rather long and curved. All basal folds are arranged radially.

Height	2.0;	diameter	2.7 mm.	Holotype.
"	2.2	"	2.5 mm.	Paratype.
"	2.0	"	2.6 mm.	Paratype.
"	2.0	"	2.8 mm.	Paratype.

Holotype and Paratypes, Mus. Nat. Hist., Univ. Ill., No. P6774; Paratypes, Acad. Nat. Sci. Phil., No. 169886.

*Strobilops sparsicostata* is related to *S. texasiana* P. & F. but differs from that species in having a more angular periphery, the costae more widely separated and not as heavy, and an almost smooth base which is distinctly costate in *texasiana*. The parietal lamella is also heavier. The arrangement of the baso-palatal folds is similar. The fossil form might be considered a race of *texasiana*, possibly ancestral, but in the light of our present imperfect knowledge of the geological distribution of this group in America it seems best to consider it a distinct species.

CARYCHIUM PEREXIGUUM n. sp.—Shell shorter and more solid than that of *exiguum*, the sutures more deeply impressed and whorls rounder, sometimes shouldered at the upper part. Whorls 5, the apical whorls somewhat smaller than in *exiguum*. Aperture a trifle more than one third of the length of the shell. Margin of aperture with thickened, callus-like lip extending basally to the parietal callus, which is well marked. There is a conspicuous callosity just above the middle of the outer lip. Umbilical region closed by the thickened basal lip. Lamella on columella conspicuous, tubercular, the fold extending upward spirally within the whorls much as in *exiguum* but it is narrower and bent upward over the axis in front. Lower lamella inconspicuous but heavier than in *exiguum*.

Length	1.8;	diameter	8.5 mm.	Holotype.
"	1.5	"	9.0 mm.	Paratype.
"	1.5	"	8.0 mm.	Paratype.
"	1.6	"	8.0 mm.	Paratype.

Holotype and Paratypes, Mus. Nat. Hist. Univ. Ill., No. P6776; Paratypes, Acad. Nat. Sci. Phil., No. 169885.

*Carychium perexiguum* is related to *exiguum*, having much the same form of shell and arrangement of lamellae. The shorter shell, heavier lip, and the upward bending columellar lamella will distinguish it from the recent species. As far as known to the writer this is the first record of *Carychium* from Tertiary strata. The genus occurs in many Pleistocene formations.

*MENETUS KANSASSENSIS* n. sp.—Shell lenticular as in *M. exacuouus* (Say). Periphery carinate with a 'pinched' border as *M. a. megas* (Dall). Whorls  $3\frac{1}{2}$ . Umbilicus wide, shallow, the whorls rounding into it. Sculpture consisting of more or less regularly spaced ribs extending from the suture in a backward curve to and over the periphery to the base and into the umbilicus. The ribs may be equally spaced, with strong growth lines between, or they may be so crowded together as to form a continuous series of ribs without intervening spaces. The surface above and below is covered with strong spiral lines.

Length	1.0;	diameter	5.0 mm.	Holotype.
"	0.8	"	4.0 mm.	Paratype.
"	1.0	"	4.0 mm.	Paratype.
"	0.8	"	3.5 mm.	Paratype.

Holotype and Paratypes, Mus. Nat. Hist. Univ. Ill., No. P6778; Paratypes Acad. Nat. Sci. Phil., No. 169884.

*Menetus kansasensis* is related to the common *M. exacuouus* and especially the form *megas* with the pinched periphery. It differs from this species in the presence of the ribbed sculpture. The genus *Menetus* is known from the Tertiary of North America, principally in strata in Oregon and California, but it has not before been reported from the Tertiary of the middle west. The genus is common in Pleistocene deposits.

*GYRAULUS PATTERSONI* n. sp.—Shell completely discoidal, flat on upper and lower sides (right and left); periphery flattened and almost as high as the height of the shell, a rounded angle bordering the body whorl above and below; whorls  $3\frac{1}{2}$ , slowly and regularly increasing in diameter; sutures well impressed; sculpture consisting of fine lines of growth crossed by fine spiral lines; on the nucleus only the spiral lines are developed, the growth lines beginning at about a fourth of the turn of the first whorl; aperture not expanded, wider than high, roundly flattened at the upper part (the shell is ultra dextral), almost horizontal at the lower part, without peripheral callus; the peristome is thickened in adult specimens.

