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# OCCASIONAL PAPERS ON MOLLUSKS

*Published by*  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy  
Harvard University

VOLUME I  
Numbers 1 to 18

*Edited by*  
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Museum of Comparative Zoölogy

AUG 13 1954

PRINTED AT  
BOTANICAL MUSEUM OF HARVARD UNIVERSITY  
CAMBRIDGE, MASSACHUSETTS  
1945-1954





## MERRILL E. CHAMPION

THIS first volume of "Occasional Papers On Mollusks" is fittingly and sincerely dedicated to Dr. Merrill E. Champion, who from the time "Johnsonia" and this present series came into being has quietly devoted himself to their success. In the capacity of Assistant Editor, his knowledge of the classical languages and his experience as an editor of medical journals has contributed greatly to the stature of these two publications.

Dr. Champion was born in 1880 in Prince Edward Island, Canada, but moved to Massachusetts at the age of fifteen. He attended Boston Latin School and Wakefield High School from which he was graduated in 1898. He received his A.B. degree from Harvard College in 1902 and his M.D. from Harvard Medical School in 1906. He had a private practice for a short time and then attended the first class of the Harvard-Technology School of Public Health. Following this, he was a field director for the Rockefeller Sanitary Commission for the study and eradication of hookworm in North Carolina. In 1915, he was appointed a State District Health Officer and in 1918 he became head of the Division of Hygiene in the Massachusetts State Department of Health. His duties here included problems in child hygiene, communicable diseases, health education and editorial work. However, at the same time, this quiet, energetic man was teaching child hygiene at the Harvard School of Public Health as well as lecturing in the School of Public Nursing and the School of Social Work at Simmons College.

In 1929, Dr. Champion was called to Michigan where he was in charge of setting up a health demonstration center in the Upper Peninsula. This work continued with great success until 1933 when activities were curtailed because of the depression. Though this was undoubtedly unfortunate for Michigan it was most fortunate for us as Dr. and Mrs. Champion

then moved to Cape Cod, Massachusetts where they lived for several years. Here, his love of the sea and of the out-of-doors took him often to the beaches, and an absorbing interest in mollusks soon developed. He became a member of the Boston Malacological Club in 1935 and has been an ardent supporter of that organization since that time, serving as Conchological Recorder and President. One night at the regular club meeting he asked Dr. Clench if he might have a "square foot of space in the Mollusk Department where he might putter." He was assured that he would be most welcome in the department and that there would always be a desk for him. Little did anyone realize at that time what this was to mean to the department. When "Johnsonia" was started he immediately took on the duties of Assistant Editor including the indexing of the completed volumes. In addition, he has revised completely the collection of North American land shells in accordance with Dr. H. A. Pilsbry's latest works. This was a tremendous task; not only was the main collection a very large one but there were in addition several thousand lots of unworked material which he has studied and which is now incorporated in the main collection.

During the Second World War, Dr. Champion was again called to the State Department of Public Health and for four years worked only part time at the museum. However, he kept the editorial work going as well as his revisional studies on the North American land shells, and in 1943 he was made Research Assistant in the department.

Dr. Champion has written numerous articles for medical journals and in addition to indexing "Johnsonia" has written a fine account of the life of Edward Sylvester Morse which was published in this series.

Dr. Champion is far more than just a volunteer worker in the department, he is a friend and counselor to everyone, student and colleague alike, ready and willing to discuss all problems and to help in every way possible.



MERRILL E. CHAMPION



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\* \* \* \*

## ACKNOWLEDGEMENTS

We are gratefully indebted to many friends who have generously donated material or loaned us specimens for our studies. Also, we are grateful to those who have given freely of their knowledge or time in searching for much needed information.

To Mr. R. W. Foster we are particularly grateful for making possible the initial start of these studies and to Mr. W. G. Fargo, J. Weber, H. Woolsey and the Boston Malacological Club for additional financial aid. Their interest and support made possible many of the numbers composing this volume.

Our thanks are extended to our subscribers, both individuals and institutions, for their continued interest and support.

We wish to acknowledge the fine photographic work of Mr. Frank White, of the Biological Laboratories, Harvard University.

\* \* \* \*

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## PREFACE

LITERATURE today regarding all phases of the study of mollusks has reached fantastic proportions. More than one thousand titles on various studies appear each year, published in more than two hundred journals, museum bulletins or other publications. Our aim, in this present series, is to bring together in one publication a few such studies which are limited entirely to mollusks. Each number is an entity and may deal with any phase of malacology whether bio-bibliographic or monographic or it may consist of catalogues of families or genera. A convenient number of pages will be grouped to form volumes, the numbers to run consecutively.

Some of the studies covered in this volume resulted from problems that arose during other research. Others, such as the bio-bibliographic sketches, are part of a long range plan to build up a historic background in our field of mollusks. Such sketches serve a double purpose: to save documentary material concerning malacologists which is now available but which may eventually become scattered or lost entirely and to make known the location of type material upon which much of their work was based.

We are dealing with a phylum of the animal kingdom which may have as many as 200,000 species. This number is, of course, an estimate only: even the approximate number will not be known for many years. Many regions, both sea and land, are still far from being fully investigated. Each decade highlights many new areas or new means of approach that result in additions to the known number of these beautiful and interesting animals.

Just what the aqualung may do for the study of marine mollusks is anyone's guess, but in it we have a new aid that can be effectively used for investigating one of the richest and still

one of the most inaccessible areas of the sea—the rock and coral reef zone. Here, at varying depths, we have many mollusks that are seldom, if ever, cast up on the beach. This is also a region in which dredging has been only faintly successful. Not only will many new forms come to light, but, in addition, it may be possible to become better acquainted with the many rare species now recorded from only a few specimens. In this deeper water, mollusks can be studied in their own environment, free from the vicissitudes of the intertidal zone—a place where the collector can observe them only during their most inactive period, mainly at low tide. The prospects ahead are exceedingly bright and even a novice in the field of biology can and very probably will make important contributions to our knowledge.

*Pages i-xii published August 14, 1954*

# Occasional Papers on Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

FEBRUARY 27, 1945 80,304

Museum of Comparative Zoölogy  
FEB 27 1945  
NUMBER 1

## A New Celebes Freshwater Snail (Hydrobiinae)<sup>1</sup>

By R. T. ABBOTT, LIEUTENANT (jg) H(S), USNR<sup>2</sup>

### Genus *Indopyrgus* Thiele 1928

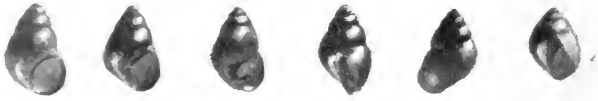
*Indopyrgus* Thiele 1928, Zoologische Jahrbücher 55, p. 373, 378; Genotype, *Indopyrgus nevilli* Thiele (Andaman Islands).

*Indopyrgus* was originally described as a subgenus of the Australian genus *Potamopyrgus*. It is raised at this time to generic standing. All members of this genus are small, less than 3 mm. in length; shell thin, ovate, smooth, with about 3 or 4 whorls, the last being large. Aperture sub-ovate, the lip slightly thickened. Umbilicus narrow and slit-like. Operculum, thin, corneous, paucispiral. Radula characters are distinct from *Potamopyrgus*. Rachidian tooth possesses two long thin basal wings and has a denticle count of  $\frac{5-1-5}{3-3}$ . The lateral tooth oblique, with a strong central elbow. The denticle count varies from 4-1-6 (*nevilli*) to 3-1-5 (*bonnei*). *Indopyrgus* is placed in the subfamily *Hydrobiinae*. Other species placed in this genus are *I. moussoni* Issel 1874 and *I. borneensis* Issel 1874, both from Bintulu, Sarawak, Borneo.

Though this genus has never been implicated as an intermediate host of the human blood flukes, there is a possibility that it may be found to be a carrier of schistosome cercariae, as in the case of its relatives, *Schistosomophora* and *Katayama*. Bonne and Sandground in their work on

<sup>1</sup> The opinions expressed in this article are those of the author and are not to be construed as official or reflecting the views of the Navy Department, or of the Naval Service at large.

<sup>2</sup> Preventive Medicine Division, Bureau of Medicine and Surgery, Navy Department.



First figure, Holotype of *Indopyrgus bonnei*, new species. Remaining figures, Paratypes, all ♀ from Lake Poso, Celebes.

1



FIGURE 1, Radula of *Indopyrgus bonnei*, new species. FIGURE 2, Operculum of *Indopyrgus bonnei*, new species. (Greatly enlarged)

*Schistosoma japonicum* in Lake Lindoe, Celebes, sent a large collection of freshwater shells to Dr. Joseph Bequaert at the Museum of Comparative Zoölogy, among which a new species of *Indopyrgus* was the nearest relative to the proven snail host, *Schistosomophora*, of the Philippines.

***Indopyrgus bonnei*, new species**

Plate 1, figs. 1-6, Plate 2, figs. 1 and 2.

*Description.* Shell small, about 3 mm. in length elongate-ovate, thin, semi-transparent, light chestnut brown, with the edge of the peristome marked by a line of deep chestnut brown. First half nuclear whorl indented, remaining whorls inflated, rounded, marked by slightly retractively curved lines of growth. These lines are very minute and spaced unevenly. Spiral sculpture absent. Suture strongly constricted; periphery inflated and well rounded. Base short, narrowly umbilicated. Aperture large, broadly ovate, with the peristome slightly expanded and slightly reflected. The operculum is thin, corneous, translucent horn-colored, approximately one third the length of the shell, and with the nucleus strongly excentric. It is paucispiral with about two and a half turns. (See Plate 2, fig. 2) Tentacles of animal simple, tapering to a point; eyes simple and situated near the base of the outer side of each tentacle. Radula formula is: rachidian  $\frac{5-1-5}{3-3}$ ; lateral 3-1-5; inner marginal 16; outer marginal 9. (See Plate 2, fig. 1).

length	width	no. of whorls	
2.9	1.5 mm.	4.2	Lake Poso, Central Celebes.
2.8	1.6	4.3	Holotype M.C.Z. no. 147474.
2.6	1.6	4.2	Lake Poso, Central Celebes.
2.5	1.7	3.9	Paratypes M.C.Z. no. 147475.
2.5	1.6	4.5	
2.3	1.5	4.2	
2.3	1.5	3.8	
2.2	1.5	3.6	
2.2	1.4	3.9	
2.0	1.5	4.1	
1.9	1.3	3.5	

2.3	1.3	4.3	Lake Lindoe, Celebes.
2.2	1.3	4.5	Paratypes M.C.Z. no. 147476.
2.2	1.3	4.2	
2.2	1.2	4.1	
2.1	1.3	3.9	
2.1	1.2	4.1	
2.0	1.2	4.1	
2.0	1.2	4.0	
1.9	1.1	4.0	
1.8	1.1	4.0	

*Types.* Holotype, Museum of Comparative Zoölogy no. 147474 Lake Poso, Central Celebes. Charles Bonne, legit. 1941. Paratypes M.C.Z. no. 147475 from the same locality and M.C.Z. no. 147476 Lake Lindoe, Celebes. Charles Bonne, legit. 1941.

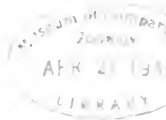
*Remarks.* This tiny freshwater shell is common along the shores in certain parts of Lake Poso and Lake Lindoe, in the Celebes. It should be suspected as a possible carrier of schistosome cercariae. The shells from Lake Poso are more mature and hence a bit larger than the specimens from Lake Lindoe. In nature the shells are partially covered by a thin encrusting of lake slime. This species differs from *nevilli* Thiele in having a more extended spire, whorls of the spire more convex and a color line of deep chestnut brown around the lip. *Indopyrgus borneensis* Issel is considerably more squat than any of the other species and differs, like *I. moussoni* Issel, from *bonnei* and *nevilli* in lacking the continuation of the lip across the parietal wall.

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# Occasional Papers On Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts



80,307

APRIL 30, 1945

NUMBER 2

## The Philippine Intermediate Snail Host (*Schistosomophora quadrasi*) of Schistosomiasis<sup>1</sup>

By R. T. ABBOTT, LIEUTENANT (jg) H(S), USNR<sup>2</sup>

This is a preliminary report on the Philippine freshwater snail, *Schistosomophora quadrasi* Moellendorff, which is responsible for the spread of the Oriental blood fluke, *Schistosoma japonicum* Katsurada. The snail serves as a host for the larval trematode from the miracidium to the human infective cercarial stage. Drawings in this paper were made from live specimens at the National Institute of Health in Bethesda, Maryland, and most dried material studies were made at the Museum of Comparative Zoölogy at Harvard University (Dr. Tubangui's material). Aid and advice were liberally forthcoming from the Division of Mollusks at the United States National Museum.

### Genus *Schistosomophora* Bartsch

*Schistosomophora* Bartsch 1936, Smiths. Misc. Coll., **95**, no. 5, p. 29. Genotype, *Prososthenia quadrasi* Mlldff. (Surigao, Mindanao, Philippines).

### *Schistosomophora quadrasi* Moellendorff Plates 2-5, all figures

*Prososthenia quadrasi* Moellendorff 1895, Nachrichtsbl. Deutsch. Malak. Ges., **27**, p. 138. (Surigao, Mindanao, Philippines).

<sup>1</sup> The opinions expressed in this article are those of the author and are not to be construed as official or reflecting the views of the Navy Department, or of the Naval Service at large.

<sup>2</sup> Preventive Medicine Division, Bureau of Medicine and Surgery, Navy Department.

*Blanfordia quadrasi* Moellendorff, Tubangui 1932, Philippine Journ. Sci., **49**, no. 2, pp. 298-301, pl. 5, figs. 1a-b, pl. 2, fig. 3.

*Oncomelania hydrobiopsis* Rensch 1932, Philippine Journ. Sci., **49**, pp. 551-552, figs. 1a-c (Palo, Leyte, Philippine Islands).

*Oncomelania quadrasi* Moellendorff, Rensch 1933, Philippine Journ. Sci., **50**, p. 325.

*Oncomelania quadrasi* Moellendorff, Bequaert 1934, Journ. Parasit., **20**, p. 281.

*Schistosomophora quadrasi* Moellendorff, Bartsch 1936, Smiths. Misc. Coll., **95**, no. 5, pp. 31-32, pl. 1, fig. 8, pl. 2, fig. 5, pl. 3, fig. 1.

*Schistosomophora hydrobiopsis* Rensch, Bartsch 1936, Smiths. Misc. Coll., **95**, no. 5, pp. 32-33, pl. 1, fig. 7, pl. 2, fig. 6, pl. 3, fig. 2.

*Blanfordia quadrasi* Moellendorff, Tubangui and Pasco 1941, Philippine Journ. Sci., **74**, no. 4, pp. 302-324.

*Schistosomophora quadrasi* Moellendorff, Bartsch 1939, Volumen Jub. pro Prof. Sadao Yoshida, Osaka, **2**, pp. 644-645.

*Description of shell.* Adult shell about 4.5 to 6 mm. in length, elongate-ovate, thin, color a translucent chocolate brown to light brown (often covered by black pond slime), with a thin, very dark brown color line around the peristome or entire mouth border. Nuclear whorls (developed in egg mass) two in number, rounded, glassy, appearing minutely granulated under magnification. Postnuclear whorls (developed after hatching) regularly increasing in size, rounded, with the body or last whorl more than  $3/5$  of the total length of the shell. Extremely fine axial sculpture of slightly retractively slanting lines of growth. Spiral sculpture seldom visible. Suture between whorls well indented. Base of body whorl short, rounded, with a narrow, slit-like umbilicus. There is a slight thickening of the outer lip just behind the aperture into a callus or weak varix. Aperture broadly ovate, slightly expanded, slightly reflected. Parietal wall slightly glazed. Interior of aperture light chocolate brown. Periostracum absent. Operculum very thin, transparent, paucispiral with eccentric nucleus and two to three whorls. Scar of muscular attachment about half the area of the operculum.

*Animal* (Plate 3, figs. 1-6) small, with a simple foot, underside of which is broad and short, rounded behind and truncate in front. Anterior edge of foot with a narrow, fairly deep mucous slit. Foot often carried in life with a longitudinal fold of flesh along the midline of the side of the foot. Head relatively small,



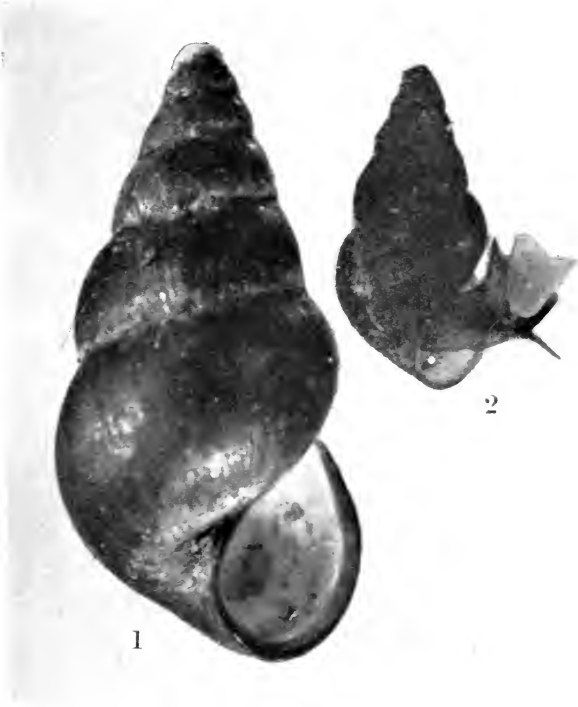


Plate 2. *Schistosomophora quadrasi* Mlldif. Fig. 1. Shell from Samar Island, Philippines, about 17x. Fig. 2. View of live animal, about 9x (both Navy photographs).

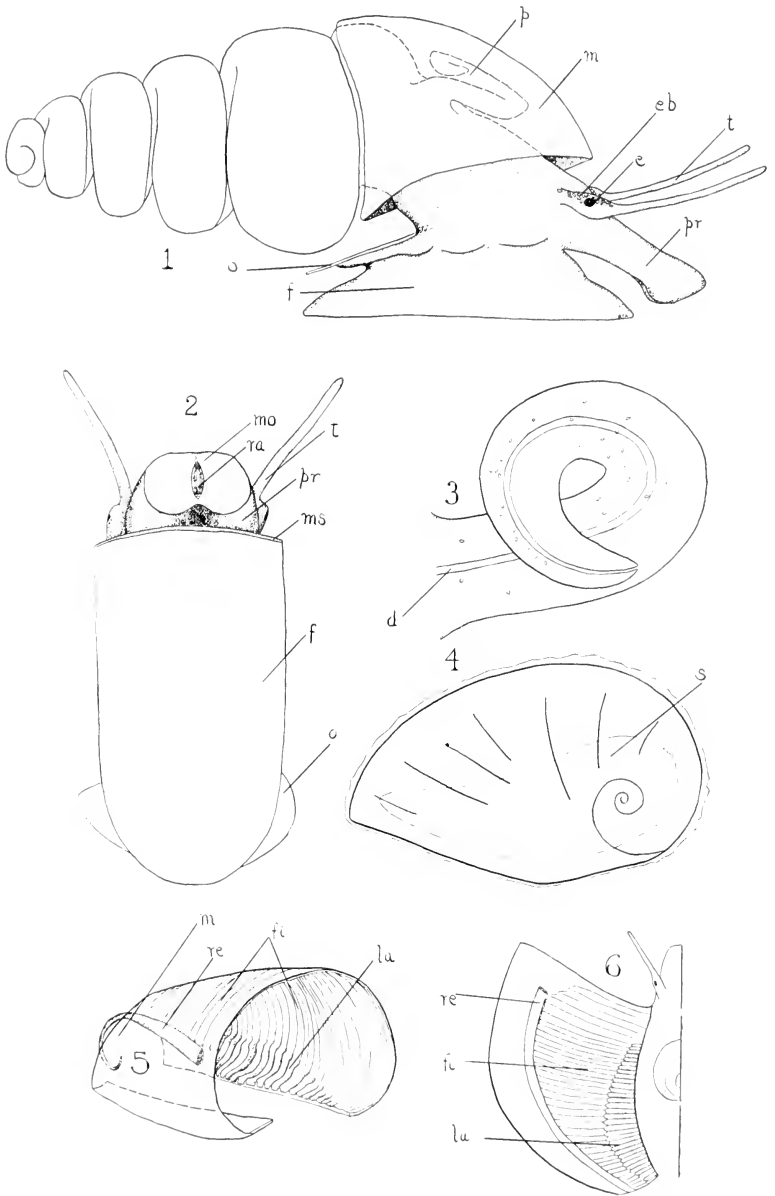


Plate 3. (Explanation of plate on opposite page.)

proboscis or snout blunt, short, bilobed in front. Single tentacle on each side of head simple, slender, swollen at the base where the eye is located. In male specimens, the verge or penis is located well behind the head on the dorsal side of the body and on the midline. It is far enough back to be obscured by the mantle. Penis simple with a single functional spermduct, translucent yellowish, slightly flattened dorsally, rounded ventrally and tapering gradually towards the rounded distal end, carried in a sinistral, single-coil position. Mantle thin with a slightly thickened border. In females the mantle border just opposite the "vaginal" opening is capable of being puckered into a funnel-shaped notch.

*Color of animal* in general a dark blackish gray. The most distinguishing color markings are the bright splotching of yellow, granular-like dots over each eye forming false "eyebrows." In detail: underside of foot gray, peppered with minute white dots. Sides of foot and body grayish with a heavy suffusion of minute black dots. A few yellow or white dots are sometimes present on the sides of the upper body and dorsal side of the forefoot. There is a suffusion of white dots on the inside of the mantle opposite the anal and "vaginal" openings. Eyes jet black with a tiny clear lens. Proboscis sandy gray-black with a reddish tinge caused by the buccal "cartilages" inside. Interior of mouth at the anterior end of the proboscis reddish. During feeding, the glint of the glass-like teeth of lingual ribbon or radula may be seen. Tentacles translucent gray intermingled with tiny gray dots. The feces of healthy animals are small, compact, hen's egg in shape, and may be seen through the shell lined up in the rectum in the last two or three whorls. Under a bright light and magnification, the edges and folds of the body and foot give off a beautiful metallic blue sheen.

Plate 3. Fig. 1. Side view of living animal with shell removed in drawing. Fig. 2. Underside of foot and head. Fig. 3. Verge or penis of male. Fig. 4. Operculum, top side. Fig. 5. Looking back under the mantle showing gills on left wall. Fig. 6. Dorsal view of animal with right side of mantle cut and laid back to show gills and rectum attached to inside of mantle.

*d*=sperm duct; *e*=eye; *cb*=yellow "eyebrow" color granules; *t*=foot; *n*=gill filaments or para-ctenidial folds; *la*=gill lamella; *m*=mantle; *mo*=mouth; *ms*=mucous slit; *c*=operculum; *p*=penis; *pr*=proboscis or snout; *ra*=radula ribbon; *re*=rectum; *s*=muscular attachment scar; *l*=tentacle.

*Variations in animal* noted were a case of one female with a split or double-tipped right tentacle, and variation in the amount of yellow coloring over the eyes.

*Variation in shells* is considerable in several characters in adult specimens from the same locality, nearby localities and distant localities on other islands. Measurements of the number of whorls, length and width of shell were made on twenty or more specimens from eight lots (5 specimens only from Surigao) with the following results: (largest shell = length 6.4 mm.; width 3.2 mm.).

Locality	Whorls average number	Length average	Width average	Length divided by width (average)
Surigao, Mindanao	5.8	5.7 mm.	2.8 mm.	2.03
Jabonga, Agusan, Mindanao	6.4	4.8	2.5	1.92
Palo, Leyte (1935)	6.2	4.7	2.5	1.88
Palo, Leyte (1945)	6.1	5.0	2.4	2.08
Dagami, Leyte	6.3	4.9	2.7	1.81
Calbiga, Samar	5.9	4.3	2.4	1.79
Naujan, Mindoro	6.4	5.0	2.5	2.00

These differences indicate that this species varies in stoutness and length with little or no correlation with its geographical distribution. After adequate field study, it may be found that local ecological conditions are responsible. Other variations of the same nature include size of lip thickening or varix, predominance of minute axial sculpturing, thinness of shell, shape of operculum, and number of whorls in the nucleus of the operculum. There is no sexual difference detectable in the shells of five females and three males examined.

*Radula.* The lingual ribbon or radula is situated in the buccal cavity in close association with the buccal cartilages. There are about 70 rows of teeth on the ribbon which is held together by a thin, transparent membrane bearing two side wings (Plate 4, figs. 2 and 3). Each row consists of a single rachidian (or central) tooth flanked closely on each side by first a lateral (or median) tooth, then an inner (or first) marginal and lastly by an outer (or second) marginal tooth. Each tooth bears a char-

acteristic number of tiny denticles. Radula counts in this paper refer to the number of denticles on each tooth. The usual count on the rachidian tooth for this species is two small denticles on each side of a single large denticle on the top edge of the tooth and three small basals on each lower side (written thus:  $\frac{2-1-2}{3-3}$ ). (Plate 4, fig. 1).

A study of every tooth on several ribbons revealed a varying frequency in the denticle counts. From anterior end of ribbon to the posterior growing end, the variation in the upper or front edge of the rachidians were: first 10 teeth, 2-1-2; next 6, 1-1-2; next 2, 2-1-2; next 7, 2-1-1; next 13, 2-1-2; next 7, 2-1-1; last 20, 2-1-2. The basals varied from 3-3 in the first half of the ribbon gradually to 2-2 in the last half. Lateral counts 2-1-3 mostly, a few 1-1-3, a few 3-1-3. Inner marginal tooth 9 mostly, some 8. Outer marginal 7, 6 mostly, a few 5.

It is evidently unsound to create species or genera, at least in this group, on the basis of denticle counts which vary as much as they do. Chinese workers have found this same type of radula variation in *Oncomelania* and *Katayama*.

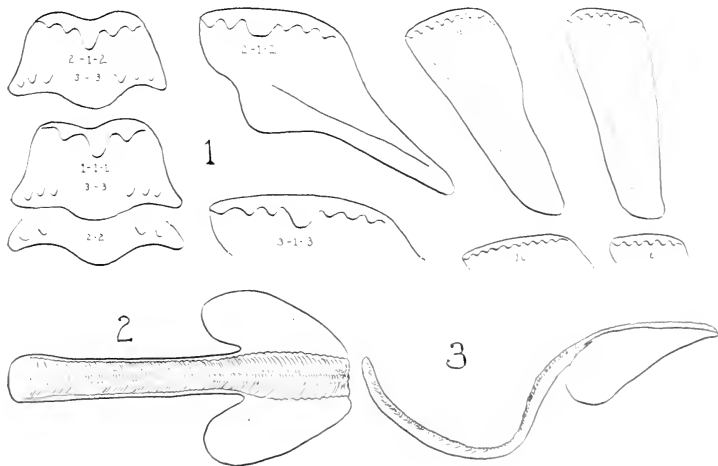


Plate 4. Fig. 1. Radula (left to right: rachidian, lateral, inner marginal, outer marginal). Top row, most frequent counts encountered. Middle row, extreme variation in rachidian from Samar Island. Bottom row, infrequent counts. Fig. 2. Dorsal view of entire lingual ribbon showing transparent membrane. Fig. 3. Side view. Anterior end on the right.

The gills or ctenidia consist of a series of 40 to 50 low, narrow lamellae or plate-like flesh folds which are attached to the inner left side of the mantle. The gills stretch across the mantle only as far as the rectum which is also welded to the mantle. The lamellae extend up on the mantle for a short distance and then flatten out into indistinct filaments or para-ctenidial folds which are closely welded to the mantle (Plate 3, figs. 5 and 6).

The pharynx in the proboscis contains two, paired flattish buccal "cartilages" tinged with a reddish brown pigment (slightly visible externally through the wall of the proboscis). Salivary glands sac-like, paired and lying along the sides of the oesophagus with the ducts leading forward and into the pharyngeal cavity. The oesophagus leads back into the body and joins the stomach which is in the posterior part of the body whorl. The brownish spotted hepato-pancreas or "liver" extends from the apical (tip) region of the shell down to the penultimate whorl. The rectum, after passing down through the last four whorls (paralleling the uterus in females) comes forward fused to the right side of the mantle. The bean-shaped pericardial sac or heart in the body whorl contains the auricle and ventricle.

The central nervous system (Plate 5, figs. 1 and 2) is strikingly similar to Robson's figure (Ann. Mag. Nat. Hist. (9) 8, p. 401) of *Katayama nosophora* Robson, differing only in having a long and slender supra-intestinal ganglion (as in Heude's figure of *Oncomelania hupensis* Gredler. Mém. Hist. Nat. Emp. Chinois, 1), three instead of four labial and ocular area nerves arising from the antero-dorsal area of each cerebral ganglion, and a pair of small nerves arising dorsally from each of the para- and pro-podial ganglia. The inner labial nerve splits in two not far from its cerebral ganglial origin, unlike in *Katayama* and similar to *Oncomelania*.

Only scanty information is available to date on the eggs of *Schistosomophora quadrasi* Mlldff. A single, small egg and a clump of four eggs have been seen under aquarium conditions.

*Habitat and Habits.* Amphibious, remaining out of water for long periods of time attached to moist, shaded grass, banks of ditches, wooden pilings, and in the area of rice fields. Prefers water of a slightly acid pH. Early Japanese workers found that

specimens of *Katayama nosophora* Robson were killed in a one per cent solution of lime in 24 hours. In the Katayama District of Japan, 75 to 85% of the snail population was eliminated in a 0.1% solution of lime. Copper carbonate would be effective in small ditches and ponds.

The animal is a continual browser in and out of water, and has a tendency to move upwards out of water. The mode of locomotion is in the form of a sliding, not loping, motion.

*Trematode Parasite.* *Schistosomophora quadrasi* was first implicated as the intermediate host of *Schistosoma japonicum* Katsurada in 1932, by M. A. Tubangui (Philippine Journ. Sci., **49**, pp. 295-304, pls. 1-5). Subsequent workers from 1934 to 1945 have substantiated this discovery. Until 1945 no other species of snail has been known to be a vector of this disease in the Philippines.

*Locality Records.* Philippines—MINDANAO: Surigao (United States National Museum and Museum of Comparative Zoölogy); Jabonga, Agusan Prov. (MCZ). LEYTE: Palo (USNM and MCZ); Dagami (MCZ). SAMAR: Calbiga (MCZ). MINDORO: Naujan (MCZ).

*Range.* (To date). Northern Mindanao, eastern Leyte, all of Samar, eastern Mindoro. Not reported from Luzon as yet. Wading birds might possibly be a mode of spreading this species, since the animal is able to withstand weeks of desiccation and might by chance be carried adhering to the feet of waders.

*Nomenclature.* Rensch recognized in a brief note (Philippine Journ. Sci. **50**, 1933, p. 325) that his *Oncomelania hydrobiopsis* of 1932 is identical with *Prososthenia quadrasi* Mlldff. Bequaert in 1934 concluded on the basis of paratypes of *P. quadrasi* Mlldff. in the M.C.Z. collection that *O. hydrobiopsis* Rensch was a synonym. Two years later, Bartsch maintained the two species were distinct on the basis of a single, stout paratype and on the basis of a difference of one denticle count on the outer marginal radula. That specimen is found now by Bartsch to fall well within the limits of variation of the specimens from all four islands.

A discussion of generic position or generic validity is not

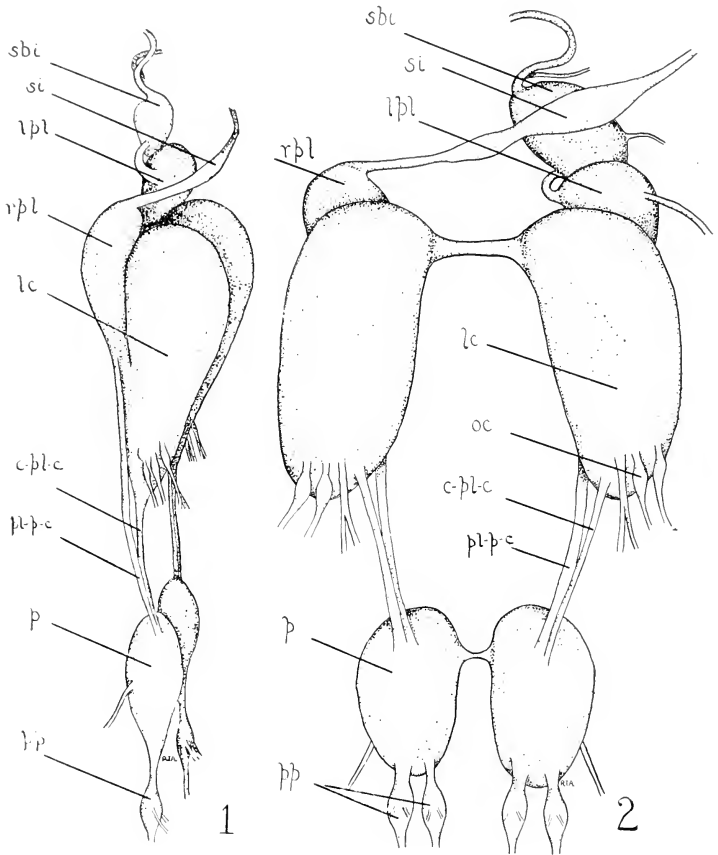


Plate 5. Central Nervous System. Fig. 1. Right side view. Fig. 2. Dorsal view (both slightly spread).

*c-pl-c*=cerebro-pedal connective; *lc*=cerebral ganglion; *lpl*=left pleural ganglion; *oc*=ocular, tentacular and labial nerve group; *p*=right pedal ganglion; *pp*=parapodial and propodial ganglia; *pl-p-c*=pleural-pedal connective; *rpl*=right pleural ganglion; *sbi*=sub-intestinal ganglion; *si*=supra-intestinal ganglion.



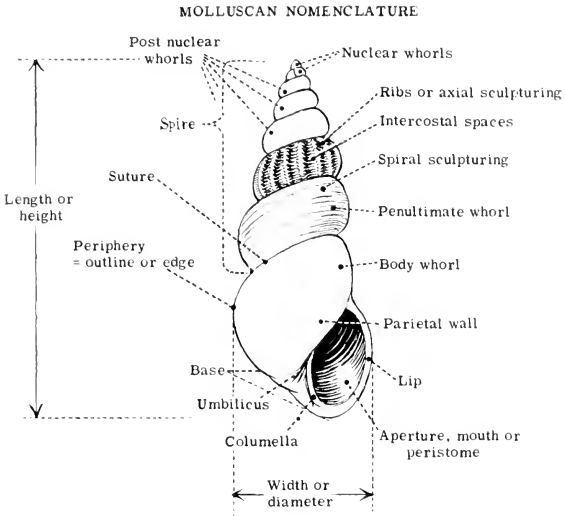
given in this paper, pending observations on live Japanese and Chinese material.

#### Note on Identification

Proper identification of the snail intermediate host and a greatly increased knowledge of its geographical distribution are highly important, as schistosomiasis is endemic only in places where the mollusk is found. In the Philippines the snail host can be confused with a small land mollusk, *Lamel-laxis (Allopeas) gracilis* Hutton which has *no operculum*, and with young melanid snails which have beautiful, *heavy sculpturing* on the early whorls. Every effort is being made by malacologists to render quick identifications as accurately as possible.

#### Acknowledgments

The author wishes to express his gratitude to the many people and institutions that have given so generously of their time, efforts, and material. For general malacological information, the United States National Museum and its shell workers, Dr. Paul Bartsch, Dr. J. P. E. Morrison and Dr. Harald Rehder. For live snails, the National Institute of Health and Dr. W. H. Wright, Dr. Myrna Jones, and Dr. Eloise Cram. For information on trematodes, Johns Hopkins School of Hygiene and Public Health and Dr. W. W. Cort and Dr. G. F. Otto. For records and notes, the Academy of Natural Sciences, Philadelphia, and Dr. Horace B. Baker. For a study collection and general malacological information, the Museum of Comparative Zoölogy at Harvard College and its research workers, Dr. Joseph Bequaert and Mr. William J. Clench.



Periostracum' thin, protective coating or "skin" over the outside of shell.  
 Operculum' corneous thin trapdoor attached to foot of animal. Fits snugly into aperture.  
 Varix: thickening of shell just behind the lip on the outside of body whorl.

Plate 6. Diagrammatic drawing to explain molluscan nomenclature.

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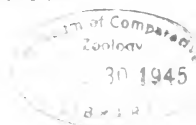
JULY 30, 1945

NUMBER 3

## Some Notes on the Life and Explorations of Hugh Cuming

80304

By WILLIAM J. CLENCH



The following notes on the life and explorations of Hugh Cuming may be of interest, particularly at this time, as so much material is being collected in the Philippine Islands, a region Cuming explored over a period of three years better than a century ago.

Botanists have been far more lenient in their estimate of Cuming than have most zoologists, at least so far as the published record is concerned. That he was a very remarkable man is certainly not questioned, and as a field-man he probably has never been equaled for the number of species of mollusks collected by any one person. However, his habit of depending upon his memory for the name and locality of his specimens, left to the taxonomists of the past, present and future the weary task of ferreting out his mistakes.

I have not seen the original Cuming collection which is now in the British Museum. I have, however, many hundreds of his specimens under my charge that have come to this museum in the collections of his contemporaries, through C.B. Adams, J.G. Anthony, Thomas Bland, A.A. Gould and others. There are no original labels. Cuming numbered his lots and then sent separately a corresponding list of numbers with their names and localities. Such a procedure added errors to any

original mistakes made at the time the material was boxed and shipped.

Cuming had the remarkable ability of getting new specimens for his collection. His enthusiasm must have instilled into others a willingness to collect shells wherever they went and as a consequence he fell heir to much material collected by expeditions and travelers in remote and, at that time, wholly unexplored regions. This naturally resulted in a remarkable number of new forms which Cuming proceeded to have described by a host of associates. The unfortunate part was that much of the original data was lost or completely left out of the record.

Hugh Cuming brought together the largest private shell collection of his day. Since that time only two or three private collections have equaled or surpassed his in the number of lots. According to Melvill, he had 19,000 species when his collection was purchased by the British Museum in 1866. The great value of this collection was in the large number of original specimens that it contained, material which had formed the basis for the descriptions of many new species.

Hugh Cuming was born in West Alvington, Devonshire, England and died in London. At the age of thirteen or fourteen he was apprenticed to a sail maker which brought him in contact with many men of the sea. Apparently he was already keenly interested in natural history and the sailors' yarns of their experiences in foreign lands must have fired his ambitions for travel. In 1819 a business opportunity led him to Valparaiso, Chile. Here he met Mr. Nugent, the British Consul; also Lieutenant Fremby, a conchologist of note who had devoted his time to studying the many large chitons which occur along the Chilean coast. Their interest and influence made possible the aid granted by the Chilean government a few years later when he collected along the South American coast.

Whatever Cuming's business was it must have been exceedingly profitable, as he was able to retire after a seven year period (1826). He then had built and fully equipped a yacht,



*Hummer*

1791-1865

Plate 7. Copied from an original photograph  
sent to J. G. Anthony in 1865.

Photograph by F. P. Orchard

the *Discoverer*, which was especially designed for collecting and dredging biological material.<sup>1</sup> His first venture was to the islands of eastern Polynesia. This trip was made by way of the Island of Juan Fernandez off the coast of Chile, Rapa Nui or Easter Island and thence to the Pitcairn Islands. In addition, several islands in the Society, Tuamotu and Tubuai groups were visited. His somewhat lengthened stay on Anaa Island in the Tuamotu group yielded a fine harvest of marine shells which were later described by Reeve and Sowerby. Much botanical material was also collected.

The success of this trip led to another and far more extensive voyage. According to Melvill, two years were spent exploring the coast of South America between Lima, Peru and Chiloé Island, Chile. The Galápagos Islands were also included. It would appear certain that far more territory was explored than was delimited by Melvill (p. 61). We have several lots of Cumingian shells from the west coast of Central America and South America, north of Lima, which had been collected during this two year period and many published records by Sowerby, Reeve and others, exist for coastal regions north of Lima. He certainly reached as far north as the Gulf of Nicoya in Costa Rica. In a conversation that I had with Dr. Johnston, he stated that the plants collected by Cuming would indicate that he may have reached as far north as Acapulco, on the west coast of Mexico. The probable dates of Cuming's visit and the islands collected in the Galápagos have been reviewed by Howell.