Height .50; diameter 2.10; aperture height .45; diameter .35 mm. Holotype.

Height .50; diameter 2.00; aperture height .45; diameter .35 mm. Paratype.

Height .50; diameter 1.90; aperture height .40; diameter .40 mm. Paratype.

*Locality:* Six miles north of Ainsworth, Brown County, Nebraska. *Horizon:* Early Pleistocene, most probably the

Aftonian interglacial interval. *Types*: Holotype, Field Museum of Natural History, No. P26128, Paratypes, No. P26129. Paratypes: Museum of Natural History, University of Illinois, No. P6778; Academy of Natural Sciences, Philadelphia, No. 169948.

*Gyraulus pattersoni* is unlike any species of *Gyraulus* known in America, recent or fossil, easily distinguished by its disc-like shell, with its flat base and spire, and by the very flat-sided whorls. More material of this species is desirable.

Dr. Bryan Patterson, of the Geology Department of the Field Museum of Natural History, has placed in the hands of the author material from a marl deposit occurring in Brown County, Nebraska, which is of more than usual interest because of its association with a deposit containing vertebrate remains. The marl bed is seven feet four inches in thickness and underlies deposits of sand, clay, and gravel 18 ft. 10 in. in thickness. A part of the upper layers are believed to represent material from the Kansan ice which was about 100 miles east of the locality from which the fossils came. A lobe of the Wisconsin ice also extended southward to the junction of the Missouri and Niobrara rivers and the upper layers probably represent sediment from the ice at this point. A layer of cross-bedded sand and gravel 2 ft. 4 in. in thickness beneath the top soil may represent floods from the Wisconsin ice. The presence of *Menetus kansasensis*, a species known from Upper Pliocene deposits in Kansas, and also from early Pleistocene deposits of that state, suggests that the marl bed near Ainsworth is of Aftonian age.

The fauna from this and one other locality nearby contains the following species:

- Valvata lewisi helicoidea* Dall. Small form.
- Stagnicola cf. reflexa* (Say). Fragments and young shells.
- Stagnicola caperata* (Say). Mostly immature.
- Physa* species, young and fragments.
- Physa* species, young of small, narrow species.
- Menetus kansasensis* F. C. Baker. Much variation in sculpture.
- Menetus umbilicatellus* (Ckl.). Mostly immature.
- Gyraulus altissimus* (F. C. Baker). Mostly immature.
- Gyraulus pattersoni* F. C. Baker. Apparently rare.
- Gastrocopta cristata* Pilsbry & Vanatta. Only one specimen.
- Vertigo ovata* Say. Several specimens.



From a locality about two miles west of the above section the following species were collected. These are probably from the same horizon.

*Pisidium* species.

*Lymnaea cf stagnalis jugularis* Say. Fragments.

*Stagnicola* species, immature possibly undescribed.

*Stagnicola* species, immature and broken specimens.

*Fossaria dalli grandis* F. C. Baker. Rare.

*Menetus kansasensis* F. C. Baker.

*Gyraulus altissimus* (F. C. Baker). Mostly immature.

*Gastrocopta tappaniana* (C. B. Adams). One specimen.

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## A NEW *ANGUISPIRA* FROM KENTUCKY

BY LESLIE HUBRICHT

*ANGUISPIRA* *RUGODERMA* n. sp.

Shell similar in general form and color to *Anguispira alternata* (Say), but larger. Whorls 5.5 to 6, periphery rounded in adults, subangulate when young. Body-whorl with about 14 strong ribs to the cm., which extend over the periphery and into the umbilicus. Under a hand-lens the epidermis of *A. alternata* shows very fine wrinkles; in this species the wrinkles are quite conspicuous.

Holotype: Whorls 5.9; gr. diam. 25.0; less. diam. 22.5; height 14.0 mm.

Paratype: Whorls 5.7; gr. diam. 23.5; less. diam. 21.0; height 12.5 mm.

Paratype: Whorls 4.1; gr. diam. 10.0; less. diam. 9.0; height 5.5 mm.

Type locality: Under logs in well developed, second-growth, deciduous forest, lower half of the north side of Pine Mountain, 5.6 miles east of Pineville, Bell Co., Kentucky. Collected by the author. Holotype No. 169882, Academy of Natural Sciences of Philadelphia; paratypes No. A3892, author's collection.