In 1831, he returned to England to find himself quite famous. His collecting successes in Polynesia and the Eastern Pacific made possible a trip to the Philippines, a region almost wholly unknown at that time. Cuming spent three years in these islands from 1836 to 1839, during which period he visited nearly all of the larger islands and many of the smaller ones. A very

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<sup>1</sup> So far as I can determine, the *Discoverer* was the first boat designed specifically for the purpose of collecting natural history specimens. As stated elsewhere, the lack of data with the material collected has left its name almost wholly unknown in the annals of such vessels.

fine account of his Philippine expedition has been written by E. D. Merrill.

It has been stated that Cuming was a pioneer in giving exact locality data for his material. This may be true for some of his shells but it is certainly not true for the majority of the species credited to his collecting. Not only are data lacking but in many cases the data associated with the species have since proved to be wrong.

Dr. J. E. Gray, Keeper of Zoology at the time the Cuming collection was purchased by the British Museum, has published the following, regarding the data and other facts about Cuming's collection. I quote only the most pertinent remarks in Gray's paper though there is much additional information of general interest.

"I certainly should have considered the following observation unnecessary if most exaggerated statements had not been published respecting the collection, which are likely to mislead the public—such, for example, as that each specimen had not only its name and its special locality attached to it, but also the depth in the ocean at which it was found, and that the specimens are in all instances the actual types of the species from which the descriptions have been taken. As this is not the case, it is necessary that some account of the collection as it was received by the British Museum should be given, in order that it may be properly understood by the scientific conchologists who may hereafter consult it. I have not the least intention by the following remarks to depreciate the value of Mr. Cuming's labors as a collector, or of his collection; for every conchologist, both scientific and amateur, is very greatly indebted to him for having collected one of the largest and most perfect collections of shells ever brought together; for he not only collected extensively himself, but he excited others to collect, and he left no stone unturned to obtain from other collections in all countries such specimens as he wanted, or from which, as types, species had been described; and he also, in the most free and liberal manner, opened the collection to the use of such conchologists and iconographers as would fall into his views as to the describing and naming of species.

“When I first saw the collection, fifteen or sixteen years ago, as may be seen by my report to the Trustees of the British Museum, which is published in one of the Parliamentary Papers relative to the Museum, the collection was without any names or habitats to the species. The names have been added since Mr. Cuming’s recovery, and gummed to the mouth of one of the specimens of each preserved species. These names were not affixed by the original describers and figurers of the species, but by two well-known conchologists; and as they must be considered to rest on identification by the latter and not by the original describers, this rather detracts from their authenticity as absolute types of the species described. It is to be regretted that when these names were attached, the special habitats of the specimens were not also marked on them.

“I am informed that as soon as any specimens were described Mr. Cuming was in the habit of destroying the habitats sent with them, as he said they could be discovered by looking at the work in which they were described. This is certainly a very inconvenient and roundabout way of arriving at the information required: if the species was procured from two or more localities, one is not able to discover which specimen belonged to each special locality.

“In many of the specimens, especially those that have not yet been determined or named, the habitat, written on a small paper label, is stuffed into the mouth of the shell.”

Johnston holds that certain of the Cumingian localities on the west coast of South America were shipping points rather than the actual collecting localities. This was in reference to his botanical material, though the same is probably true for his shipments of mollusks. Mr. E. L. Layard, who had been a close associate of Cuming, makes the following statement:

“I have often heard collectors complain of the inaccuracy of some of the localities given by Cuming, and I think I can account for this. . . . I have seen him making up a series of specimens for a correspondent, and I have also said I do not



think he could write. I never saw a notebook in his hand, nor were his shells in separate labelled boxes. He trusted entirely to his wonderful memory, not only for his localities, but for the names of the shells and their authors."

This statement of Layard that Cuming could not write, may, of course, be the answer to the unlabeled condition of the Cumingtonian collection, at least as far as it concerned the material he had personally collected. In fairness to Cuming, we may judge that certain of the data might have been eliminated from the record by the describers of his shells. It is to be borne in mind that at that time, data, other than a name, were considered of interest rather than of value. It is unfortunate that many species described from his collection, but not collected by him, had inadequate data as to the collector. A clue to their origin would be a material aid in an understanding of many of his species.

Cuming did not collect in the Western Atlantic. However, the vast collections that he had obtained in both the Eastern and Western Pacific offered tempting material for both exchange and purchase. As stated above, the origin of many of his Western Atlantic shells is seldom indicated in the descriptions that were published by many authors who had access to his collection. I know that C. B. Adams, T. Bland and T. Swift were among the many who contributed specimens from the Western Atlantic in exchange for the many new species that he had collected in the Philippines.

Merrill believes that Cuming was not illiterate as has been stated, but was capable of writing a fine letter. This belief is based upon the several letters written to Sir William J. Hooker by Cuming during his Philippine expedition. However, Dr. Merrill did not see the original letters, but only transcribed copies. We possess fourteen original letters by Cuming that were written between the years 1852 and 1861 to J. G. Anthony, W. G. Binney and T. Bland. Three or four different handwritings are apparent and Cuming's signature on each is different from the writing in the letters, leaving one with the impression that they may have been written by someone acting in

the capacity of a secretary, but that Cuming added his own signature.

Hedley, in a report upon the mollusk fauna of Queensland, has given an excellent history of the various collectors that had been associated with the development of the natural history of that State. In his remarks under John MacGillivray, naturalist of the *Rattlesnake* Expedition, he gives the following that is pertinent to Cuming:

“The shells of MacGillivray seem to have passed into the hands of Cuming. Hugh Cuming was an illiterate sailor, whose history shows him as a man of strong character, a master organiser, and one born to success. He aimed to have the finest collection of shells in the world, and he reached it. Unfortunately, his plans did not regard the advancement of science, and the strong man wastes no energy on aught but the attainment of his object.

“For purposes of sale or exchange, an unnamed shell was of less value to him than one named, so names were needed for his wares. More time for determination and description was required by careful writers. But worse authors quickly supplied names good or bad, and doubtless better submitted to Cuming’s dictation as to what constituted a different species.

“So the leading conchologists of his generation in England, Gray, Woodward, Forbes, Hanley, and Carpenter, had little or no dealings with Cuming. Gray, indeed, seems to have quarrelled outright. The naming of Cuming’s huge collection fell to weaker men—Reeve, the Sowerby’s, and the Adams [H. and A. Adams]. It has happened that these renamed the same species twice or thrice. The least amount of work necessary to carry the name satisfied them.”

I have read somewhere that Cuming paid a shilling a species to have his shells described. In the days of very short and formal Latin descriptions, such a procedure was a rather profitable venture, particularly when no illustrations accompanied the text. Many of these species were later figured in the

monographs of Reeve, Sowerby, Pfeiffer, and others, but it still leaves a long and sometimes difficult search to locate a figure for some of these species and, of course, uncertainty generally exists whether the figured specimen and the description were based upon the same material.

We have a case in point regarding MacGillivray specimens. In our collection, there are three lots of *Cyclostoma forbsiana* Pfeiffer, described from the Cumingian collection and originally collected by MacGillivray. One lot from Dohrn, who had purchased the Pfeiffer collection, gives the locality of New Hebrides, the second lot directly from Cuming is given as from New Caledonia and the third lot originally received from Cuming by Gould is without locality data. As far as we now know, all of these lots came from New Caledonia; the locality of New Hebrides published by Pfeiffer is certainly open to question.

Errors of this sort are exceedingly exasperating to workers on faunistic studies. Such inaccuracies inject into the geographical problem disharmonic elements which are very difficult to explain. This is particularly true of regions that are still imperfectly known. It is only in areas which are well surveyed that such errors can be ruled out. The following short and cryptic note by Connolly expresses an opinion that I have heard verbally many times:

“*G. obovata* was described as from Liberia, obviously one of the many miasmas arising from the pestilential conchological swamp of the Cuming collection; the species seems to be confined to Natal.”

Dr. Prashad of the Indian Museum, Calcutta, told me at the time of his last visit that Cuming substituted new material for old when he obtained better specimens. This, of course, was regardless of the fact that the old material may have been the types upon which the species was established.

It would appear that Iredale unwittingly committed an error that may have been based upon such a substitution. Reeve figured a specimen from the Cumingian collection as *Cassis*

*recurvirostrum* Wood, with the locality of Raine's Island, Torres Strait [Australia]. This figured specimen is unquestionably *Phalium cicatricosum* Meuschen from the Western Atlantic. Iredale, noting its differences from any known Australian species, renamed it *Xenogalea lacrativa*.

Many localities given by the describers of Cuming's shells were brief, mentioning only the town or city. In most cases, of course, there are not many chances for error. In a few cases, certainly, unsuspected errors may occur by using a locality name and then adding the wrong country. A case of this sort was indicated by von Martens<sup>1</sup> in which Carácas was given as the locality. The Cumingian locality was Carácas, Ecuador (S. Lat. 0°30') and not Carácas, Venezuela, by far the better known place. In addition, on modern maps, the Ecuador locality appears as Bahía de Caráques.

In the Zoological Record for 1869, p. 530, von Martens mentions that Cuming collected on two of the three Pacific islands known as Lord Hood Island. One of them is in the Galápagos group and the other is in the Tuamotu Archipelago. Care must be taken to differentiate between these two localities as two faunistic areas are concerned.

That Cuming was able to get the best of exchange material is attested to by the following paragraph that appeared in a letter now in our files by J. G. Anthony to Thomas Bland. It was written in Cincinnati, Ohio, October 23, 1856.

"Started another man off this morning for two days trip to Indiana for Unios to a special locality where they grow large. I shall move heaven and earth to get good specimens for Cuming. All my wits are at work for him and if there is any 'good thing in Nazareth,' I am bound to ferret it out for him."

One can readily glean from the following passage in a letter to T. Bland (London, April 30, 1852) that Cuming wanted to "corner the market" as far as it concerned some of the rarities among the mollusks. "You observe that you are likely to get

<sup>1</sup> *Nachrichtsblatt deut. Malakozoologischen Gesell.*, 8, 1876, p. 68-69.

specimens of the *acosta* [?] of D'Orbigny, I will take 20 or 30 at £ 1. each provided you do not send any away or allow them to be in any other hands otherwise they are not worth to me so much." From the tone of his letters to Bland and especially to J. G. Anthony, this desire to hold and control prize specimens was not for any pecuniary gain but to use this choice material in exchange for equally choice species that would add to his collection. He expressed his delight for the large and fine Unios that had been sent by Anthony from the region of Cincinnati.

Cuming must have corresponded with about all of the shell collectors of his day as most collections made prior to his death in 1865 are sure to have a few of his specimens. The British Museum probably disposed of certain duplicates after it came in possession of his collection. Many private collections made after 1865 contained material purchased from Sowerby with the note "Cuming Collection" on the label.

In the later years of his life, Cuming financed several field collectors, either wholly or in part, and as a consequence, added much to his collection from this source. In a letter to Thomas Bland, he complained bitterly that, though he had contributed £ 25 towards Blauner's trip, Shuttleworth, for whom Blauner had made the trip [Puerto Rico?] had only sent him two or three of the new species that had been found. He also aided Auguste Sallé in 1849-1851, in making a trip to Santo Domingo [Hispaniola] for the purpose of collecting mollusks and orchids. Sallé's one-man expedition still stands as the most successful trip, from a malacological point of view, that has ever been made to this island.

Cuming will always be remembered as a great collector. That he failed to give all the necessary data with his material is, of course, to be regretted. He was a product of his time, a time when natural history objects had value, mainly in themselves, and he, like many of his contemporaries, failed to realize the intricate problem of distribution and its relationship to all other branches of Natural Science. It will be years before his mistakes are corrected and his omissions admitted to the record by others.

The following papers have much additional information about the life and record of this remarkable man.

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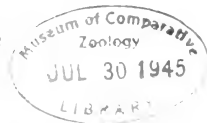
JULY 30, 1945

NUMBER 4

## Notes on the Family Cardiidae

80,304

By LILLIAN C. SMITH



While studying the family Cardiidae, for a *Johnsonia* number on the Western Atlantic species, some notes were made regarding several species from other oceans. They seem sufficiently important to warrant publication.

### *Fulvia bullata* Linné

*Solen bullatus* Linné 1758, Systema Naturae, ed. 10, p. 673 (locality unknown) refers to Rumphius 1741, D'Amboinsche Rariteitkamer, pl. 44, fig. N.; Linné 1767, Systema Naturae, ed. 12, p. 1115; Gmelin 1790, Systema Naturae, ed. 13, p. 3226.

*Cardium virgineum* Linné 1758, Systema Naturae, ed. 10, p. 682 (Mediterranean Sea); *ibid.* 1767, ed. 12, p. 1124; Gmelin 1790, Systema Naturae, ed. 13, p. 3253 refers to Gronovius 1781, Zoophylacium Gronovianum, **3**, pl. 18, fig. 5 (Mediterranean Sea). Variety  $\beta$  refers to Chemnitz 1782, Conchylien-Cabinet (1) **6**, pl. 18, fig. 181 (Indian and American Oceans).

*Cardium apertum* Bruguière 1789, Encyclopédie Méthodique, p. 226 (Asiatic and American Oceans) refers to Gronovius 1781, Zoophylacium Gronovianum, **3**, pl. 18, fig. 5, and to Chemnitz (1) **6**, pl. 18, figs. 181-183.

*Cardium hians* Spengler 1799, Skifter af Naturhistorie Selskabet, Copenhagen, **5**, p. 39, refers to Chemnitz (1) **6**, pl. 18, fig. 181, 183.

*Cardium rugatum* Dillwyn 1817, Descriptive Catalogue of Recent Shells, p. 125 (Coast of Jamaica and the East Indies) refers to Gronovius 1781, Zoophylacium Gronovianum **3**, pl. 18, fig. 5.

*Cardium tenerum* 'Solander' Dillwyn 1817, Descriptive Catalogue of Recent Shells, p. 125 (no locality given).

This species, *Fulvia bullata* Linné, was based upon a figure in Rumphius' work. There can be no doubt that this figure corresponds to shells from Australia and the East Indies which

are in the collection of the Museum of Comparative Zoölogy. Many early authors mistook the figure for that of *Papyridea hiatus* Meuschen which is a Western Atlantic species.

### ***Fulvia tenuicostata* Lamarck**

*Cardium tenuicostatum* Lamarck 1819, Histoire Naturelle des Animaux sans Vertèbres, **6**, p. 5 (Timor and New Holland); Delessert 1841, Recueil de Coquilles Décrites par Lamarck, pl. 11, figs. 6 a, b, c.

*Cardium rickettii* Donovan 1825, Naturalists' Repository, **4**, pl. 124 (New South Wales).

*Cardium radiatum* Reeve 1843, Conchologia Iconica, **2**, **Cardium**, pl. 18, fig. 89 (locality unknown); *non radiatum* 'Donovan' Gray 1824; *non radiatum* Dujardin 1837.

*Cardium pallidum* Reeve 1843, Conchologia Iconica, **2**, **Cardium**, pl. 18, fig. 92 (Manila Bay, Philippine Islands).

*Cardium rickettii* 'Donovan,' Hedley 1916, Proceedings Linnean Society of New South Wales, **41**, p. 685.

In 1916, C. Hedley published an article in which he suggested that the real *C. tenuicostatum* Lamarck had been "lost to view" and that the later Australian references should be transferred to *C. rickettii* Donovan. We cannot accept these suggestions, since we find shells from Australia that agree with Lamarck's type figure in Delessert. Hedley pointed out that Lamarck had described a specimen measuring 56 mm. in height. Our largest specimen reaches 51 mm. It is possible that there was a misprint in this particular, as the remainder of the description agrees with the shell in question. Hedley also mentioned that his shell had 49 ribs, while the Lamarckian species had but 48. Such close differentiation does not hold in the family Cardiidae, where there is often a variation of 3-4 ribs. Reeve reported that there was a variation of from 40-52 in the rib count of *C. tenuicostatum* Lamarck. We suggest that the name *Fulvia tenuicostata* Lamarck be retained for this Australian species.

### ***Acanthocardia spinosa* Solander**

*Cardium spinosum* Solander 1786, Catalogue of the Portland Museum, p. 105, lot no. 2297 refers to Favanne, La Conchyliologie ou Histoire Naturelle des Coquilles de Mer, d'Eau Douce, Terrestres et Fossiles par M. Desallier d'Argenville, Troisième édition, par Mm. de Favanne de Montcervelle 1780, **1**, pl. 52, A2. (Mediterranean).

*Cardium erinacum* Lamarck 1819, Histoire Naturelle des Animaux sans Vertèbres, **6**, p. 8 (Mediterranean) refers to exactly the same plate and figure as that given by Solander.



The earlier name of Solander is valid for this Eastern Atlantic species of *Acanthocardia*.

### ***Cardium indicum* Lamarck**

*Cardium hians* Brocchi 1814, Conchiologia Fossile Subapennina, p. 508 (Middle Pliocene, Asti, Italy) *non Cardium hians* Spengler 1799.

*Cardium indicum* Lamarck 1819, Histoire Naturelles des Animaux sans Vertèbres, **6**, p. 4 (Indian Ocean).

*Cardium darwini* Mayer 1866, Journal de Conchyliologie, **14**, p. 69 (upper Tertiary of Algeria).

It is unfortunate that we must discard the well known name of *Cardium hians* Brocchi due to a prior use by Spengler. Lamarck described *Cardium indicum* as the "recent analogue" of Brocchi's *C. hians*, which had been described from fossil material. We consider the two to be synonymous thus enabling the use of Lamarck's name.

### ***Lophocardium cumingii* Broderip**

*Cardium cumingii* Broderip 1833, Proceedings of the Zoölogical Society, London, p. 82, 83; Reeve 1843, Conchologia Iconica, **2**, **Cardium**, pl. 12, fig. 59 (Gulf of Dulce, Costa Rica, Central America, in 12 fathoms).

*Protocardia (Lophocardium) cumingii* "Sowerby" Smith 1944, Panamic Marine Shells, Winter Park, Florida, p. 58 [*Protocardia comingi*, fig. 738 error in reference to figure].

The original and unique specimen of *Lophocardium cumingii* Broderip was collected by Hugh Cuming and is in the British Museum. Recently, through the courtesy of John Armstrong of the American Museum of Natural History, we have been privileged to study specimens of this shell dredged by the *Askoj* in 1941. They were taken at a depth of 17-21 fathoms in Ardita Bay, Colombia.

This is a very rare and beautiful shell, about 25-30 mm. in length, inflated and gaping. We can add little to the enthusiastic description of Broderip, who said, "This beautiful bivalve, rosy, transparent and exquisitely wrought, was found by Mr. Cuming whose name it bears." It is fragile and delicate, rose-pink and iridescent. There are many fine radiating ribs, approximately 200, crossed by faint, irregular lamellae which become slightly more developed and more widely spaced on the anterior slope. There is an unique vertical ridge, made of

periostracal material which is formed in elaborate loops and gives a crest-like appearance. This rib separates the posterior sculpture from that of the anterior slope of the shell. It is not made of shelly material as in the case of *Maetra alata* Spengler. Because of this vertical ridge, Fischer (1887, Manuel de Conchyliologie, p. 1038) allocated *C. cumingii* to a section which he named *Lophocardium* and placed in the subgenus *Papyridea* Swainson. Fischer's description is brief and he differentiates the shell section on only the basis of the "vertical ridge with a prominent wing-like" shape. There are species of the genus *Fulvia* that have looped periostracum; there is also a species of the genus *Microcardium* having a vertical ridge made up of periostracum and separating the posterior sculpture from that of the anterior slope. There is another, more significant basis for differentiation, however. This is the fact that *Lophocardium* has no anterior lateral teeth. The cardinal teeth are well developed, the posterior are long and narrow, but there is no trace of the anterior laterals. Because of this unusual hinge character and the differences in the sculpture already mentioned, *Lophocardium* should, we believe, take its place as a full genus.

There are two species of the genus *Lophocardium* which have been dredged in the same general locality, *L. cumingii* Broderip and *L. annettae* Dall. The latter was reported in 1889 (Nautilus **3**, p. 14; Report of the *Albatross* Mollusca, Proceedings of the United States National Museum, 1889, **12**, pp. 264-266, pl. 10, fig. 4) from the Coast of Lower California near Cerros Island, Mexico. *Lophocardium annettae* Dall is slightly higher, not so elongate posteriorly and is more inflated than *L. cumingii* Broderip. It is less fragile and less highly colored, having only a pinkish tinge. The outstanding difference, however, is the arrangement of the periostracum on the posterior slope, which is in a very definite pattern of from five to seven concentric ridges, running parallel to the growth lines.

# Occasional Papers On Mollusks

Published by

THE DEPARTMENT OF MOLLUSKS

Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

VOLUME 1

FEBRUARY 14, 1946

NUMBER 5

## Joseph Pitty Couthouy — A Bibliography and Catalogue of His Species

By RICHARD I. JOHNSON

During the year 1808, when the masts and spars of trim merchant vessels cast long shadows over the weatherbeaten wharves of Boston, there was born to Captain Couthouy, ship-master of that city, on the sixth of January, a son, Joseph Pitty. Young Couthouy was educated at the already venerable Boston Latin School. Quite naturally he chose a life at sea and when still a young man, succeeded to the command of a vessel. Married to Mary G. Wild of his native city on March 9, 1832, he left at the time of his death in 1864, three daughters, his only son having died some years before.

A bent for natural history led Couthouy at the age of twenty-eight to become a member of the Boston Society of Natural History, and his first paper was read before that society the following year. Like his contemporaries, J.W. Mighels and C.B. Adams, he turned to the investigation of fish entrails, especially those of the haddock, as a means of discovering new and rare shells. His efforts were varied and productive and some of his finds so rare that only in recent years have these species been rediscovered.

When the U. S. Exploring Expedition was organized in 1837, Couthouy applied in person to President Andrew Jackson for a position with the scientific staff. The President said he could not seriously entertain the application as the list of officers was already complete. To which the irrepressible young sailor replied, "Well, General, I'll be hanged if I don't go, if I have to

go before the mast." This pleased "Old Hickory," who told him, "Go back to Boston and I will see if anything can be done for you." There, a few days after his return, he received his commission as Conchologist of the Scientific Corps.<sup>1</sup>

The expedition left Norfolk, Virginia, August 18, 1838. During the course of the voyage Couthouy made many valuable drawings and notes on the mollusca, some of which are preserved in the report of the Expedition. When the expedition left Samoa, his health declined. Wilkes demanded that Couthouy turn over his notes and drawings to his commander, for Wilkes was preparing a narrative of the voyage. Couthouy, however, refused, claiming that his subsequent work would be crippled without them. Wilkes thereupon suspended him and ordered him home "for disobedience of orders."

Upon returning home Couthouy set about classifying those parts of the collections which had already been sent back to Washington; but unfortunately they had been turned over to the newly organized National Institution where a worthy curate, who knew nothing of natural science, was instructed to unpack them. Couthouy had numbered his notes and had placed correspondingly numbered tin tags in each of the jars of specimens preserved in alcohol. The reverend gentleman, upon receiving the material, noting that the tags were slightly discoloring the alcohol, carefully removed them and placed them in a bottle by themselves, failing to put any other means of identification in the jars. The result of this unfortunate error may well be imagined. Couthouy found that the shells to which his notes referred could not be sorted out and that some were even missing. Nevertheless, Couthouy struggled with the material until the return of the expedition, at which time a forty-four per cent decrease in the already low salaries of the naturalists was put into effect. This forced Couthouy to resign and his papers and collections were placed in the hands of Dr. A. A. Gould of Boston, who completed the report.

After quitting the expedition, Couthouy again set sail, this time as captain of a merchant vessel, visiting Europe, South America, and islands of the South Pacific. While in Spain, at the time of the Carlist Wars, he was several times under the

<sup>1</sup> Dall, W. H., 1888, Proc. Biol. Soc. Washington, 4, p. 109.



*Joseph P. Couthouy*

1808 - 1864

Plate 8. Copied from Dall 1888, p. 108

Photographed by F. P. Orchard

suspicion of government officials who could not believe he was a foreigner, as his Spanish was so pure and unaccented. He also spoke French, Portuguese and Italian with fluency, and even knew more than one of the unwritten languages of the South Seas. In 1854, Captain Couthouy commanded an expedition to the Bay of Cumaná where he spent three years in search of treasure which had been lost on the Spanish ship *San Pedro* nearly half a century before. On the return voyage, his ship was lost off Cape Cod and he and his crew were rescued only with great difficulty.

During the War between the States, he volunteered his services to the United States Navy and on August 26, 1861, was appointed acting volunteer lieutenant. A few days later, he was placed in command of the barque *King Fisher*. In December, he was transferred to the command of the *S. S. Columbia*, which was engaged in blockading the Confederacy. His vessel was wrecked in a storm at Masonboro Inlet, North Carolina, and he was sent as a prisoner of war to Salisbury, North Carolina. He remained here for three months before being exchanged. He next appears in charge of the monitor *Osage* of the Mississippi River Squadron, which was under the command of Admiral Porter. He was subsequently transferred to the *S. S. Chillicothe* of the same squadron and was ordered up the Red River. On the third of April, while off Grand Ecore, Louisiana, directing his vessel from the turret, a Confederate soldier shot him from ambush and he died on the following day.

Couthouy described as new one genus and thirty-eight species of recent mollusks, and one brachiopod. Of the thirty-eight mollusks, at least sixteen are now acknowledged to be synonyms. This resulted chiefly from the scarcity of European conchological works in this country at that time, a fact which accounts for many of the synonyms created by other early American naturalists as well. Couthouy's work is clear and his species are, in general, well defined. His papers are illustrated by carefully prepared engravings by Dr. A. A. Gould.

As previously mentioned, Couthouy did not publish the results of his observations with the United States Exploring Expedition. His manuscripts were turned over to Dr. A. A. Gould, who prepared the report. Dr. Gould attributed to Couthouy a number of the names which appear in his manuscript, how-

ever, according to the International Rules of Nomenclature, Gould, not Couthouy, receives the credit for naming these species. However, these names have been listed below without a reference to make the record as complete as possible, particularly as these names are occasionally referred to under the authorship of Couthouy. Much credit should be given to Couthouy for the many field notes that he had included with his material which Gould published in his report. All of these names appear in volume 12, Mollusks of the United States Exploring Expedition, 1852, and reference is given in this publication to these species that Gould had previously published in the Proceedings of the Boston Society of Natural History. These names also appeared in Gould's collation of his own descriptions in "Otia Conchologica," Boston, 1862.

Type specimens of most of Couthouy's species were deposited in the collection of the Boston Society of Natural History. Couthouy had a private collection, the location of which is unknown, if indeed it is still in existence. Other of his types were deposited in the collections of Drs. A. A. Gould and J. C. Jay and also in the cabinet of the New York Lyceum of Natural History. The Museum of Comparative Zoölogy is in possession of a few of his types as well as those originally contained in the Boston Society of Natural History.

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- 1838, same title: extracted from the Boston Journal of Natural History, **2**, No. 1, Feb. 1838, pp. 53-111; repaged 1-59, no change in plates.
- July 1838, same title: American Journal of Science and Arts O. S., **34**, pp. 216-219. (This article, which is really a review, contains all of the species described in the Boston Journal of Natural History, **2**, No. 1, Feb. 1838, pp. 53-111, but the descriptions have been reduced to mere skeletons and translated into Latin. The author's remarks and the plates have been omitted.)
- Feb. 1839, Monograph on the Family Osteodesmacea of Deshayes, with remarks on two species of Patelloidea, and descriptions of new species of Marine Shells, a species of Anculotus, and one of Eolis. Boston Journal of Natural History, **2**, No. 2, pp. 129-189, pl. 4-5.
- 1839, same title: extracted from the Boston Journal of Natural History, **2**, pp. 129-189, repaged 60-120, no change in plates.
- July 1839, American Journal Science and Arts, O. S., **36**, pp. 379-390. (In the "Miscellanies" Dr. A. A. Gould, recording secretary of the Boston Society of Natural History, has made a report on the papers and species described in the Boston Journal of Natural History, **2**, Feb. 1839, pp. 129-189.)

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*A List of Recent Mollusks described by J. P. Couthouy with their original references and type localities.*

- The initials BJNH refer to the Boston Journal of Natural History and MCZ to the Museum of Comparative Zoölogy.
- antarctica** 'Couthouy' Gould, **Siphonaria**
- antarcticus** 'Couthouy' Gould, **Sigaretus**
- asperimus** 'Couthouy' Gould, **Chiton**
- attenuatus** 'Couthouy' Gould, **Eolis**
- bicarinata**, **Pleurotoma**: 1838, BJNH, **2**, p. 104, pl. 1, fig. 11 (from maw of a haddock taken 3 miles east of Nahant, Mass.).
- bostoniensis**, **Eolis**: 1838, BJNH, **2**, p. 67, pl. 1, fig. 1 (tide water of Charles River, Mass.).
- brasiliense** 'Couthouy' Gould, **Osteodesma**
- buccinoides**, **Cancellaria**: 1838, BJNH, **2**, p. 105, pl. 3, fig. 3 (Massachusetts Bay). [Cotype MCZ 154829.]
- caelatum** 'Couthouy' Gould, **Cerithium**
- candida**, **Patella**: 1838, BJNH, **2**, p. 86, pl. 3, fig. 17 (from stomach of a cod taken off Barnstable, Mass.). [Cotype MCZ 154824.]



- castaneus** 'Couthouy' Gould, **Chiton**  
**cinereus**, **Turbo**: 1838, BJNH, **2**, p. 99, pl. 3, fig. 9 (from stomachs of fish taken off Lynn, Mass., and dead on Phillips Beach, Mass.). [Cotype MCZ 154828.]  
**Cochlodesma**: new genus, 1839, BJNH, **2**, p. 170. Genotype, *Anatina leana* Conrad.  
**conradi**, **Thracia**: 1839, BJNH, **2**, p. 153, pl. 4, fig. 2 (Chelsea Beach, Mass.). [Cotypes MCZ 147651.]  
**consolidata**, **Natica**: 1838, BJNH, **2**, p. 89, pl. 3, fig. 14 (from stomachs of fish taken near Nahant, and off Cohasset, Mass.). [Cotype MCZ 154831.]  
**costellatus**, **Trichotropis**: 1838, BJNH, **2**, p. 108, pl. 3, fig. 2 (from entrails of fish taken between Cape Ann and Cape Cod, Mass.). [Cotype MCZ 154827.]  
**cyanella** 'Couthouy' Gould, **Eolis**  
**cucullata** 'Couthouy' Gould, **Tritonia**  
**decussata**, **Pleurotoma**: 1839, BJNH, **2**, p. 183, pl. 4, fig. 8 (from haddock caught off Barnstable, Cape Cod in about 15 fathoms).  
**dentatus**, **Anculotus**: 1839, BJNH, **2**, p. 185, pl. 4, fig. 7 (rapids, about one mile above the little falls of the Potomac River, Virginia). [Cotypes MCZ 154626.]  
**diaphana** 'Couthouy' Gould, **Bulla**  
**diversa**, **Eolis**: 1839, BJNH, **2**, p. 187, pl. 4, fig. 14 [not figure 9]. (Chelsea Beach, Massachusetts Bay, among roots of *Laminaria saccharina*.)  
**eightsii** 'Couthouy' Jay, **Nucula**, 1839, Catalogue of the Shells Contained in the Collection of John C. Jay, Third Edition, New York, p. 113, pl. 1, fig. 12-13. (New South Shetland [South Shetland Islands, Antarctic Ocean] ). The description of this species was read by Couthouy before the Lyceum of Natural History, New York, but was never published. Credit, therefore, goes to Jay who first described and figured it.  
**emersonii**, **Chiton**: 1838, BJNH, **2**, p. 83, pl. 3, fig. 10 (from stomachs of cod taken off Cape Ann, Mass.). [Cotype MCZ 154836.]  
**erosa**, **Turritella**: 1838, BJNH, **2**, p. 103, pl. 3, fig. 1 (in maws of fish caught in Massachusetts Bay). [Cotypes MCZ 154832.]  
**exigua**, **Jaminea**: 1838, BJNH, **2**, p. 92, pl. 1, fig. 7 (near ferry landing at Chelsea, Mass.).  
**fulminatus**, **Chiton**: 1838, BJNH, **2**, p. 80, pl. 3, fig. 19 (from stomachs of fishes taken near Cohasset rocks and Cape Ann, Mass.). [Cotypes MCZ 154830.]  
**glabra**, **Oxinoe** (?): 1838, BJNH, **2**, p. 90, pl. 3, fig. 16 (from stomachs of fish caught off Barnstable, Mass.).  
**gouldii**, **Bulla**: 1839, BJNH, **2**, p. 181, pl. 4, fig. 6 (from stomachs of cod and haddock taken off Cohasset rocks in about 12 fathoms, and at eastern end of Nahant Beach, Mass.).  
**gymnota**, **Eolis**: 1838, BJNH, **2**, p. 69, pl. 1, fig. 3 (tide waters of Charles River, Mass.).  
**harpularius**, **Fusus**: 1838, BJNH, **2**, p. 106, pl. 1, fig. 10 (from cod taken off Phillips Point, Lynn, Mass.). [Cotypes MCZ 156334.]  
**hiemalis**, **Bulla**: 1839, BJNH, **2**, p. 180, pl. 4, fig. 5 (from codfish taken off Provincetown, Mass., in about 30 fathoms). [Cotype MCZ 156326.]  
**incarnatus**, **Turbo**: 1838, BJNH, **2**, p. 98, pl. 3, fig. 13 (from stomachs of fish taken between Marblehead and Nahant, alive on shore at Phillips Beach, Mass.). [Cotype MCZ 154835.]  
**indolens** 'Couthouy' Gould, **Peronia**  
**lacunculata** 'Couthouy' Gould **Bursatella**

- lateralis** 'Couthouy' Gould **Siphonaria**  
**lineolata**, **Bulla**: 1838, BJNH, **2**, pl. 3, fig. 15 [figure only]; *ibid.*, 1839, p. 179 (from stomach of a haddock taken in about 25 fathoms off Race Point, Cape Cod, Mass.). [Cotypes MCZ 156327].
- liratus** 'Couthouy' Gould, **Fusus**  
**luteola** 'Couthouy' Gould, **Doris**  
**lyrata** 'Couthouy' Gould, **Helix**  
**marginata** 'Couthouy' Gould, **Peronia**  
**megalocyathus** 'Couthouy' Gould, **Octopus**  
**myalis**, **Nucula**: 1838, BJNH, **2**, p. 62, pl. 3, fig. 7 (from stomachs of cod taken in Massachusetts Bay). [Cotype MCZ 154834.]  
**navicularis**, **Nucula**: 1839, BJNH, **2**, p. 178, pl. 4, fig. 4 (from stomach of cod caught off Plymouth, Mass.). [Cotype MCZ 154833.]  
**novangli**, **Scalaria**: 1838, BJNH, **2**, p. 96, pl. 3, fig. 5 (from stomach of cod taken off Cape Ann, Mass.).  
**obscurus**, **Turbo**: 1838, BJNH, **2**, p. 100, pl. 3, fig. 12 (from stomachs of fish taken between Marblehead and Nahant, Mass.). [Cotypes MCZ 154825.]  
**pleurotomarius**, **Fusus**: 1838, BJNH, **2**, p. 107, pl. 1, fig. 9 (from stomach of cod caught near Lynn, Mass.).  
**plumulata** 'Couthouy' Gould, **Doris**  
**praetenuis** 'Couthouy' Gould, **Sigaretus**  
**pubescens**, **Cardium**: 1838, **2**, p. 61, pl. 3, fig. 6 (near Egg Rock, off Lynn, Mass.).  
**punicus** 'Couthouy' Gould, **Chiton**  
**reynoldsii**, **Tritonia**: 1838, BJNH, **2**, p. 74, pl. 2, figs. 1, 2, 3, 4 (tide water of Charles River, Mass., at the Bathing House, Cragie's [Craigie's] Bridge).  
**rhododendron** 'Couthouy' Jay, **Conus**: 1839, catalogue of the Shells contained in the collection of John C. Jay. Third Edition, New York, p. 121, pl. 7, fig. 2-3 (Seas of Australasia) [see note under *eightsii*] [Cotypes MCZ 88299].  
**sagrinatus**, **Chiton**: 1838, BJNH, **2**, p. 82 [not figured] (from stomachs of fishes taken between Cohasset rocks and Cape Ann, Mass.).  
**salmonacea**, **Eolis**: 1838, BJNH, **2**, p. 68, pl. 1, fig. 2 (tide water of Charles River, Mass.).  
**saxatilis** 'Couthouy' Gould, **Helix**  
**septentrionalis**, **Terebratula**: 1838, BJNH, **2**, p. 65, pl. 3, fig. 18 (from stomach of a haddock taken off Nahant, Mass.). [Brachiopod.]  
**similis**, **Thracia**: 1839, BJNH, **2**, p. 150, pl. 4, fig. 2 (coast of Brazil not far from Rio de Janeiro).  
**sordida**, **Tellina**: 1838, BJNH, **2**, p. 59, pl. 3, fig. 11 (about 2 miles outside of Boston Lighthouse, Boston, Mass.).  
**storeria**, **Marginella**: 1837, BJNH, **1**, p. 440, pl. 9, figs. 1, 2 (southern coasts of the Gulf of Mexico). [Cotype MCZ 161232.]  
**striatulus**, **Pyramis**: 1838, BJNH, **2**, p. 101, pl. 1, fig. 6 (from the stomachs of fish taken off Cape Ann, Mass.). [Cotypes MCZ 125507.]  
**subulata**, **Scalaria**: 1838, BJNH, **2**, p. 93, pl. 3, fig. 4 (Massachusetts Bay, vicinity of Cape Ann).  
**sulculata** 'Couthouy' Gould, **Nucula**  
**tenuisulcata**, **Nucula**: 1838, BJNH, **2**, p. 64, pl. 3, fig. 8 (from stomachs of fish taken off Phillips Beach, Mass.). [Cotypes MCZ 152488.]  
**triticea**, **Bulla**, 1838, BJNH, **2**, p. 88, pl. 1, fig. 8 (Massachusetts Bay).  
**viridulus** 'Couthouy' Gould, **Chiton**

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Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

VOLUME 1

FEBRUARY 14, 1946

NUMBER 6

## The Egg and Breeding Habits of *Oncomelania quadrasi* Mlldff., the Schistosomiasis Snail of the Philippines<sup>1</sup>

By LIEUTENANT TUCKER ABBOTT H(S), USNR<sup>2</sup>

Since 1895 when *Oncomelania quadrasi* from the Philippines was first described by Moellendorff, the egg and egg-laying habits of this species have remained entirely unknown. The recent discovery of the egg on Leyte, P. I., has aided further studies in the natural history, control and taxonomic relationships of this snail. The four-month search was made difficult by the presence of other egg-laying mollusks and the then unknown fact that the egg is camouflaged by means of a jacket of sand.

The natural habitat of *Oncomelania quadrasi* Mlldff. is always limited to small, slowly-flowing, fresh-water creeks or boggy areas which are being constantly supplied with a fresh flow of water. The snail is amphibious, but never absent from shady and moist, if not actually flooded, creek beds. It is in these localities that the females find conditions suitable for laying eggs. Rotting, water-logged coconut husks, sticks, boards and dead leaves are the only surfaces on which eggs have been found.

Eggs are laid singly, and rarely have two been seen side by side. It is not known at what frequency or how many eggs are

<sup>1</sup> The opinions expressed in this article are those of the author and are not to be construed as official or reflecting the views of the Navy Department, or of the Naval Service at large.

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laid by one female. On a husk bearing 25 eggs it was noticed that 5 females were present. The greatest concentration of eggs observed was on a section of coconut husk four square inches where twelve eggs had been laid.

Adult males and females copulate most frequently during rainy spells, especially at night or when the sky is heavily overcast by clouds. The two sexes do not appear to attract each other from a distance, but once in contact, the female remains quiescent while the male slides over the back of her shell. The male plunges its large, extended penis or verge into the mantle cavity of the female in the region just behind the head. Copulating pairs have been seen to remain in this interlocked position for more than two hours. Mating of pairs under water has never been observed.