The largest specimen of a variety of *A. alternata* found with this species measured: Whorls 5.5; gr. diam. 19.0; less. diam. 16.0; height 10.0 mm.



## ON THE OCCURRENCE OF *HELIX LACTEA* MÜLLER IN NORTH AMERICA

BY HENRY VAN DER SCHALIE

In the course of some studies of the Naiades of the Ogeechee River in northeastern Georgia, Dr. E. P. Creaser called my attention to the fact that an unusual land shell inhabited Cockspur Island, a small island located in the mouth of the Savannah River. Upon investigation the species was found to be *Helix lactea* Müller. According to Mr. W. J. Clench credit for the discovery of this exotic species should go to Mr. A. J. Nitzsche who sent specimens to him a long time ago. Although Mr. Clench intended to publish a note regarding this discovery, he has kindly submitted what information was available for this account.

The question as to how *Helix lactea* became established on Cockspur Island cannot be answered with any degree of certainty. Dr. Creaser suggested that this species might have carried from its normal haunts in the western Mediterranean by ships which temporarily stopped at Cockspur Island to deposit stone carried as ballast before these ships proceeded to the river-port of Savannah where they took on their load. This suggested origin has some degree of likelihood, particularly since piles of such ballast are still found much in evidence on the island.

At present the species is prospering well on the vegetation surrounding the old, historic Fort Pulaski which commands a prominent position on the island. We found *lactea* confined to the yucca or Spanish bayonet (*Yucca* sp.). At the time the collection was made a drizzling rain was falling and active specimens were found moving about on the leaves of the yucca. Those not active were found clustered near the bases of the leaves.

Another colony of *Helix lactea* was reported in 1931 by Mr. Wm. G. Fargo who found them in the region of his home at Pass-a-Grille, Florida. In this case we are more fortunate in learning something about the origin of the colony. Mr. Fargo reports that the snails were introduced by the owner of a curio shop in Pass-a-Grille, who imported them from Morocco along with other snails. The snails were scattered around on Long Key, on which Pass-a-Grille is located, and also on two smaller keys, Mud Key

and Cabbage Key, which are eastward across Boca Ciega Bay (*cf.* Henderson, NAUTILUS 50: 72).

The acclimatization of *H. lactea* on these three keys as here reported by Mr. Fargo is of interest. Evidently Mud Key is little more than a mangrove bar and the snails did not prosper there. On Cabbage Key they did well for a time while feeding on castor bean (*Ricinus communis* L.) foliage. This island was later abandoned by its tenant, the castor beans were destroyed, and subsequently Mr. Fargo noted that he was no longer able to find *H. lactea* there. On Long Key this species is now fairly common. Here it is found on papayas (*Carica Papaya* L.) and mostly on a large, coarse lily which is locally called "milk and wine lily." On inquiry Mr. Fargo was informed by a reliable nursery in St. Petersburg that this lily was *Crinum Kirki*. Species of *Crinum* are so numerous in cultivation that it is hazardous to attempt any indication of species here. The depredations of *H. lactea* in feeding on these lilies have caused the inhabitants of Pass-a-Grille to consider the snail a nuisance.

The above information leads us to believe that *H. lactea* is at present confined to but two localities in North America. The fact that a considerable area extends between these points as a potential range for this species should not be overlooked. On the basis of what is known of *H. lactea* in its native haunts we can safely assume that it does well where the yucca thrives. But we now have evidence that it will adapt itself to feeding on other foods, such as the castor bean and certain species of *Crinum*, as mentioned above. K. H. Jones (Journ. Conch. IX, 1900, pp. 368) reports that *H. lactea* in its normal range is preyed upon by parasitic diptera and coleoptera which deposit their eggs in this snail. One might well raise the question as to what the future history of *H. lactea* will be in North America where it may not be held in check by its predators and where there may be a wide variety of foods to which it can adapt itself.

George W. Tryon (Manual Conch., Vol. 4, 1888, p. 130) gives the distribution of *Helix lactea* as: "Spain, Canary Islands, North Africa; introduced into Cuba, Buenos Ayres and other Spanish colonies." In substantiation of the West Indian records, Mr. W. J. Clench informs me that there are specimens in the M. C. Z.

collection from Jamaica and Cuba. Unfortunately, neither of these collections have specific locality data. The labels do indicate, however, that this species was definitely introduced into those islands, but whether it is still living there is uncertain. When we consider that *lactea* normally ranges through the region of Gibraltar, a great cross-road in the commerce of the world, the potential passive distribution of this species becomes tremendous.

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## REMARKS ON SOME OF DR. PAUL BARTSCH'S EXPERIMENTS

BY HENRY VAN DER SCHALIE

In the recent report of Dr. Paul Bartsch at the Seventh Annual Meeting of the American Malacological Union, results on some experimental breeding of *Goniobasis* in cages placed at stations in the Potomac River were of considerable interest. These breeding experiments were virtually a failure due to unusual silting conditions. However, an unexpected discovery was made. To quote the article: "Greatly to the surprise of the experimenters in one of the cages specimens of *Anodonta cataracta* Say were found with eight annulations, one measuring 66.2 mm. in length, 40.0 mm. high and with a diameter of 19.3 mm. This would indicate that annulations must not be taken as an indication of year marks."

In this quotation it is clearly stated that "annulations must not be taken as an indication of year marks." If this is true we are faced with a major problem since much of the better work with mussels in the past has been based on methods which use annual rings in the determination of age. Since Dr. Bartsch has raised this question, it would be highly desirable for him to supply us with experimental data sufficient to disprove the work of Hessing, Rubbel, Coker, Isely, Chamberlain and others. Their investigations have clearly indicated that age in mussels can be determined by annual rings.

An analysis of Dr. Bartsch's work shows that there may be an explanation for the results he obtained. In the first place, his experimental work was not carefully checked since he visited his stations only once in ten months. Furthermore, he will learn, if

he considers some of the publications of men referred to above, that one must differentiate between annual rings and lesser growth-rests which are produced with a temporary cessation in growth due to unfavorable circumstances. In a species such as *Anodonta cataracta* Say, shell growth may be very rapid when the animal lives under favorable conditions. During such rapid growth, disturbances of the animal may be registered on the shell as growth-rests. If Dr. Bartsch is unable to interpret properly his experimental results, the burden of disproving earlier work rests with him.

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### A NEW SPECIES OF *POLYGYRA* FROM THE GREAT SMOKY MOUNTAINS, NORTH CAROLINA

BY ALLAN F. ARCHER

*POLYGYRA* (*MESODON*) *JONESIANA*, new species. Plate 10, fig. 6.

*Description*.—Shell rather small, imperforate, rather solid, subglobose, concave in the umbilical region, dull and faintly hirsute. Color light chestnut; nuclear whorl eroded, dirty white. Parietal lamella white; peristome white edged with a faint reddish brown. Whorls,  $5\frac{1}{4}$ , gradually increasing; gently convex; nuclear whorl nearly flat. Suture impressed throughout. Body whorl gently bulging behind the peristome; area immediately behind the peristome deeply impressed. Aperture oblique, lunate. Peristome rather narrow except in the basal area, reflected; edge of peristome rather sharp; surface of peristome dished and concave directly above the anal sinus; the rest of the surface convex. Outer denticle present in the form of a slight, rounded boss; basal denticle, a faint curve inwards towards the parietal wall, and nearly continuous with the thickened, undifferentiated rim of the basal peristome. Parietal lamella rather prominent, slightly curved, and robust; the proximal portion of the lamella much more elongated than the distal portion. The umbilical region covered by a broad callus, rather impressed. The nuclear whorl and the two succeeding whorls covered with faint, irregular, axial riblets. The fourth whorl and the body whorl covered with rather widely spaced axial riblets which tend to become faint below the periphery in the region just above the parietal callus. From about the third whorl onwards to the groove behind the peristome the shell covered with spirally disposed longitudinal pits surmounted by cuticular laminae; these laminae in a staggered arrangement. The entire surface of the peristome, parietal lamella,

and parietal callus covered with very closely set and very fine beading. Holotype: height 7.5 mm.; greater diameter 12.8 mm.; aperture  $3 \times 5$ . Paratypes: height 8.5; greater diameter 13–13.5; aperture (of one mature specimen)  $3 \times 5$  mm.

*Holotype*.—A. N. S. P., no. 169583, 4800 feet elevation, near New Found Gap, Swain County, North Carolina,  $2\frac{1}{2}$  miles south of Mount LeConte. Three paratypes from the same locality. A. F. Archer collector, September 8, 1937.