Soon after copulation, the female seeks a moist area on the surface of a coconut husk, usually within an inch of the water line and there deposits a single, clear, round egg about 0.7 mm. in diameter. Following this, comes a slow and careful process of patting down small grains of sand over the egg to form an agglutinated capsule or jacket. In most cases, the female utilizes its own soft fecal pellets which consist almost entirely of sand. During this process there is an abnormally large amount of mucus secreted, probably from the accessory gland, which aids in cementing the grains of sand into a firm jacket. The proboscis and foot of the female are used to knead and shape the capsule. Though expertly camouflaged to match nearby lumps of mud or sand, the tiny capsule, 1 to 1.5 mm. in diameter (Plate 9, figs. 1, 2), can be detected readily with the aid of a hand lens, because it has an artificial-looking, dome-like outline.

Usually the day following its deposit, the egg commences its first cleavage. Second cleavage occurs about four hours after the first. During the first week, the embryo, set off to one side in the clear, colorless egg mass, remains yellow in color and about 0.1 to 0.2 mm. in diameter. In late cleavage, development occurs only in the upper half of the embryo, while the lower half remains dormant. By the ninth day, the first part of the apex of the shell appears (fig. 3), followed on the eleventh by the appearance of the two black eyes and the thin, translucent operculum. The shell continues to increase in size

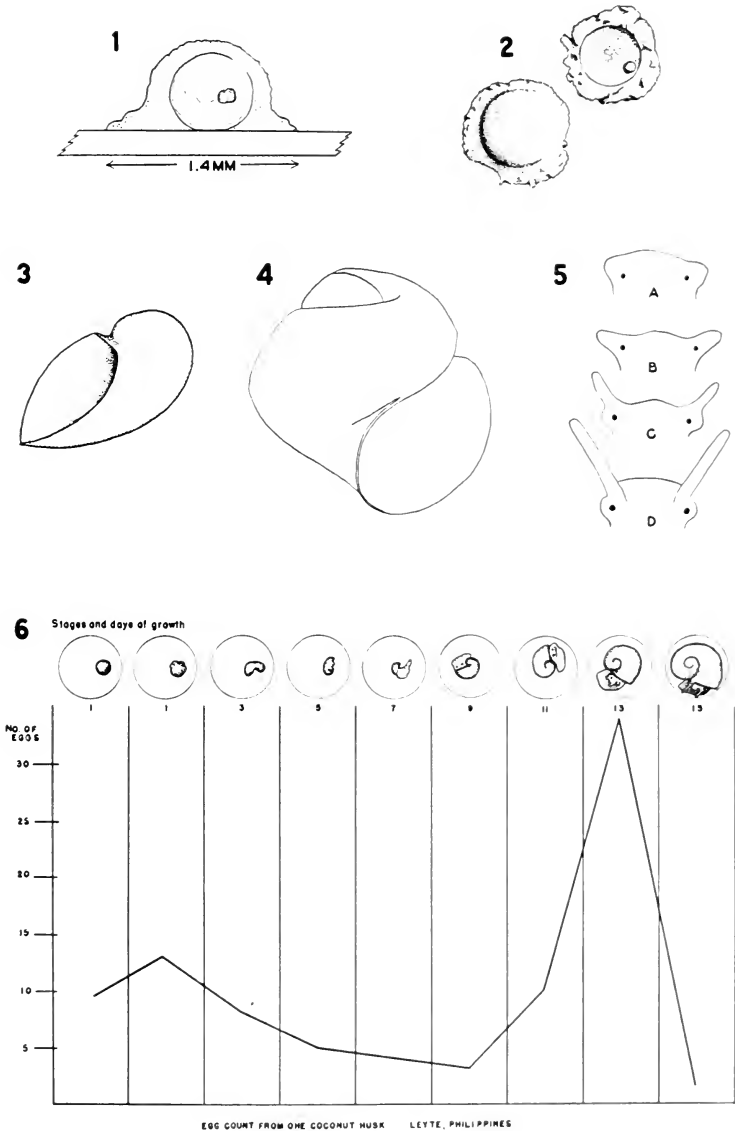


Plate 9. Fig. 1. A cross-section of egg in sand jacket. Fig. 2. Top and bottom view of jacket. Fig. 3. Nuclear shell whorl 8 days old (animal removed) x50. Fig. 4. Newly hatched shell (animal removed) x50. Fig. 5. Development of eyes and tentacles: A, 9 days; B, 11 days; C, 13 days; D, 15 days.

by the addition of whorls. When the embryonic snail is ready to hatch, on the fifteenth day, it has produced  $1\frac{1}{2}$  to  $1\frac{3}{4}$  whorls (fig. 4). The development of the snail is graphically represented in Plate 9, fig. 6.

During early and middle stages of development the embryo revolves slowly, end over end, in one direction, as is the case with most gastropod veligers. This action is not continuous, but more frequent in the final stages and is accomplished by the action of exceedingly minute cilia on the underside of the foot.

A few days before hatching, the embryonic snail is restless and often moves its head and foot in and out of the shell. The jaws and radula (ribbon of teeth within the proboscis) begin to function. The sand capsule is usually eaten away when the young is ready to emerge. Crawling and feeding begin at once after hatching, and within 12 hours after birth the young snail will have produced enough fecal material to equal its own bulk.

Motion and a yellowish color are characteristic of life throughout embryonic development. Dead embryos may be detected by the absence of motion and the presence of a milky-white color.

Several eggs *in situ* on pieces of coconut husk were dried in the laboratory at room temperature ( $84^{\circ}$  F.) to determine the effect of desiccation. All of the eggs were alive after a period of 12 hours. However, under the same conditions, 10 (83%) eggs were dead after 48 hours of drying. Desiccation for 12 hours under artificial light at a temperature of  $108^{\circ}$  F. killed 10 (100%) eggs. Direct sunlight would probably kill eggs in an even shorter time.

Figure 6 graphically represents the results of an inspection of a coconut husk taken from Gacao Creek, 1 mile southwest of Palo, Leyte. The husk was found in two inches of water hidden in the tall, shady grass of the creek bed. All egg capsules were removed, opened, and recorded according to the amount of embryological development. Of the 100 eggs removed, 14 were found to contain dead embryos. The graph shows two peaks, one occurring at an early cleavage stage, the other at a much later stage of development, two or three days from hatching. Four days previous to taking the husk from the creek, rains had fallen for 24 hours and the level of the

water in the creek had risen a foot. This would seem to indicate that soon after the occurrence of a heavy rain and rise in the level of water, females began to lay eggs more actively. The second peak represents a much earlier spurt of egg-laying, approximately 14 days previously. About 20 empty capsules with their tops punctured were found on the husk. In addition to this, it was noted that there was an increase in the number of newly hatched snails in the surrounding colony of snails. This phenomenon has been observed several times following a rise in the level of water in the creek and it is likely that the current of water aids in the release of young snails from the capsules. This may also account for the drop in the number of snails in the last stages of development (15 days) shown in the graph.

Egg counts on sticks, old boards and other coconut husks in the same creek showed similar peaks but not at the same stage of development. This is to be expected, since egg-laying is governed by the amount of water in the immediate area of the husk, and not directly by the rainfall. In Gacao Creek, the degree of moisture or amount of water varies a great deal even in spots less than twenty feet apart.

It is quite possible that fully developed embryos ready to hatch do not break out of their capsules until the arrival of favorable flood periods which occur two or three times a month during the summer. Measurements of snails of all ages in a colony show peaks in the size of individuals in the population and these peaks indicate that the times of hatching are unevenly spaced. Such peaks most likely represent previous rainy spells that aided hatching.

Seasonal increase in egg-laying on the island of Leyte is as yet undetermined, but it is likely that during late October, November and December, when there is an abundance of rain and overcast skies, there is an increase in mating and egg-laying.

This type of small, single, sand-jacketed egg is common to the members of the genus *Oncomelania*. The egg of *O. nosophora* Robson (syn.: *Katayama nosophora yoshidae* Bartsch, *K. lii* Bartsch, *K. fausti* Bartsch, *K. cantoni* Bartsch) was first discovered by S. Sugiura (1933) in Japan. Of them Sugiura says, "The eggs of this snail are usually laid singly and they are en-

tirely covered with a layer of mud particles, which is incidentally attached to the outer mucous shell-membranes, so that they look like small grains of mud or sand." His remarks and clear illustrations parallel our findings in *O. quadrasi* Mlldff. of the Philippines.

Fu-ching Li (1934) published a figure of what he then believed to be the eggs of the ribbed *Oncomelania hupensis* Gredler of China. Those were probably the eggs of some Planorbid snail, for the next year (Li, 1935) he corrected this error and described and figured eggs of *O. hupensis* which are identical to those of *O. quadrasi* and *O. nosophora*. Bartsch in 1936 overlooked this correction and published the incorrect drawings of *O. hupensis* eggs. Li's manuscript drawings of the eggs of *Katayama lii* Bartsch (= *O. nosophora*) included in the same paper (Bartsch, 1936) are the same as the eggs of the Japanese and Philippine species.

Under adverse or aquarium conditions *Oncomelania* will sometimes lay eggs without adding a sand jacket.

A study of the anatomy, shell characters, ecologic variations and radulae of living specimens of Chinese, Japanese and Philippine *Oncomelania* has led the author to the belief that the genera *Schistosomophora* Bartsch and *Katayama* Robson are synonymous with Gredler's genus, *Oncomelania*. All known species of *Oncomelania*, including *O. formosana* Pils. and Hirase, possess a characteristic yellow "eyebrow" or streak of yellow color granules embedded in the skin just above the eye. Nine months' search in the field in the Pacific and China has failed to bring to light any other freshwater snail with this character.



**New Localities For *Oncomelania quadrasi* Mlldff.**

During the author's four-month survey for snails in the Philippines, a number of new localities harboring *Oncomelania quadrasi* Mlldff. were discovered which seem worthy of recording at this time. In the following list of new Philippine localities, the percentage of snails infected with the cercariae of *Schistosoma japonicum* Katsurada followed by the number of snails examined are included in parentheses. In cases where no figures are given, the snails were not examined for cercariae.

## LEYTE ISLAND

1. San Isidro, 4 miles E.N.E. of Dagami, 2 miles north of the Binahaan River. June 17, 1945, (10%–10).
2. One mile west of Alangalang, near road. June 10, 1945.
3. Two miles north of Burauan, north side of road. July 4, 1945, (0%–300).
4. Northern and southern outskirts of Santa Fe. July 24, 1945.

## SAMAR ISLAND

5. Sitio Nadang, 2.1 miles N.E. of Oquendo on Route No. 1. July 16, 1945, (1%–363).
6. Western outskirts of Gandara. July 10, 1945.
7. A half mile north of San Miguel, 2 miles south of Gandara on Route No. 1. July 10, 1945.
8. East side of Cabulaloan Valley, 3 miles west of Bayog, Catubic River area. July 17, 1945.
9. Barrio of Malijao, 10 miles south of Catarman. July 19, 1945, (0%–187).
10. Sitio Daganas, 2 miles west of Catarman. July 18, 1945, (4%–134).

## MINDANAO ISLAND

11. Kilometer post No. 42, between Tubod and Alegria, Lake Mainit drainage. August 31, 1945.

12. One mile N.E. of Mainit, near road, Lake Mainit drainage. August 31, 1945.
13. Ditch running into Lake Lanao, 2 miles S.E. of Dansalan City. September 11, 1945.

Though the snail has not been found on any island of the Philippines other than the four previously known to harbor it (Leyte, Mindanao, Mindoro and Samar), the new localities recently discovered indicate that there may be a much more general distribution of this snail than was formerly supposed. Therefore, it is not unlikely that it will be found on other islands of the Philippines in future surveys.

It is important to note that although no human cases of schistosomiasis have been reported from Lake Lanao, Mindanao, the recent discovery of the intermediate snail host in this area serves as a warning of possible future outbreaks of the disease.

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rachidian tooth is large and the marginal tooth elongated.<sup>2</sup> Pelseneer<sup>3</sup> has called the marginal teeth in the *Toxoglossa* "lateral teeth," but we believe in error. When his treatise was written, the radula of *Drillia* was apparently unknown. The broad and flattened lateral teeth and the elongated marginal teeth would indicate that the marginal teeth remained after the loss of either or both lateral and rachidian teeth.

The large species of the Terebridae may very well be as poisonous as the large species of the Conidae, and extreme caution should be exercised in their collecting.

There is a very rich field for the investigator in the tropics. Embryological studies may easily prove the loss, in progression, of the radular teeth. Observations on the poison, its effect and its extent in the very many species that make up these three families is practically untouched as a problem.

Much additional data on the anatomy, especially on the teeth of many species is given by R. Bergh (1895, *Nova Acta der Ksl. Leop.-Carol. Deutschen Akademie der Naturforscher*, **65**, pp. 69-214, pl. 1-13).

A great deal of information is given by M. Phisalix (1922, *Animaux Venimeux et Venins*, Paris, **1**, pp. 470-573) on the poison glands of gastropods. An extensive bibliography is included.

The observation below was kindly supplied by my colleague, Richard W. Foster.

"A year and a half ago I was able to observe the phenomenon of poison ejaculation by one of the common Florida cones.

"Mr. and Mrs. L. A. Burry and I were on our way back to Garden Cove after a two hour collecting trip at Molasses Reef off Key Largo. Our collections for the afternoon were in a couple of shallow white enamel trays. The cones formed the greatest portion of the material. In fact, we had been fortunate in finding twenty specimens of *Conus regius* Gmelin and seventy-five of the smaller *C. citrinus* Gmelin.

"While watching the snails move about and crawl over each

<sup>2</sup> See J. Thiele, 1929, *Handbuch der Systematischen Weichtierkunde*, **1**, pp. 357-375.

<sup>3</sup> P. Pelseneer, 1906, *A Treatise on Zoology*, **5**, pp. 163-166.

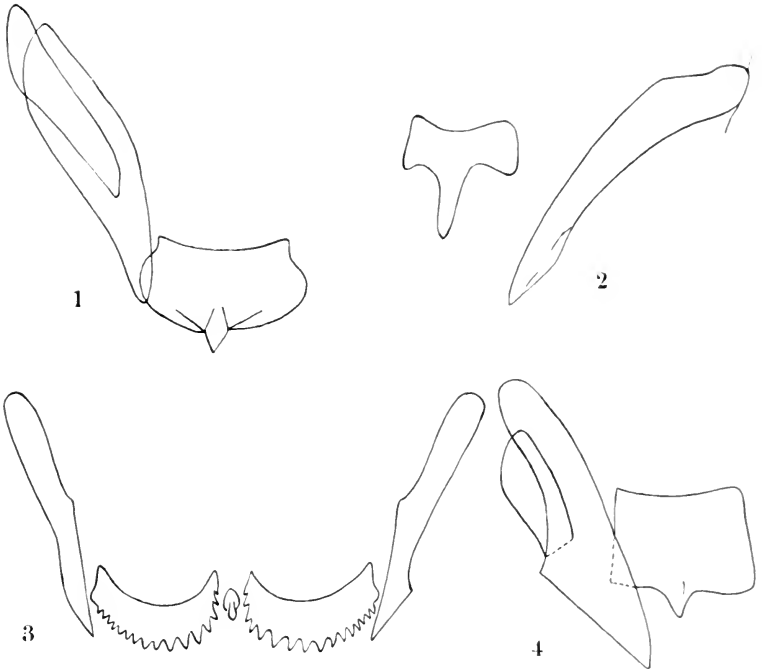


Plate 10. Radula: fig. 1. *Ptychosyrinx bisinuata* v. Martens. Fig. 2. *Pseudometatoma moesta* Carpenter. Fig. 3. *Drillia umbilicata* Gray. Fig. 4. *Leucosyrinx crispulata* v. Martens (modified, after Thiele).

other, we teased them with probes in hopes that they would be incited to strike—but to no avail. Suddenly we noticed the fleshy proboscis of a little *citrinus* extend forward and from it we could see the sharp brown needle of a radular tooth emerging. The proboscis was raised in the air and then jabbed forward and downward upon the shell of another *citrinus*. The milky white viscous fluid which spurted from the fang formed a little pool at least one quarter of an inch in diameter. This seemed like a considerable quantity of poison for a snail no more than an inch in length to produce. We wondered what would have happened had our specimen been a large *C. striatus* Linné.”

The report that follows is the same as originally published in The American Journal of Tropical Medicine. The bracketed numbers in the text, i.e., [p. 105], refer to the original pages in that journal. Bracketed numbers on the plates refer to the plate number in Occasional Papers On Mollusks.

### The Poison Cone Shell

By WILLIAM J. CLENCH AND YOSHIO KONDO

[p. 105] During the past one hundred years a few specific cases of death by the bite of a cone shell (*Conus*) have been published. The total list of known cases is not at all impressive and the danger from such a source may be very minor indeed, but it is present and constitutes a hazard that should not be overlooked by the shell collector in the tropics.

In these times when an increasing number of our armed forces are being sent to the tropics, a surprising amount of interest has developed in the collecting of shells in places where they are come upon more or less casually, as while swimming. This report is to focus attention on a potential hazard which might be encountered, especially in the South Seas, and to serve as a warning to those who would hardly expect a formidable danger in the form of a marine snail.

The number of unrecorded deaths from this cause may be fairly extensive as the original “bite” may not have been no-

ticed, particularly if the collector has suffered the usual cuts and scratches that one encounters while reef collecting, especially among live coral.

The primary function of the bite of the cone shell is to paralyze its prey before feeding upon the immobilized victim—a condition strikingly parallel to the use of the poison apparatus in the rattlesnake. A secondary function, though to a lesser degree than in the rattlesnake, is that of protection.

All cones, so far as our experience would show, are exceedingly sluggish and when taken from their environment remain almost completely inactive until they die. However, such cases of death that are recorded indicate that the fatal bite occurred during the collecting and shortly after the animal was taken from the water.

No specific case records are available other than from the Western Pacific, though the species responsible are widely distributed in the Indo-Pacific region. However, it would be wise to consider all cone shells as potentially dangerous. We have made radular slides of several species and all are equipped with a rather formidable biting apparatus, though none so far examined equals in size that of *striatus* figured in this report.

In March, 1941, during the senior author's visit to the Hawaiian Islands, Mr. Clifton Weaver of Honolulu collected a fine large specimen of *Conus striatus* off Rabbit Island, Oahu, in about three fathoms. The junior author dissected the specimen and made the drawings that accompany this paper.

The mechanism of the actual delivery of the poison is still difficult to under- [p. 106] stand. The poison is apparently not delivered directly by means of the poison gland through the individual teeth from their base, but possibly after the wound is made by the tooth and then into the wounded surface, or perhaps through the hollow tooth after it is ruptured from the lingual membrane. It would appear that after the tooth has penetrated the victim a slight retraction would open or rupture the lower barb (figs. 6 and 7) and thus open up the duct for the delivery of the poison. This may then open a channel through which the poison is subsequently ejected by pressure of the muscular proboscis, the entire process being very rapidly carried out.

The following are the several accounts that we have been

able to find regarding known cases of poisoning by various species of *Conus*. We have published these in full as the original records are widely scattered in the various reports and it would be impossible for most people to obtain them unless ready access could be had to large libraries.

Adams, A., 1848, [in] Narrative of the Voyage of the H.M.S. Samarang, 2, pp. 356-357.

"The animal of *Conus aulicus* has the proboscis beautifully varied with red and white, and there is a square and very minute operculum on the dorsal surface of the hinder part of the foot. Its bite produces a venomous wound, accompanied by acute pain, and making a small, deep, triangular mark, which is succeeded by a watery vesicle. At the little island of Meyo, one of the Moluccas, near Ternate, Sir Edward Belcher was bitten by one of these Cones, which suddenly exerted its proboscis as he took it out of the water with his hand, and he compares the sensation he experienced to that produced by the burning of phosphorus under the skin. The instrument which inflicted the wound, in this instance, I conceive must have been the tongue, which in these mollusks, is long, and armed with two ranges of sharp-pointed teeth."

Gray, J. E., 1853, On the Head of the Genus *Conus* Linn., Ann. Mag. Nat. Hist. (2) 12, p. 178.

"Its bite produces a venomous wound, accompanied by acute pain, and making a small deep triangular mark, which is succeeded by a watery vesicle. At the little island of Mayo, one of the Moluccas near Ternate, Sir Edward Belcher was bitten by one of the Cones, which suddenly exerted its proboscis as he took it out of the water with his hand, and he compared the pain he experienced to that produced by the burning of phosphorus under the skin. . . . The instrument which inflicted the wound in this instance was probably the tongue, which in these mollusks is long and armed with two ranges of sharp-pointed teeth. (Zool. Voy. Samarang) Mr. Edwards informs me that it adhered to the hand by its mouth like a leech, as described by Adanson."