*Remarks*.—This species belongs somewhere between *P. clarkii* and *P. christyi*, but is nearer the former. It differs from *clarkii* in the following respects: The peristome is proportionately narrower; the basal denticle is less angular; the upper denticle, absent in *clarkii*, is faintly represented in this species; the surface is covered with spiral laminae, absent in *clarkii*; the spire is not elevated, as in *clarkii*, and there is at least one less whorl. Besides its much smaller size *P. christyi* has no denticles, lacks the cuticular laminae, and has at least one half less whorl, thus contrasting with *jonesiana* in these respects. *P. subpalliated*, although hirsute like *jonesiana*, has the hairs arranged as zigzag, continuous, axial laminae; it has a flatter spire and one less whorl; it lacks the upper denticle, and the surface of its peristome is flattened instead of being convex; the inner rim of the basal peristome is narrow and bordered by an indented groove.

It is unfortunate that only three specimens of this rare and apparently endemic species are available for diagnosis. I found all three specimens in a very limited area during a field trip in company with H. E. Wheeler. Possibly the seasonal conditions were unfavorable for finding this snail alive. One of the adults was freshly dead, but the soft parts were already disintegrated, and were consequently not available for dissection.

This species is named for Dr. Walter B. Jones, of the Alabama Geological Survey, who has always shown great interest in the geological and biological work in the southeastern United States.

*Habitat*.—This snail inhabits the birch-beech-maple-hemlock forest of the higher elevations. Characteristic trees are *Tsuga canadensis*, *Betula lutea*, *Acer rubrum*, *A. spicata*, *Fagus grandifolia*. *P. jonesi* does not occur in the talus of massive, moss-covered rocks of the *Polygyra ferrissii* zone, but instead lives in

the humus zone. Its habitat is under the top layer of leaves and hemlock spills, or under bark and logs in a cover of fallen limbs and twigs.

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NOTES ON *HYGROMIA STRIOLATA* (PFR.) AT  
TORONTO, CANADA

BY JOHN OUGHTON  
Royal Ontario Museum of Zoology

This European land snail, also known under the names *Helix rufescens* (Penn.), *Fruticola rufescens* (Penn.) and *Trichia striolata* (Pfr.) has for many years been established at Quebec City. (J. F. Whiteaves, "On the land and fresh water mollusca of Lower Canada," Can. Nat. & Geol. 6: 452, 1861). A colony of this same species has been recently discovered at Ottawa by Mr. G. E. Fairbairn. (Can. Field-Nat. in press). Mr. A. LaRocque kindly pointed out to me that Justice F. R. Latchford (Ottawa Nat. 7: 132, 1893) many years ago secured a batch of this species from Quebec City and liberated them in Ottawa. However, Mr. LaRocque considers that the existing Ottawa colony has probably been derived from some other source.

The purpose of the present paper is to record the occurrence of *Hygromia striolata* at Toronto, to suggest its probable source, to indicate its present extent and abundance and finally to mention some observations, chiefly on the pigmentation of shell and mantle.

I am indebted for assistance to Professor J. R. Dymond, Mr. A. LaRocque and my wife.

*Occurrence.*—The Toronto colony was discovered by my wife and myself in November, 1937. *H. striolata* has apparently lived unnoticed for several years here. Such neglect is not strange, as the species is confined to a small extent of waste land. However, it is possible that it has been noticed before, but under the wrong name. Thus Robertson ("Mollusca" in Natural History of the Toronto Region, 1913, p. 289) lists "*Gastradonta ligera* Say" for the Toronto region—an unlikely record which has never been authenticated. His *G. ligera* was based, I believe, either on *H. striolata* or on an immature specimen of some *Polygyra*.

*Probable Source.*—Mr. E. V. Rippon has informed the author that in August, 1894, he imported a shipment of between 65 and 90 living snails, comprising *Cepaea nemoralis* (L.) and *C. hortensis* (Müll). He obtained these from Upper Norwood (Crystal Palace), Kent, England, and liberated them in Rosedale Valley Drive, Toronto, near the Huntley and Sherbourne St. bridges. The two bridges just mentioned mark the extent where *H. striolata* now abounds.

Thus, circumstantial evidence points to the strong probability that the Toronto colony of *H. striolata* came from a few individuals accidentally introduced with some intended settlers (*Helix nemoralis* and *H. hortensis*). Incidentally, the stock of the latter two species seems to have perished utterly in this vicinity.

*Extent.*—A fair amount of mollusk collecting has been done around Toronto during the past few years. However, *Hygromia striolata* has been discovered only in the single station—Rosedale Valley Drive, a small ravine, situated fifteen minutes walk from the Royal Ontario Museum. The snail under consideration has a very small range in this ravine. It occurs in abundance from the Huntley St. bridge to the Sherbourne St. bridge (a distance of about two hundred yards). A few individuals were found extending another two hundred yards eastwards to the Glen Road bridge. An intensive search in suitable locations to the east and west of the above limits revealed no further specimens.

*Abundance.*—In a few spots, a very high number was found. The highest population was that occupying a matted mass of vines 50 yards east of Huntley Street, on the south side of the road. Here, in an area of 12 square feet, 612 adults, 202 young and 50 dead shells were collected in twenty-five minutes. This figure may be too low by one or two hundred, since no special sifting technique was employed to secure the young individuals. The average population for the entire range, however, was much lower and probably was not over ten or twenty per square foot.

*Observations on Pigmentation of Mantle and Shells.*—In size, shape and color, the shell of the Toronto specimens resembles closely those from Quebec City and Ottawa. This opinion is based on small series at hand from these two latter localities, received from Mr. LaRocque and Mr. Fairbairn.



The living specimens may be separated fairly readily into "light" and "dark" groups, representing one-third and two-thirds respectively of the total population. This difference in shade is due chiefly to the amount of pigment in the mantle. In the "light" group, there are scattered blotches of brownish or black pigment, while in the "dark" group there is usually solid black. This divergence in shade is strikingly displayed by comparing the preserved extracted animals of the two groups side by side. Pigmentation in the cleaned shell itself partially accounts for the appearance of the living snail—the "dark" group having on the average a slightly darker shell.

This information is tabulated below:

Series	Animal	Shell						Totals
		Red-Brown		Brown		White		
		No.	%	No.	%	No.	%	
I .....	Dark (64%)	7	2	351	91	28	7	386 } 605
	Light (36%)	0	0	201	92	18	8	
II .....	Dark (68%)	8	7	103	88	6	5	117 } 171
	Light (32%)	0	0	46	85	8	15	

*a.* Both the above series were collected at random, *i.e.*, care was taken to extract every specimen from a given area, regardless of color or shade.

*b.* Series I is the large collection (less the immature and 7 adult shells accidentally destroyed in cleaning) made on the south side of the road, 50 yards east of Huntley Street. It was obtained from an area of 12 square feet.

Series II is an amalgamated collection accruing from several small areas within a rectangle (25 yards  $\times$  10 yards) which was chosen on the north side of the road about 100 yards east of Huntley St.

*c.* All these shells referred to above and a large part of the extracted animals are preserved in the collections of the Royal Ontario Museum of Zoology for future reference.

*d.* Some of the varietal names proposed for this European snail appear to be applicable to the above color phases of the shells (Ellis, "British Snails," p. 210, 1926).

My "red brown" = "var. *rubens*" Moquin-Tandon.

"white" = "var. *alba*" " "

"brown" = "var. *albocincta*" Cockerell, chiefly.

*Miscellaneous*.—1. *Habitat*: *H. striolata* dwells in waste ground, in open woods, under decaying leaves, sticks and matted vegetation; chiefly on the flats: less on the hillside. 2. *Habits*: Twice on cool rainy days the snails have been observed crawling over fallen leaves. Once we saw a few individuals climbing up the trunk of a willow tree to a height of three or four feet.

### 3. *Molluscan Associates*.

Common: *Arion circumscriptus* Johnston, *Deroceras agreste* (L.), *Cochlicopa lubrica* (Mull.), *Gonyodiscus cronkhitei anthonyi* Pils., *Vallonia pulchella* (Mull.), *Vallonia costata* (Mull.).

Scarce: *Oxychilus cellarius* (Mull.), *Deroceras campestre* (Say)?, *Zonitoides nitida* (Mull.)?.

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## ADDITIONAL DATA ON COPIES OF SAY'S AMERICAN CONCHOLOGY

BY H. E. WHEELER

Recently located copies of Say's *American Conchology* are as follows. The author requests detailed report on any other copies that may be in public or private libraries.