MacGillivray, J., 1860, Zoological Notes from Aneiteum, New Hebrides, The Zoologist, **18**, pp. 7136-7138.

"On a Poisonous Property attributed to *Conus textile*.—On my first visit to Aneiteum I was told of a shell-fish which, on being incautiously handled, is said to eject a poison, causing, if it comes in contact with the hand, an immediate and peculiar sensation, then numbness of the hand and arm, followed by intense pain, usually severe illness, and not unfrequently death. The native name is Intrag, and the mollusk in question is the well-known *Conus textile*. Having frequently handled this shell-fish while collecting on coral reefs in the Pacific, Torres Strait, and the N.E. Coast of Australia, without having sustained any injury from it, I was naturally somewhat incredulous in the matter; yet as the general belief—which is never wholly destitute of foundation—was against me, I yielded to it so far [p. 107] as afterwards to handle with caution any live specimen I saw. I was told that the small Intrags and those of certain localities (one of which is near my present residence) are reputed more dangerous than others. The Intrag is not usually considered dangerous unless the animal be touched, which of course no one here will do, except unwittingly, but some of the natives say that it can 'blow' the poisonous influence upon the hand of an intruder from the distance of several inches.

"On June 9th of the present year, about 10 P.M. I had brought to me a young man, my neighbor Niuenham, who was said to have recently been poisoned by the Intrag, and appeared to suffer intense pain. From what I could learn it seems that he and a companion had been looking for shell-fish by moonlight about two hours previously. N. had picked up in the shallow water something he did not see distinctly. Immediately on touching it, and while his hand was in the water, he felt a sensation as if some very cold water had been "blown" on the palm of his right hand, and dropped the object, which he saw was an Intrag. Not long afterwards he went home, and soon began to complain of a numbness in the whole of his right arm and hand. This was immediately ascribed to his having touched the Intrag, and his companion went back to the spot for it, carefully picked it up, the shell with the animal retracted, and eventually it was given to me. A bandage was tied tightly

around the sufferer's arm at a little below the shoulder, and when I saw him the arm was cold and much swollen, and the pulse about 50, and very feeble. I administered an enormous dose of the solution of muriate of morphia, as he suffered excruciating pain. A medical man in New Zealand having suggested the experiment of burying the hand and arm affected in fresh earth, this was done, but the patient could not endure it long, for he literally writhed in agony while lying on his face on a mat, with his arm in the ground. Meanwhile a man experienced in such matters had been sent for. On arrival he prepared a knife of two strips of bamboo, and made two deep incisions in the upper part of the arm, one in front, another behind, below the ligature, which had been slackened. About half-a-pint of blood was obtained. Next morning at 8 A.M. I found that the morphia had produced sound sleep during the night, and that the bandage had been removed according to my suggestion. The right arm was swollen, and felt rather cold, but the pulsation was equally strong at each wrist, sixty-three beats to the minute. Means were taken to assist in restoring the natural temperature to the arm, and wine was ordered, to be discontinued on indications of reaction showing themselves. All pain, except from the incisions, had disappeared, and in the course of about a week the patient recovered his usual health. With regard to this case it is right to mention that although satisfied by the circumstantial evidence that contact with an *Intrag* had produced extraordinary effects, yet I could not separate them satisfactorily from those fairly attributable to the ligature. No pain was felt before the bandage was applied.

"A case which terminated fatally may now be mentioned. On the 28th of May, 1859, I went along with the Rev. J. Geddie to see a sick woman, who, fourteen days before, was believed to have been poisoned by her hands having accidentally come in contact with an *Intrag* while collecting shell-fish on the reef. The whole right hand and arm to within a few inches of the axilla were in a state of gangrene, with the bone exposed in several places. No haemorrhage, however, had taken place. I could see that numerous small but deep incisions had been made in the arm. There was not, I may mention, as with a light skinned person, the same facility for ascertaining the existence of a line of demarcation between the living and the dead por-

tions of the body. Apparently, there was sound material enough to render amputation at the shoulder-joint possible, but unfortunately, on the back of the shoulder, also on the sides of the chest, there were indications of incipient gangrene in the peeling off of the cuticle, and the formation of vesicles, rendering the operation unadvisable, because holding out no hope of saving life. In this case I learned that a tight bandage had been kept on for several days, probably of itself sufficient to induce mortification even in a healthy limb.

"These two cases are the only ones of which I can say anything from personal observation, and I shall make no further comment than merely to observe that as I cannot find any [p. 108] special apparatus in the animal of *Conus textile*, or see any anatomical difference between it and *C. arenatus* (which is known to be innocuous) after examining both, I feel great reluctance in subscribing even to the universal popular belief on this island of the power of the Intrag to cause injury to man in the manner ascribed to it. A jet from the siphon of the animal might partially account for the first sensation experienced. No puncture or abrasion of the cuticle is ever spoken of, but in some cases, I have been told, the skin has been discoloured,—the word used being "emilmat," which means either blue or green."

Bennett, George, 1860, *Gatherings of a Naturalist in Australasia*, London, footnote, p. 382.

"The common *Conus textilis* of Linnaeus is found at Aneiteum, and other islands of the New Hebrides group; the animal is poisonous. On biting its captor, it injects a poisonous and acrid fluid into the wound, occasioning the part to swell, and often endangering the life of the injured person."

Crosse, H. and E. Marie, 1874, *Jour. de Conchy.* 22, p. 353 (translated by Joseph Bequaert).

[Under *Conus tulipa*]

"According to Dr. Marie, the bite of the animal of *C. tulipa* is as venomous as that of *C. textile*. It is by error, however, that the bite has been blamed on the operculum; it is made by the armature of the tongue."

[Under *Conus textile* Linné]

"This species reaches in New Caledonia a very large size. The fact, mentioned before by several English naturalists, that the bite of *C. textile* is venomous was confirmed in New Caledonia. According to an eye-witness a native of Pouébo, after being bitten on the hand, suffered a considerable swelling of this hand and the corresponding arm with very sharp pain. The swelling persisted for some time. However, the mistake was made in that country of blaming the operculum of the *Conus* for what was caused by the teeth of the tongue."

Montrouzier, R. P., 1877, Jour. de Conchy. **25**, p. 99 (translated by Joseph Bequaert).

"We received from Father Montrouzier, our correspondent in Noumea, a communication which seems to confirm the truth of the venomous properties of the lingual teeth of species of *Conus*, as claimed by some naturalists. Father Montrouzier writes us that at Maré, one of the Loyalty Islands, *Conus marmoratus*, which is abundant there, cannot be handled carelessly without the risk of causing accidents through the bite of its tongue. In the New Hebrides accidents due to the bite of *C. textile* are said to be rather frequent."

Garrett, A., 1878, Annotated Catalogue of the Species of *Conus*, Collected in the South Sea Islands. Quarterly Jour. of Conchology, **1**, p. 365.

In this list of *Conus*, Garrett appends notes on the various species, mainly on their ecology. Under *Conus tulipa* Linn. he has the following note:

"Somewhat plentiful; under clumps of coral on reefs. When collecting at the Puamotus, I found three examples of this species, and held them in my hand while searching for other shells, when one suddenly threw out its long slender proboscis and punctured one of my fingers, causing sharp pain not unlike the sting of a wasp."

Cox, J. C., 1884, Poisonous Effects of the Bite Inflicted by *Conus geographicus*<sup>4</sup> Linn. Proc. Linnean Soc., New South Wales, **9**, pp. 944-946.

<sup>4</sup> *geographus* is the correct spelling.

The following letter was received by Dr. Cox from Mr. B. Hinde R. N. of H.M.S. *Diamond* and published in the above. We copy in full this letter as well as the appended note by Cox.

[p. 109]

"H.M.S. DIAMOND"

"At Sea, Lat. 10° 14' S.. Long. 155° 34' E.

"The following facts which I have learned partly by hearsay, and partly by personal observation, concerning the shell, known as *Conus geographus*, of Linnaeus, may be of interest.

"What first drew my observation to this curious power of *C. geographus* was, a native of Nodup, New Britain, an interpreter on board H.M.S. *Diamond*, seeing me with a specimen of *C. geographus* in my hand, remarked, 'suppose he bite he kill man.' Thinking this to be an exaggeration on the part of the native, but at the same time thinking that he must have some reason for saying so, I enquired of him more particularly as to how the shell would harm any one, as at the time I fancied that he meant if the edge of the shell cut a person by accident it would cause blood poisoning, however, he described how the fish would bite and that the bite was poisonous, and that it always killed people if they did not cut themselves to let the blood run, all round the place bitten, he also promised to procure me a live specimen and shew me how it bit.

"This promise he carried out as nearly as he could for he brought me the shell, but said when he went to take it up the animal had retired or rather, commenced to retire into its shell when he cut off the head, which he brought me separated from the shell. The shell he brought was about 5 inches in length.

"Some time afterwards being in conversation with a Mr. R. Parkinson, a New Britain Cotton Planter, I enquired if he knew any thing about this man's statement about this *Conus*. He told me that he believed it to be perfectly true, and that he had written about it to some one in Sydney.

"I should have taken no more notice of the statement but for the fact, that I saw myself, a native, on the Island of Matupi, Blanche Bay, New Britain, who had been bitten by one, and who had at once cut small incisions with a sharp stone all over his arm and shoulder from which the blood had flowed freely, and he explained to me that if he had not taken these

precautions that he would have died. He explained to me also the shell and how he had been bitten (there was a small mark about the size of a three-penny piece) between his finger and thumb, but upon close examination there were two small incisions in the centre but from which evidently no blood had come.

"I may mention that to stop the bleeding of the numerous cuts in his arm and shoulder, hot wood ashes had been put on them, and the arm seemed to be stiff and useless for the time. But whether this was the effect of the bite or the cure I really am unable to state.

"Many natives whom I questioned, (shewing them the shell at the same time) said that the bite was deadly.

"Hoping that these few observations may be of use either as information, or conformation to Conchologists generally.

"Benj. Hugh Hinde, R.N."

"Dr. Cox stated that an instance had been recorded by Mr. Arthur Adams of a poisoned wound produced by the bite of *Conus aulicus*, Linn. The Rev. W. Wyatt Gill had recorded the fatal effects of the bite of the *Conus textilis*, Linn., and Mr. Brazier had informed Dr. Cox that he had known severe effects caused by the bite of the *Conus tulipa*, Linn. This was the first instance Dr. Cox had heard of the poisonous effects of *Conus geographicus*."

Hedley C., 1892, [in] *British New Guinea*, by J. P. Thomson, London, appendix pp. 283-284.

"The natives are quite aware of the poisonous bite inflicted by several of the Cones. While collecting on a coral reef, I once rolled over a boulder and exposed to view a living *Conus textile*. Before I could pick it up, one of my coloured companions hastily snatched it away, and pointing to its "business-end," explained with vivid gesticulations its hurtful qualities. He would on no account allow me to handle the shell, but insisted on putting it himself into my bottle of spirits."

[p. 110] Coxen, Mrs. C. 1894, *Notes on Poisonous Cones*. Proc. Royal Soc. Queensland, **10**, pp. 38-39.

Mrs. Coxen quotes data from earlier reports which we have republished and adds the following note:

"This account is borne out by a specimen received from Tanna. My late husband sent £2 to a missionary at Tanna for shells. In one of those (a *Conus*) which he received from the missionary is a memorandum—written, I suppose, by the sender—stating that the animal sometimes bites its captor, and injects a fluid poison into the wound which causes death in a few hours through contraction of the throat."

Corney, R. G., 1902, *Nature* **65**, p. 198.

The account given below appears to be about the same person mentioned by Cleland, 1912.

"I notice that doubt is cast on the opinion held by some authorities that the bite of certain species of *Conus* is poisonous; and as a case has now occurred here in a European subject whose intelligence places her account of it beyond question, I think it may be useful to represent the corroborative evidence thus obtained.

"I should mention, first, that a shell exactly similar to the one in question was forwarded to the Australian Museum, Sydney, and that I am indebted to Mr. Etheridge, the curator, for information on the point and for the identification of the specimen as the shell of *Conus geographicus*.

"The patient, Mrs. B., was fishing from a boat after dark in the harbour of Levuka (Fiji), and one of the crew handed her a mollusc he had picked up in shallow water at low tide while getting bait—a *C. geographicus*. Mrs. B., being an old resident in the islands, proceeded to evulse the mollusc with her little finger, the boy having cracked the shell to facilitate this procedure. While doing so she received a puncture, and shortly afterwards felt her hand and fore-arm becoming numb. The effect quickly extended to the shoulder, and the patient had to return to the shore and be conveyed home. In an hour or so she was in great distress, speechless, and paralyzed in most of the voluntary muscles; a condition which later became intensified and alarming, although the cardiac and respiratory muscles showed no evidence of flagging. The medical man who attended Mrs. B. likened her condition to that which might be looked for after poisoning by curare.

"The puncture was so slight as to be scarcely discernible; after two days a steady but slow recovery took place, and a fatal termination was averted.

"During this time the patient did not lose consciousness; but there was for a while some confusion of ideas, and, chiefly, in consequence of the loss of power in the muscles concerned in articulation, she was unable to speak intelligibly, although she subsequently asserted that she knew quite well what was going on around her. She underwent an attack of conjunctivitis a few days later, which she connects with the occurrence; but it is doubtful whether she is right or not in so believing.

Medical Department, Fiji, September 30. 1901."

Cooke, A. H., 1905, Cambridge Natural History, **5**, Molluscs, pp. 65-66.

In this account Cooke states that "The poisonous nature of the bite of certain species of *Conus* is well authenticated," and quotes a few passages from Hinde, MacGillivray, Adams, and Hedley, which are quoted in full elsewhere in the present report.

Cleland, G. B., 1912, Injuries and Diseases of Man in Australia Attributable to Animals (Except Insects). The Australian Medical Gazette, **32**, pp. 269-274; 295-299.

In this report, Cleland has brought together most of the foregoing cases on mollusks (pp. 272-274) and adds considerable new data which we publish here. The report of Dr. Hallen was also republished in the Nautilus, **27**, pp. 117-120, 1914.

[p. 111]

"Phyllum Mollusca.

"Bites of Shellfish of the Genus *Conus*.—Through the kindness of Mr. Charles Hedley, F.L.S., of the Australian Museum, Sydney, who has kindly placed the following references to bites from shells of the genus *Conus* at my disposal, I am able to submit a number of valuable accounts of the severe effects produced in man by careless or inexperienced handling of these animals. Save that one of the implicated species is found along the Great Barrier Reef, the subject is hardly to be considered as strictly Australian, but, in view of the interest attached to the observations, it seemed well to take this opportunity of bringing the references together. I am also much in-



debted to the courtesy of Mr. R. Etheridge, Curator of the Australian Museum, for permission to use the very valuable information supplied by Dr. Corney, the original of which is filed amongst the Museum Records."

"The following report by Dr. A. Herbert Hallen was forwarded to the Australian Museum, Sydney, by Dr. B.G. Corney, from Fiji, 10th September 1901. Accompanying it was a shell, identified as *Conus geographus*, said to be similar to the one that inflicted the severe bite described. The following is the extract from the Government Medical Officer's Report, Levuka, for the month of June, 1901.

"I had under observation the case of a European lady here who was the subject of a severe form of poisoning by a shellfish of the species of which a shell is now sent for identification.

"The lady was fishing not far from the shore in the evening, with her family and native servant in the boat. The shellfish having been obtained, the boy cracked it to extract the meat, which was large in quantity for the size of the shell, and having cracked the shell, handed it to his mistress with the meat hanging from its internal attachment. To free the flesh she inserted her little finger towards the upper end, and, she declares, felt it shoot out a sharp-pointed thing which penetrated her finger and caused such a peculiar sensation that she at once called out that she was bitten and poisoned.

"The poisonous matter is said to be yellow pulpy matter at the thicker end of the shell; it might of course be merely reproductive or digestive tissue, or again there might well be a modification of some secretory gland to form a protective poison gland, and in the latter case, nature would surely provide along with poison, some mechanical means to promote injection into the enemy.

"The point of puncture in this case was minute and only to be seen with great care; indeed, that it was a puncture was much less readily seen than the local effect of the poison which caused a bluish discoloration of the surrounding tissues. It was situated at the point of the patient's little finger near the side of the nail. Through so small a puncture, and in so short a time as was allowed to its insertion (she did not unfortunately suck the wound), but a most minute quantity

of the poison could have entered the circulation, yet the effects were most grave. Locally a numbness was first experienced. This extended rapidly up the arm, which became paralysed and the paralysis spread thence rapidly throughout the body. It was peculiar that not only was general muscular control abolished, even so far that the head had to be supported over the trunk in order that unimpeded breathing might be allowed to continue; but there was a loss also in a lesser degree (as I think) of sensation, with numbness and "pins and needles" beginning in the arm and becoming generalised through the body, and to a more marked degree there was a disappearance of muscular sensation and a complete absence of knee jerks. The patient constantly asked where her limbs were. Utterance was thick and indistinct. The respiratory and cardiac muscular apparatus did not at any time participate to a dangerous degree in the paralysis. The stomach, however, may have been affected, for I could not induce vomiting. When at its worst, some three or four hours after the poisoning began, the condition distinctly affected the throat, and a good deal of distress was caused by the difficulty in removing accumulated fluid. The poison seemed to me to clearly belong to the class of which curare is the type. Of this I felt assured as soon as I had examined the patient and observed the freedom of the respiratory and circulatory centers from its actions compared with the absolute abrogation of voluntary muscular paralysis, so that, the patient weighing 16 odd stone, I felt a good deal of anxiety as to whether the arms would not dislocate at the shoulder when the body was lifted in the chair by the hands under the armpits; indeed it was exceedingly difficult to move the patient, all the parts being so abnormally yielding. The treatment I adopted was merely directed to the maintaining of life till the poison should have been destroyed. The heart and lungs were quite equal to their work if other circumstances could be kept favorable. This was done by placing the patient in a semi-recumbent position in a canvas chair, and by keeping the head in such a position that breathing and swallowing were facilitated. I should have liked to relieve the circulation by inducing vomiting, but failed to do so. Had I had strychnine with me, I should have injected it hypodermically, but I did not feel jus-

tified in leaving the patient to get it. The worst was past in about six hours. The wound was made about 9:30 p.m. Paralysis lasted on with steadily diminishing intensity till late next day, but the numbness lasted considerably longer in the injured finger, and for a month after the patient experienced a shock in the little finger on hard impaction—as in playing the piano. This was the last symptom to clear up, unless the sore eyes, which began and lasted later, are to be attributed to this poison as their cause. Though natives declare that recovery from fish poisoning is often complicated by sore eyes, yet I am not aware that the tradition would apply to this kind. I have heard since of other cases of this kind of fish poisoning, and among others of a Kadavu woman who died before she could be got from the shore.”

Sugitani, F., 1930, On the Poisoning by the Bite of *Conus geographus* Linne. *Venus*, **2**, pp. 151–152.

Written entirely in Japanese. A specific case is given, and then follows a review of this subject, mainly of the case herein given in detail (Cleland, 1912).

Iredale, Tom, 1935, *Nautilus*, **49**, p. 41.

“In June, 1935, a young man examining a cone, apparently *Conus textile*, at Hayman Island, Queensland, was bitten in the hand and died four and a half hours afterwards. This is the first fatal case in Australian history, though a few cases have been recorded from the islands to the north and east.”

Iredale, Tom, 1935, *Jour. of Conch.*, **20**, p. 166.

[Iredale republished his note which was first given in the *Nautilus* (above) about the same case and added the following, listing the various species of *Conus* so far known that have been responsible for such attacks.]

“Apparently he [Charles Garbutt] was handling it when ‘a spike’ came out and pierced his hand. He did not complain of pain until later, when he said his sight was failing and that he had a burning sensation round the mouth. He grew steadily worse and died while being taken to a hospital.

Allan, Joyce, 1935, Poisonous Shellfish. *The Medical Jour. of Australia*, **2**, pp. 554-555, 6 text figures.