A copy is reported in the Library of Dr. L. C. Glenn, Vanderbilt University, which contains all the parts, but lacks the Glossary. It was not stated whether this copy has the original covers.

There is a copy in the Library of Charleston, S. C., Museum, which contains six parts and covers to all parts except the 5th. This copy originally belonged to Dr. Edmund Ravenel. There is a letter in the Library from Thomas Say to Dr. Ravenel enquiring whether he had received part 5 and the Glossary, but the Glossary is not with the copy now.

There is also a copy in the Cornell University Library which was purchased in 1897. Parts 6 and 7 are missing, also the Glossary. When this copy was bound by the Library the original covers were not preserved.

Data on a copy in University of Colorado Museum Library were given by Prof. Hugo G. Rodeck in the January *NAUTILUS*, p. 108.

Dr. W. Adam communicates the following: It may be of interest to record the presence of two copies of Say's "American Conchology" in the library of the Musée Royal d'Histoire Naturelle de Belgique. The first copy contains 5 parts and the Glossary which are bound in one volume. The covers are missing. The 50 plates are in excellent condition but several pages are age-stained. The copy bears the signature of H. Nyst and the price indication: 36 francs. The second copy is in the library of the late Ph. Dautzenberg. Dautzenberg's collection and library were transferred to our Museum after his death. This copy contains the 7 parts but the Glossary is missing. The 7 complete parts with the covers intact (only the last cover is missing) are bound in one volume. Although some of the pages are age-stained, the copy is in excellent condition. On the last page it contains the following remark written with pencil: "ouvrage très rare, complet," and as price indication, 125 (probably French francs).

It may be worth noticing that in 1875 a French translation of the first 5 parts appeared in Chenu's "Bibliothèque conchyliologique," première série—Tome III. In this translation the figures of the 50 plates have been reproduced on 17 uncolored plates.

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#### DR. EMMET RIXFORD

Dr. Rixford of San Francisco died January 2, following an operation. He would have been 73 on February 14. Although he was one of the most eminent surgeons of the West Coast, in active practice up to within a few weeks of his death, Dr. Rixford found time for active interest in several hobbies, horticulture, yachting, mountain climbing and collecting mollusks. He was considered an authority on roses, and served at one time as commodore of the San Francisco yacht fleet. He was a companion of Dr. David Starr Jordan on hiking trips. One of the high peaks of the Sierra is named Mount Rixford in his honor.

He was an excellent land shell collector, and in company with Dr. Hanna discovered *Polygyra penitens*, *Monadenia hirsuta* and collected many other interesting California snails. *Micrarionta rixfordi*, a desert snail which he discovered, was named for him. Some years ago he acquired the old A. W. Crawford collection which he merged with his own.

**ROBERT SWIFT**

Through the kindness of Mr. A. F. Gray, the following obituary notice of Mr. Robert Swift was placed in my hands for our records. It is a newspaper clipping, dated in Bland's handwriting, as July 13, 1872, and no doubt written by T. Bland. Though his main collection is now in the Academy of Natural Sciences, Philadelphia, most of the larger museum collections contain shells collected by Mr. Swift.—W. J. CLENCH.

“Another gap in the ranks of American students and patrons of natural history has been made by the death of Mr. ROBERT SWIFT. This gentleman was born in Philadelphia in 1796, and studied law for a short time in his native city, but subsequently was engaged in mercantile affairs. In about the year 1824 he went to Laguayra and several years later removed to Porto Cabello, where he resided as agent of the Bolivar Mining Association. In 1835 Mr. Swift established himself at St. Thomas, where he continued in business as a merchant until his retirement in 1866, when he removed to Philadelphia; but finding the climate unsuitable, returned to St. Thomas in October, 1867, remaining there until his death, on the 5th of May, 1872, in the seventy-seventh year of his age.

“Mr. Swift, at an early period of his residence in Venezuela, acquired a taste for natural history, and commenced the collection and study of the mollusca, which he pursued with increasing interest to the end of his life. In 1852 he became acquainted, in the United States, with the late Professor C. B. Adams, who contemplated another visit to the West Indies (he had already been in Jamaica, and also at Panama), and invited by Mr. Swift, went to St. Thomas as his guest, where he died in 1853.

“From that period, more especially, Mr. Swift became greatly interested in the subject of the geographical distribution of the mollusca in the West Indies. In correspondence with conchologists in the islands and elsewhere, Mr. Swift, by purchase, exchange, and collecting personally, became possessed of an extremely valuable cabinet. Always liberal and hospitable, he did much to aid and encourage others of similar scientific tastes.

“His friend and intimate correspondent for upward of twenty years, Mr. Thomas Bland, of New York, in his various publica-

tions on the geographical distribution of terrestrial mollusca in the West Indies, gratefully acknowledges his obligations to Mr. Swift.

“In March, 1863, Mr. Swift published a book of (marine) “Researches of the Virgin Islands,” and took great interest in the preparation and publication, by his friend Mr. Henry Krebs, of a catalogue of the marine shells of the West Indies. With the view of better determining the ornithology of St. Thomas and Porto Rico, Mr. Swift, about the year 1865, employed a native collector in gathering an extensive series of specimens, which he presented to the Smithsonian Institution, and which was made the basis of a systematic report by Dr. Bryant, of Boston, who himself subsequently fell a victim to his zeal for science in the last-mentioned island.

“Mr. Swift was, we believe, a contributor to the fund raised in his native city for the purchase, in behalf of the Philadelphia Academy of Natural Sciences, of the Morton collection of skulls; and we learn that his valuable cabinet of shells, now the property of his only daughter, will be by her presented to the same institution.”

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### NOTES AND NEWS

MISS CARLOTTA JOAQUINA MAURY, formerly paleontologist for the Brazilian government and from 1912 to 1915 professor of geology and zoology at the Huguenot College of the University of the Cape of Good Hope, died on January 3 at the age of sixty-four years.

DIMENSIONS OF FLORIDA CHAMAS.—In a recent letter Mr. Frank B. Lyman reports finding specimens larger than measurements given in NAUTILUS for January of this year. *Chama macrophylla*, 80 mm. long; *C. sinuosa firma*, over 100 mm.; and *Pseudochama radians variegata*, many more than 70 mm.—H. A. P.

EDITOR NAUTILUS. Sir:—It is generally believed that freshwater molluscs like some other species wear away the front portion of the radula and that it is constantly being replaced by posterior rows of teeth, as is believed to occur in land species.

This contention has recently been disputed on the ground that the food consists merely of microorganisms and there is not sufficient evidence to show that the front portion comes into contact with the food during feeding.<sup>1</sup>

Would any of your readers be able to observe such species as *Lymnaea* feeding on the glass of an aquarium and isolate a specimen which possesses a distinctive row of teeth so that any change which takes place may be noted as development proceeds? Only in this way would it seem possible to decide whether there is any wear and tear and constant replacement of the teeth.—F. GORDON CAWSTON, Durban, South Africa.

NOTE ON THE RANGE OF *Pecten caurinus* GOULD.—Three specimens of *Pecten caurinus* were recently presented to the California Academy of Sciences by Mr. G. H. Clark, of the Division of Fish and Game of the State of California. These were obtained by fishermen in 50 fathoms off Eureka, California,  $9\frac{3}{4}$  miles S.W. by W.  $\frac{1}{2}$  W. of Humboldt Bar buoy, July 2, 1937. This is a southern extension in range. The species has been collected by George Willett as far north as Craig, Alaska, where it usually occurs in the inside channels and around islands in 10 to 30 fathoms. This is the most northerly record of the species in collections studied by the author. The only record of a more northern occurrence is that of "‘scallops over eight inches across’" at Kayak Island near Controller Bay, Alaska, mentioned in the diary of Georg Wilhelm Steller, a member of the Russian expedition to America commanded by Vitus Bering which stopped at Kayak Island in 1741. These shells were referred to *Pecten caurinus* by Stejneger. (See A. Stejneger in Golder, Bering's Voyages, Amer. Geogr. Soc. Research Ser. no. 2, 1925, p. 44, footnote.)—L. G. HERTLEIN.

MR. CALVIN GOODRICH with Mrs. Goodrich have left Ann Arbor for an extended tour from Cape Town to England.

<sup>1</sup> Cf. The Radula of *Lymnaea* and *Bulinus*, NAUTILUS 41: 141-142, 1928.

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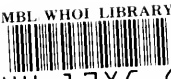








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