"It is reported that a young man has died in Queensland from the effects of the bite or sting of a shellfish. While on a pleasure cruise through the Whitsunday Group of the Great Barrier Reef he was handling a prettily marked shell at Hayman Island<sup>5</sup> when the animal within it pierced his hand. Some time later serious symptoms developed, the patient was hurried to the mainland, by which time he was unconscious, and he died on the way to hospital.

"Though this is the first record in Australia of a death from a bite of a shellfish, or even of an attack of this kind, there are many instances recorded of similar happenings in the South Pacific islands. Scientists have known for many years of the dangerous qualities [p. 113] of certain shellfish and have therefore handled them carefully when removing them from the sea.

"The shellfish responsible for the attacks in the South Pacific have in each case been certain species of cone shells, a large family of brightly coloured shellfish living in warm waters, and particularly common in the South Pacific islands and along the Great Barrier Reef. These shellfish haunt holes and fissures of rock and the maze of coral reefs, where they lead a predatory life, boring into other shellfish and sucking the juices from their bodies. It is almost certain that the species responsible for the recent death in Queensland is one of the cone shellfish. No other types of shellfish have as yet been known to inflict poisonous wounds, though it is suspected that several may be capable of doing so should the occasion arise.

"In numerous scientific publications references have been made to the poisonous qualities of the cone shellfish, and instances quoted where people, mostly natives, have been bitten. These references were given in 1912 by Dr. J. Burton Cleland, at that time stationed at the Government Bureau of Microbiology, Sydney, in a paper published by him in the *Australasian Medical Gazette*, September 14 and September 21, 1912, on 'The Injuries and Diseases of Man in Australia Attributed to Animals.'

<sup>5</sup> This is, apparently, the same case reported by Iredale above.

"This very important paper records all the cases known of poisonous bites of shellfish, from the years 1850 to 1911, and, although at that time there was no record of such an accident having occurred in Australia, as the shellfish responsible were in all cases coned shellfish, and as the different species concerned are also found in Queensland waters, the author rightly considered it advisable to include them in his paper. The recent death has shown that such cases can occur in Australia.

"Shellfish Responsible for Poisoning.

"In all, five different species of cones were responsible for the bites recorded amongst inhabitants of the South Pacific islands. The scientific names of these are *Conus textile*, *Conus tulipa*, *Conus marmoreus*, *Conus geographus* and *Conus aulicus*, all easily recognized species, *Conus textile* and *Conus marmoreus* having the most outstanding colour patterning. If a cone shellfish was responsible for the death in Queensland, it was quite possibly *Conus textile*, because that species occurs so commonly on the Great Barrier Reef, particularly round the islands included in the Whitsunday Group."

"The poisonous bites from cone shellfish known to science occurred in New Guinea, New Hebrides, New Caledonia, Tonga, Samoa, Fiji, New Britain, the Carolines, and the Society, Sandwich and Loyalty Islands. In these places natives were generally the victims, and one is known to have died from the effects. The natives are well aware of the poisonous bites some of the cones can inflict, and have been observed in New Britain cutting small incisions round the place where they have been bitten. It is their belief that unless this is done and the blood is allowed to flow freely, the victim will die.

"In the case at Fiji the victim was a European woman, who was bitten while extracting the animal from a *Conus geographus*, and, although the paralysis which almost immediately resulted from this bite lasted only until the following day, it was quite a month before she felt completely recovered.

"Since this article was written the species responsible for the attack has been identified as *Conus geographus*. The actual specimen is now in the Queensland Museum.

### "The Manner of Attack.

"The manner in which a shellfish attacks its victim is rather extraordinary. It is stated earlier that cones are predatory animals which prey on other shellfish and suck juices from their shells. They are able to do this by means of a long, tubular, fleshy structure, known as a proboscis, which can be retracted at will, but when extended reaches beyond the anterior end of the shell. Opening into this tube is a radula-sac containing roughly two [p. 114] rows of numerous teeth and a bundle at the end. When grabbing its food, or when opposed by any outside agency, such as the hand of a human being, the cone immediately shoots out this proboscis and the object is pricked by the sharp points of the teeth, which are hollow and have a swelling at their bases. The poison reaches them from a special poison gland.

### "The Symptoms of Poisoning.

"The symptoms experienced by a person suffering from this shellfish poisoning are, after the first pain of the prick from the sharp pointed teeth, acute pain and considerable swelling, with local numbness which leads to paralysis extending in severe cases throughout the body. The tissue surrounding the minute points of puncture has a bruised appearance, and one or more tiny punctures may be seen. Muscular control goes, and even the head has to be supported in such a way to allow breathing to continue. Speech becomes thick and indistinct, the throat is considerably affected, the eyesight is dim, and a feeling of 'pins and needles' extends throughout the body. Sore eyes appear to be one of the serious symptoms of the poisoning, and in the case of the European woman who was bitten at Fiji, this was the last to disappear. Dr. A. H. Hallen, who described her case in the Government Medical Officer's Report, Levuka, June, 1901, states that natives declare that recovery from shellfish poisoning is often complicated by sore eyes. Possibly the state of health of the victim at the time of an attack would either help or hinder his recovery. The Queensland victim complained of failing eyesight an hour or so after he was bitten. He became drowsy, as in snake-bite

poisoning, and later fell into a coma, from which he did not recover.

"There has, to my knowledge, been no literature published on the proper treatment for this poison. As a case, with unfortunately fatal results, is reported to have occurred in Australia, there is ample opportunity for a medical man, interested in this branch of his science, to investigate the poison of cone shellfish and its treatment."

Flecker, H., 1936, Cone Shell Mollusc Poisoning, with Report of a Fatal Case. The Medical Jour. of Australia, **1**, pp. 464-466, 2 text figures.

In the above citation, Flecker has reviewed most of the cases that we have published in detail. We add only the new information. The case of "C. H. G." refers again to the paper by Iredale (herein quoted) but it gives much additional information of interest to the medical student. We have not seen the report by Cleland in the 6th Report of the Microbiological Laboratory of New South Wales, so we quote this from Flecker's report.

"Professor Cleland quotes the following extract from 'Life in the Southern Isles,' by the Reverend W. Wyatt Gill. On the island of Mare (southernmost of the Loyalty Group, immediately to the east of New Caledonia), in the doubtful light, a native 'unhappily took a good-sized shellfish (*Conus textile*) and put it in his basket. He immediately felt a painful sensation running up his right arm to the shoulder. He went home. The pain increased until he writhed in agony. The body swelled to an enormous size, and by daylight he was a corpse.'

"Of the above cases there were two caused by *Conus aulicus* and *Conus tulipa* respectively, and these appear to be relatively mild; two instances of poisoning by *Conus textile*, one mild and the other fatal; and two of *Conus geographus*, one perhaps mitigated by treatment by incision and the other severe.

"Early this year it was decided, at a conference held at Cairns, to form a Registry of Injuries Caused by Plants and Animals in Tropical Queensland, and accordingly questionnaires were forwarded to all the medical practitioners practising in North Queensland. The first case reported was by Dr.

T. B. Clouston, then at Proserpine, to whom I am indebted for details of the fatal case here recorded.

"C. H. G., a male, aged twenty-seven years, whilst on a pleasure cruise landed at Haymen Island on June 27, 1935, and picked up a live cone shell (since identified by Mr. H. A. Longman, of the Queensland Museum, as *Conus geographus*). According to an eye-witness, it was gripped in the palm of one hand, with the open side downwards in contact with the skin, whilst with the other he proceeded to scrape with a knife, the epidermis, that is, a [p. 115] thin cuticle covering the hard part of the shell. It was during this operation that he was stung in the palm of the hand. 'Just a small puncture mark' was visible. Dr. Clouston did not see the patient until just before death, but the following details were obtained by him from the patient's mother, who was present with him. Local symptoms of slight numbness started almost at once. There was no pain at any time. Ten minutes afterwards there was a feeling of stiffness about the lips. At twenty minutes the sight became blurred, with diplopia; at thirty minutes the legs were paralysed; and at sixty minutes unconsciousness appeared and deepened into coma.

"No effect was noted upon the skin, lymphatic, alimentary or genito-urinary systems. Just before death, the pulse became weak and rapid, with slow, shallow respirations. Death took place five hours after the patient was stung.

"A post mortem examination showed that all the organs, heart, lungs, et cetera, were quite healthy. Mr. J. B. Henderson, Government Analyst, reports that no poison was found in the stomach contents. The victim was prior to the injury in perfect physical condition and in training for football.'

"The symptoms resemble much those of curare poisoning as described in earlier reports. As usual, the puncture was in the hand and insignificant in size. The most striking difference was the entire absence of pain, although there was a feeling of stiffness. This is in contrast to Case I [A. Adams], in which the pain (*Conus aulicus*) was compared with the burning of phosphorus beneath the skin; Case II [Crosse and Marie] (*Conus textile*), in which severe pain persisted for some time; Case III [A. Garrett] (*Conus tulipa*), in which there was sharp pain, not unlike the sting of a wasp; and Case V [G. B. Cleland]



(also *Conus geographicus*), in which the patient felt a sharp-pointed thing, which made her call out at once that she was bitten and poisoned. The victim of the fatal stinging by *Conus textile* immediately felt a painful sensation running up to the shoulder, which increased until he writhed in agony."

Yasiro, H., 1939, Fatal Bite of *Conus geographicus*, *Venus*, **9**, p. 165-166. [The Translation (below) of this paper appears anonymously in the *Proc. Mal. Soc. London*, 1940, **24**, p. 32].

"On 29 June 1935 a man 32 years old left home about 10 a.m. for bathing and shell-collecting. Soon after he was infected by the bite of a *Conus geographicus*. He immediately felt great pain and scarcely managed to walk home. A doctor attended promptly; the patient's temperature arose to about 36°C. (= 113°F), breathing became difficult and his fingertips went purple. He was soon unconscious and died about three to four hours after infection. The shell is stated to be about 13.5 mm. long; perhaps this is a misprint for 13.5 cm."

The following citation is added as such published observations are exceedingly rare. It indicates the protection the bite affords against an enemy that is quite numerous in ecological areas where members of *Conus* are also present.

Cummings, Bruce, 1936, *North Queensland Naturalist*, **4**, Cairns, p. 42: Encounter Between Cone Shell and Octopus.

"In the course of seeking material for cinematographic study, a small party set out on the exposed reef at Green Island and came across a small octopus whose tentacles extended some eight or nine inches from its body. Placing this in an enamel pail of sea water, a further search resulted in the discovery of a live cone shell, *Conus textile*, which was likewise deposited in the same receptacle, where the cephalopod was swimming about freely.

"It was not long, however, before the latter was aware of the presence of the cone, and some twenty minutes or so later, as is usually the case in attacking gastropods, placed one of its tentacles across the entire length of the narrow opening of the shell, the tip of the tentacle entering further than the remainder. (The mouth of the shell measures two and a quarter inches

long by about five-sixteenths of an inch wide.) About twenty seconds later the octopus quickly withdrew its hold waving its tentacles about with a writhing motion as though violently agitated.

[p. 116] "Inspection of the shell immediately after the withdrawal of the tentacles revealed a thin round spike-like object, evidently the radula being withdrawn. This spike-like radula was about an inch in length tapering from its proximal extremity to a point distally, and was bright red in color. A few minutes later it was noted that the octopus had shed one of its tentacles, it being detached close to its body.

"The octopus was transferred to a glass tank and although well supplied with abundant fresh sea water it was found dead on the following morning. On the other hand the cone shell did not suffer any apparent injury and is still alive and in excellent condition ten days later.

"When the radula is protruded, it is seen directly beneath the syphon, the latter having a red band at its free extremity, a white ring around its centre and a black band proximally. The cone itself measures two and a half inches in length and an inch and three-sixteenths in diameter.

"In view of the reported case of a fatal issue following the bite of a native of New Caledonia in 1847 from this shell as well as of similar fatalities from other species of *Conus*, this encounter between the two molluscs is interesting. No doubt, such are of frequent occurrence although rarely observed."

#### ANATOMY OF CONUS STRIATUS LINNÉ

The alimentary canal anterior to the mantle consists of the oral aperture, vestibule, buccal canal, pharynx, radula sheath, salivary gland, poison gland, and the oesophagus (crop).

Figure 1 shows the gross external anatomy of the *Conus*, the softer parts having broken off during extraction. Figure 2 shows the same with the vestibule and external covering laid back to reveal the organs *in situ*. The proboscis, figure 3, consists of a thick, wrinkled outer covering underlaid by a layer of longitudinal muscles. Below this layer are numerous retractor muscles. The buccal canal lies therein and consists of a tough conical anterior portion and a thin but large posterior part separated by a circular muscle bundle. The conical

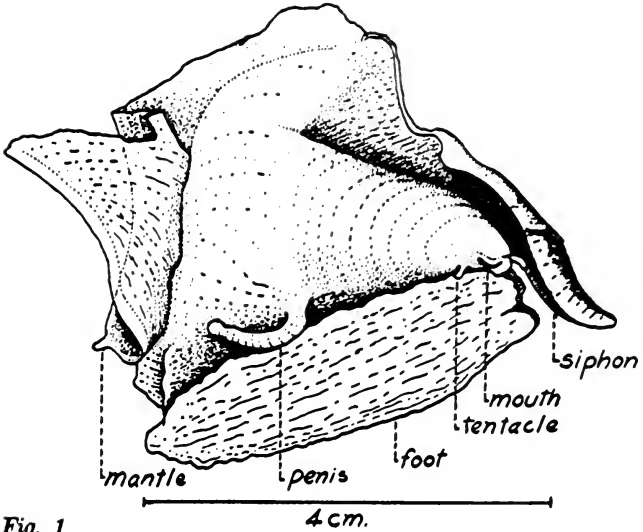


Fig. 1

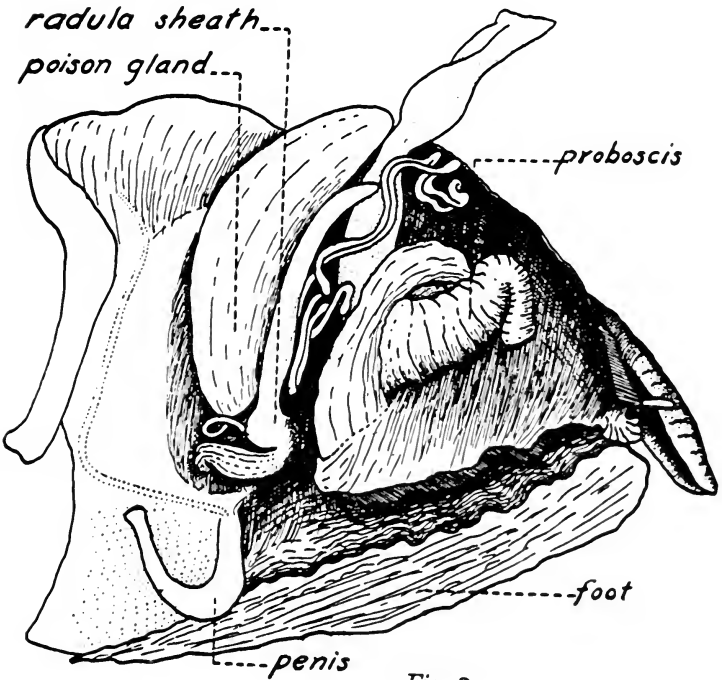


Fig. 2

[Plate 11]

Fig. 1. Anatomy of *Conus striatus* Linné

Fig. 2. Fore digestive part in position of *Conus striatus*

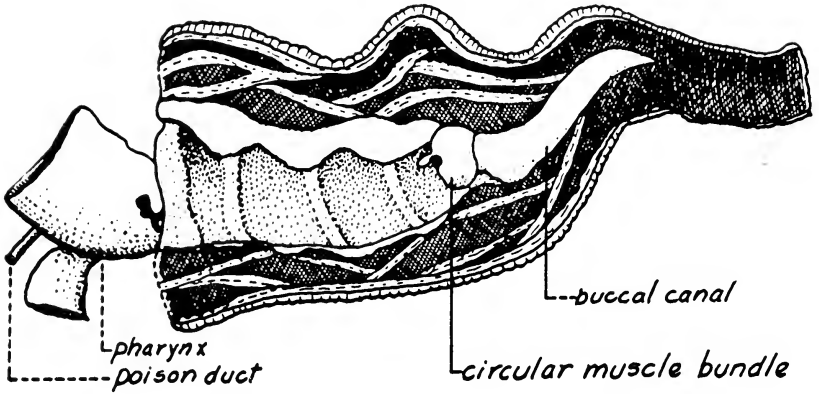


Fig. 3

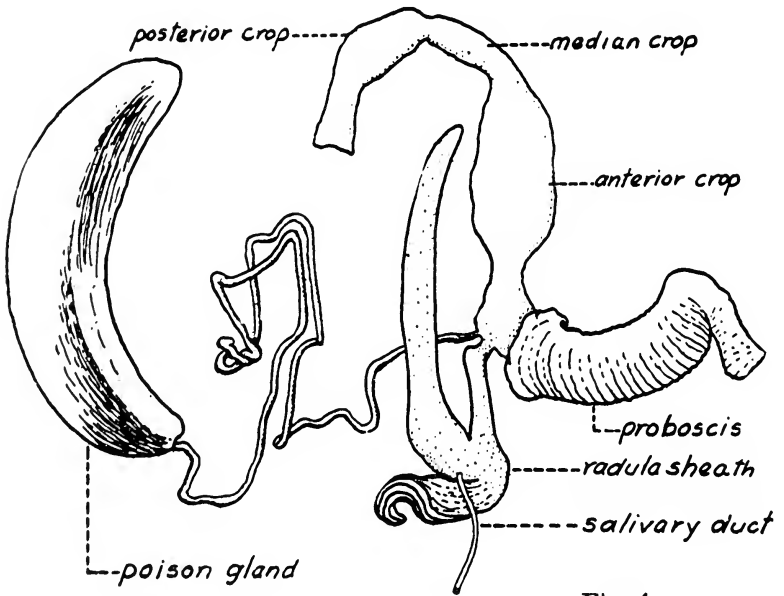


Fig. 4

[Plate 12]

Fig. 3. Internal anatomy of proboscis of *Conus striatus*

Fig. 4. Fore digestive system of *Conus striatus*

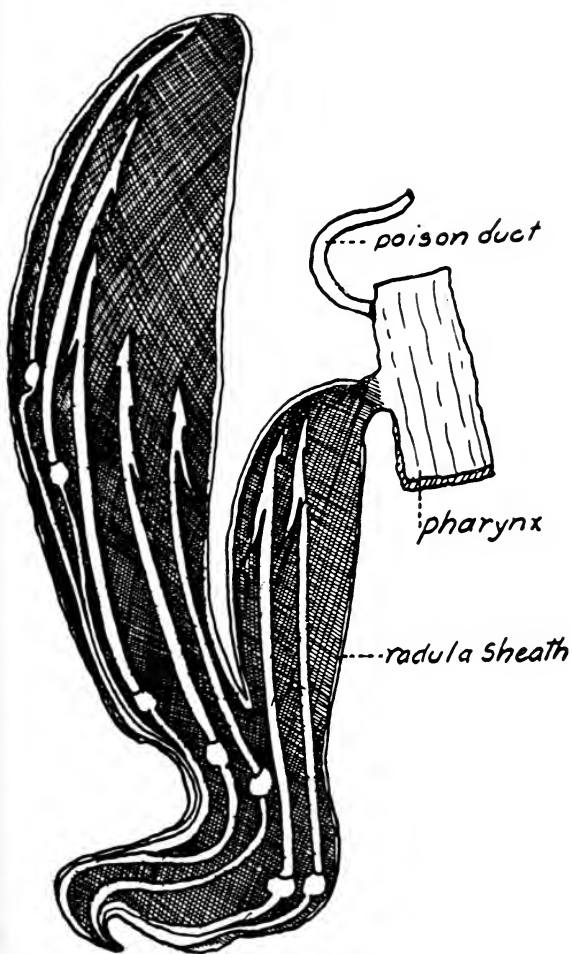


Fig. 5

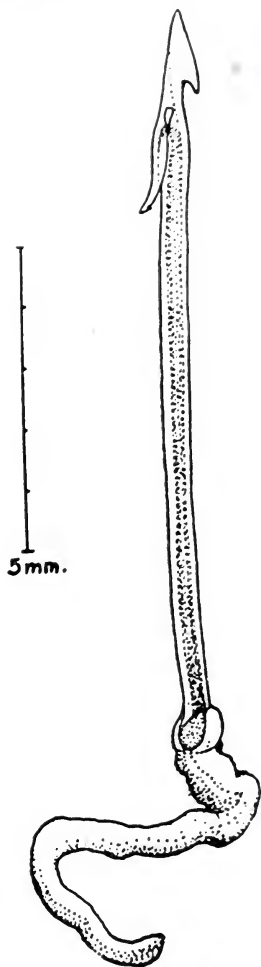


Fig. 6

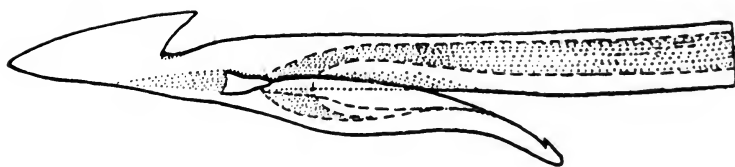


Fig. 7

[Plate 13]

Fig. 5. Radular sheath opened of *Conus striatus* (free hand). Fig. 6. Greatly enlarged radular tooth of *Conus striatus*. Fig. 7. Greatly enlarged tooth of *Conus striatus* showing barb.

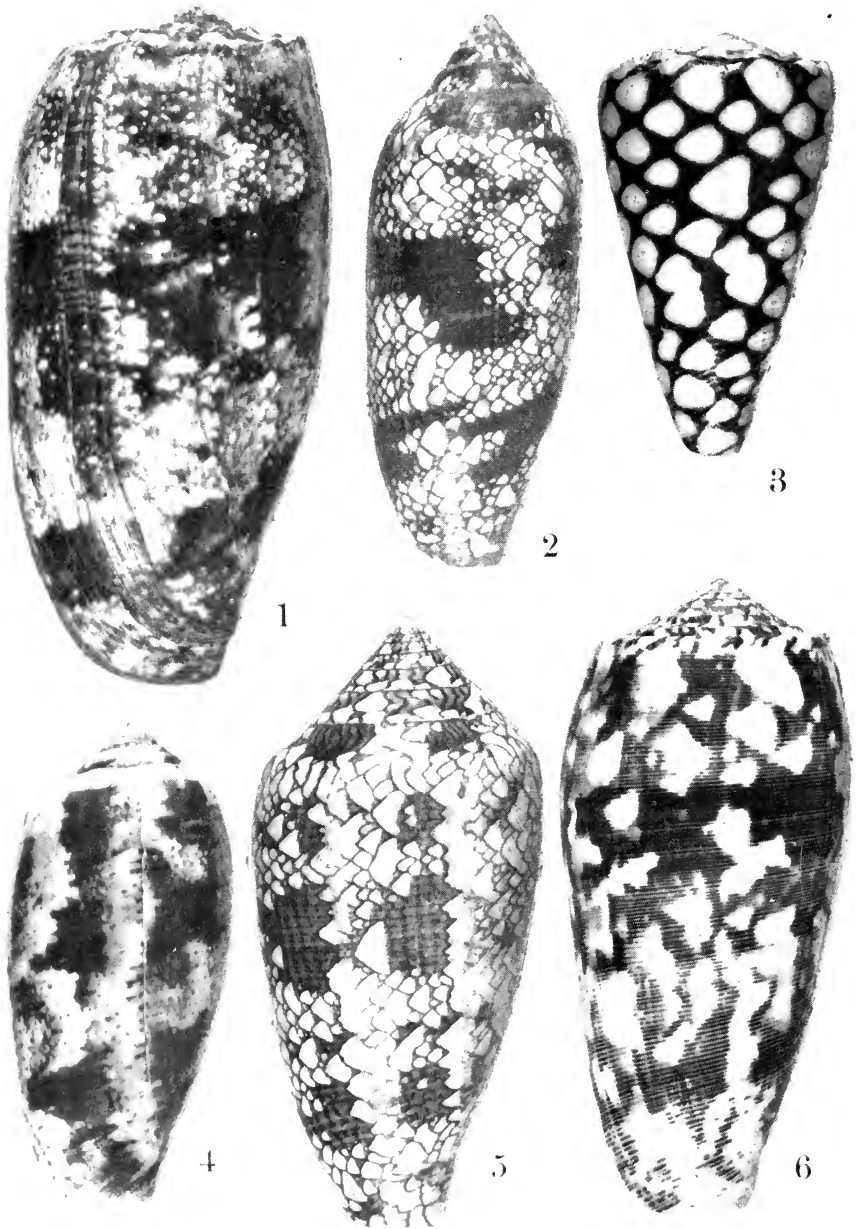


Plate 1 [Plate 14]

Fig. 1. *Conus geographus* Linné. Fig. 2. *Conus aulicus* Linné. Fig. 3. *Conus marmoratus* Linné. Fig. 4. *Conus tulipa* Linné. Fig. 5. *Conus textilis* Linné. Fig. 6. *Conus striatus* Linné.

portion engaged the sharp spear-like tooth and probably is also a thrusting organ as it is quite tough and filled with numerous bundles of longitudinal muscles. In the crop of our specimen there was found the remains of a fish together with a radula tooth.

Figure 4 shows the relationship between the alimentary organs of our specimen. Simroth's *Giftdrüse*, or poison gland, is quite large. Its vessel, which is 13 cm. long, opens into the pharynx 2 mm. posterior to the opening of the radular sheath. It is not certain how the poison is syringed into the hollow teeth.

Figure 5 is a sketch of the opened radular sheath showing the arrangement of the teeth. The actual number dissected out was about 40.

Figures 6 and 7 which are greatly enlarged, exhibit two drawings of the tooth of *C. striatus*. The crystalline portion is 12-13 mm. long, sharply pointed at the apex and bulbous at its base. To the base is attached a transparent cartilaginous appendage. The apex of the tooth is armed with three barbs; the apical, the single small median and the curved posterior.

The pharynx opens anteriorly into the buccal canal by a narrow aperture, figure 3. Posteriorly it soon bulges out into two crops which for this paper may be called the anterior and posterior crops. A short narrow tube connects the two. In the anterior crop were found the skeletal remains of some small fish. [p. 120] They appear to be portions of the skull, fin, and a segment of the vertebra. There were also bundles of crystalline spicules which could not be identified. In the median crop or the narrow connecting tube was a well preserved tooth of the *Conus* itself, which is without doubt the one used to kill the now partially-digested prey. In the posterior crop were found two valve-like objects, perhaps made of horny material, which may either be a bivalve eaten prior to the fish, or a grinding mechanism. What leads us to suspect the object to be a pulverizing mechanism is that it was deeply embedded in the wall of the crop (though not attached by muscles) and that between the valves was a bundle of crystalline spicules similar to the kind found in the anterior crop.

[end of reprinted paper]

## DESCRIPTIONS

We add the following brief descriptions of the five species of *Conus* whose bite is known to be serious. *C. striatus* Linné has not been recorded injurious to man.

All of these shells possess a thin brownish periostracum when collected alive, though upon drying, this usually scales off. Our plate is based upon shells without the periostracum.

These species of *Conus* are wide ranging in the Indo-Pacific region. They are all tropical and do not extend into the temperate portions of this area. They probably occur wherever coral is to be found. All frequent coral reefs, generally behind the reefs and under slabs or blocks of dead coral. They are nocturnal in habit and, with the aid of a flash light, can be found crawling around in exposed places.

***Conus geographus* Linné**

Plate 14, fig. 1

Shell 3 to 5 inches in length, rather wide, fairly thin in structure. Color consisting of irregular patches of mahogany brown with two more or less distinct spiral bands of the same color over a cream or bluish white ground. Spire depressed and with a series of small knobs on the shoulder of the whorl. Sculpture consisting of fine growth lines.

***Conus aulicus* Linné**

Plate 14, fig. 2

Shell 3 to 5 inches in length, slender, rather thin in structure. Color consisting of numerous white tent-shaped figures on a dark mahogany background. Spire extended terminating in an acute apex. Sculpture consisting of fine growth lines and very fine spiral threads.



**Conus marmoreus** *Linné*

Plate 14, fig. 3

Shell 2 to  $4\frac{1}{2}$  inches in length, cone shaped, rather heavy in structure. Color consisting of white and irregular tent-shaped figures on a chocolate background. Spire depressed and generally with a series of small knobs on the shoulder of the whorl. Sculpture consisting of fine growth lines and very fine spiral threads, somewhat stronger on the lower third of the shell.

**Conus tulipa** *Linné*

Plate 14, fig. 4

Shell 2 to 3 inches in length, fairly wide, rather thin in structure. Consisting of irregular patches of mahogany brown with two bands of the same color over a bluish white ground. In addition there are numerous and fine lengthened dots arranged in rather close-set spiral lines. Spire depressed, generally smooth over the whorl shoulder. Sculpture consisting of very fine growth lines.

**Conus textilis** *Linné*

Plate 14, fig. 5

Shell 2 to 4 inches in length, somewhat slender, rather heavy in structure. Color consisting of numerous small, white, tent-like figures over a yellowish brown ground color. Spire extended, terminating in an acute apex. Sculpture consisting of very fine growth lines.

**Conus striatus** *Linné*

Plate 14, fig. 6

Shell 3 to  $4\frac{3}{4}$  inches in length, rather slender and heavy in structure. Color consisting of irregular patches of dark chocolate brown, more regular in the center and at the base to form two rather indistinct bands. This color is on a ground of a pale brownish cream. Spire depressed and having a rather sharp ridge at the whorl shoulder. This feature produces a groove between each of two whorls on the spire. Sculpture consisting of fine growth lines and, in addition, very numerous and fine spiral threads more or less evenly disposed over the entire surface of the shell.

\* \* \* \*

J. R. le B. Tomlin has published the following catalogue in which he gives references to all species in this genus, both recent and fossil, that have been described as late as 1936.

Catalogue of Recent and Fossil Cones. 1937, Proceedings of the Malacological Society of London, **22**, pp. 205-330; *ibid.* p. 333.



# Occasional Papers On Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

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VOLUME 1

JULY 20, 1946

NUMBER 8

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## **John Gould Anthony** **With a Bibliography and Catalogue of His Species**

*By* RUTH D. TURNER

John Gould Anthony, son of Joseph and Mary Gould Anthony and first assistant in charge of mollusks at the Museum of Comparative Zoölogy at Harvard College, was born in Providence, Rhode Island, May 17, 1804. Regarding Anthony's childhood we know very little except that at an early age he developed an interest in natural history and, while living in Providence, was mainly interested in marine shells. Although at the age of twelve he was forced to leave school and earn his own living, he continued his interest in natural history and educated himself in the field of mollusks. In 1832 Anthony married Ann Whiting Rhodes of Providence and two years later, with other members of the Rhodes family, moved to Cincinnati, Ohio. The records show that Anthony held several positions while in Ohio, the first with Allen, Rhodes & Company, Silver Plate Manufacturers. In 1840 he was listed as an independent accountant. Four years later he was working with Derby Bradley & Company into which firm he was later taken as a partner; by 1849 the company was known as Bradley and Anthony, Booksellers and Publishers. There are several published notes to the effect that Anthony worked in a bank but no definite record of this can be found.

Shortly after Anthony's arrival in Cincinnati he was elected to membership in the Western Academy of Natural Sciences, and, throughout his stay in Ohio, he was an ardent supporter of the struggling young Academy. He held the offices of sec-

retary, librarian, and curator on various occasions and the meetings were often held at his home.

He soon became the local authority on the fossils of the Blue Limestone of Cincinnati. The varied forms of our midwestern terrestrial and fluviatile shells also attracted Anthony's attention and he rapidly built up a fine collection, specializing first in the Unionidae and later in the Pleuroceridae. By 1839 he was carrying on a very active exchange in the hope of assembling a complete collection of North American shells.

In 1847 his health and eyesight were seriously impaired after contracting scarlet fever from his youngest daughter, then two years old. His son wrote that "for two years he was unable to see his hand in front of his face and it was seven years before he was able to return to business." We have come across numerous references to Anthony's eye trouble as it affected both his business and scientific life.

In 1849 Anthony sent the descriptions and specimens of sixteen new species of *Melania* to Dr. A. A. Gould at the Boston Society of Natural History for publication in the Proceedings of that Society. Later, in a notebook containing an annotated collection of his papers he wrote the following: "My vision at that time being very much obscured owing to a disease of the eyes, could not be fully depended upon for nice discrimination in regard to species, and Dr. Gould was requested to examine and compare the specimens forwarded, making such corrections and additions as his better vision and more extended means of comparison might suggest, so that the descriptions when published might be as complete and perfect as possible. To some extent this was done." On the label of the type specimen of *Melania brevispira*, which was described in this paper Anthony wrote: "determined by touch alone while I was blind."

In June 1853, in an effort to restore his health and to further his study of fresh-water shells, Anthony made a walking trip from Cincinnati, Ohio through Kentucky and Tennessee to Macon, Georgia. Anthony's notes, letters and original labels have added but little to his published record of the trip and though several people have tried to follow Anthony's route it has been practically impossible. The following note given to me by William J. Clench concerning his attempt to cover Anthony's route is of real interest here. "During the summer



*John G. Anthony*

1804 - 1877

Plate 15. From an original photograph  
copied by F. P. Orchard

of 1924, P. S. Remington and I attempted to follow the route of Anthony from Cincinnati, Ohio, at least as far south as Chattanooga, Tennessee. This, of course, was only part of a program, outlined by Calvin Goodrich of the University of Michigan, for a general reconnaissance in Kentucky, Tennessee and northern Alabama for future river surveys of the mollusks in these states, mainly for Pleuroceridae. Anthony had left but little data behind for us to go upon. He had listed his new species only by states, and not in the form of specific localities. Old maps were consulted for roads that may have been followed between the larger cities. Our attempt was to collect at all creeks, rivers and springs along the way. We were fortunate in collecting many of the species of Anthony, probably at the type localities or at least in the same streams that he had visited many years before."

Due to lack of proper precautions in caring for his collections in the field, Anthony, on returning home, apparently had a rather serious mixture of lots (Goodrich 1931). However, in going over many of his notes and original labels we have found references to specific localities as well as discrepancies between the data given on labels and those published. This additional material has been included in square brackets under the proper species in the catalogue accompanying this paper.

On returning from this trip Anthony was still unable to work except for occasional bookkeeping, apparently done at home. This period must have been one of great difficulty for the Anthony family, for his sons, Thomas and Edward, both left school in order to help support the family. In a letter to Thomas Bland, Anthony wrote, "During my troubles my shells were my mainstay on every occasion. To use my friend's language . . . 'I had enjoyed the pleasure of collecting my shells, the satisfaction of looking at and studying them when collected, and now I am eating them,' which in my case was true, since when my funds ran low and I could earn nothing I literally sold my shells to procure bread — and a good source of income it was too — 2 or 300 dollars at a time did I sell of shells and fossils — many of my chosen specimens were sacrificed which I may not soon replace and my library too followed suit. . . ." However, even this was not enough and in 1856 Anthony wrote E. R. Mayo that he was "over head and ears in business at last

trying to make my bread and butter, after so long eating upon the small stock I had previously made – to tell the truth I had about found the end of my string and it was a work of necessity to do something more substantial than work over shells and collect specimens.” Anthony was at this time with Taylor and Anthony, General Insurance Agents. He continued in partnership with Taylor until he left Ohio to become assistant in the Museum of Comparative Zoölogy.

Anthony collected all species in large quantities and exchanged with conchologists throughout the world. Many of his species he named and sent out on exchange before the descriptions had been published. Consequently many of the species which appear in Reeve's *Conchologia Iconica*, though isolated by Anthony, must be credited to Reeve. In most cases Anthony never did publish descriptions of these species, but a few species sent to Cuming, Anthony later described and published. Reeve, however, having access to the Cuming collection also described them, crediting them to Anthony. Since Reeve's monograph came out a few months before Anthony's paper, the credit must go to Reeve who fortunately did not change any of Anthony's manuscript names. In Brot's catalog of the *Melania* (1862) there are two Anthony names which do not appear elsewhere and which were apparently undescribed species sent to Brot. This is also the case with *Melania obliqua* listed by Tryon as a synonym of *Melania incisum* Lea. In 1852 Temple Prime wrote Anthony concerning his proposed monograph of the Corbiculidae, asking for material on old and new species. Anthony immediately responded by sending the descriptions and specimens of several new species of *Cyclas* and *Pisidium* which Prime published and credited to Anthony as was the accepted procedure of the day. However, according to the International Rules of Zoölogical Nomenclature, the person who publishes the species is the one to whom the credit for the name must go. All species, so far as can be determined, which have been credited to Anthony but published by others have been included in the following catalogue.

In many of Anthony's letters he refers to the K K's, very probably a conchological club, an association of correspondents with whom he had exchanged through the years. His "King" of the KK's was Hugh Cuming with whom Anthony had many profitable exchanges.

When Spencer F. Baird became Assistant Secretary of the Smithsonian Institution, he immediately tried to build up the collections and asked all zoologists to contribute. Printed labels were supplied collectors by the Smithsonian Institution, and Anthony on receiving those prepared by Lea for the Unios was incensed. The following quotation is a portion of a letter written to Baird in which he complains bitterly concerning the practice of that time of claiming authorship of a species by merely changing it to a different genus. Unfortunately this practice was continued until about 1900.

Office of Taylor & Anthony,  
General Insurance Agents,  
76 West Third Street,  
Cincinnati, July 24th, 1860

Spencer F. Baird Esq.

My dear Sir:

I wrote you respecting labels for the Unio's designed for the Cabt. of the Smithsonian Institution and have since rec'd a set of the labels in question, but on examining them I find them most extraordinarily defective, particularly in regard to species which I have taken great pains to prepare for the Collection. About One hundred Names of well known species have been entirely omitted altho' they are such as generally form the basis of exchanges & many of them are superseded it seems by names of Mr. Lea's which are at best only entitled to rank as synonyms—Now it seems to me that the only fair & honest way to print a Catalogue of American Unionidae is to adopt the plan pursued in some other parts of the General list, viz to include every species published by various Authors leaving the synonymy to be worked out by each one as he sees fit, or if there must be an expurgated list, for heaven's sake intrust it to *unprejudiced & disinterested* hands to be arranged with at least the appearance of honesty and justice—If this list is to be made the *Authorised & only Authorised* list, why I have not the slightest hesitation in saying that I for one cannot conform to it and if the shells for your Collections must be labelled by it, some one other than myself must do it, for I cannot rec-



ognize a list so manifestly incorrect and govern myself by it in naming my specimens—After pursuing the study of Conchology for 35 years during all which time I have been engaged in numerous and large exchanges and for 26 years past having distributed Annually many thousands of *Unio*'s under their true names I cannot consent at this late day to abandon them merely to minister to the inordinate and insane Ambition of Isaac Lea, to be considered the *only* American Conchologist—And how will our transatlantic Naturalists regard such a published list purporting to be a *Complete* list of American *Unionidae* when they find it ignoring such names as *Unio crassus* Say, *U. heros* Say, *U. politus* Say, *U. lapillus* Say, *U. cicatricosus* Say, *U. nexus* Say, *U. metallicus* Say, *U. subrostratus* Say, *U. glebulus* Say, and *U. purpureus* Say, all well known names. True Mr. Lea is very careful to include *U. complanatus* *Lea* which he says is the same as *U. purpureus* Say, which name of *complanatus* he contends should supersede it because Solander had a "*Mya complanata*" & he endeavors to show that *Mya c.* was intended to represent our *Unio purpureus* hence he transfers it to "*Unio*" & thereupon proceeds to append *his own Name as author* without ever describing it & robbing thereby both Say and Solander at one Operation. Prof. Rafinesques Names with the single exception of "*Metanevra*" are entirely set aside to make room for Mr. Lea's subsequent christenings—& such names as "*torsus*" "*costatus*" "*flavus*" & *cardium*, with some 30 others must all be passed by as unworthy of notice because Mr. Lea affects not to understand them—Now Mr. Lea May print as many such Catalogues & synopses as he pleases and every one he has printed has varied from its predecessor according to his fancy for the time, and I would say nothing, but I do not like to find the Smithsonian Institution lending its influence to Circulate any such errors—I speak freely and warmly too, because I feel it—I have during the 26 years I have exchanged *Unio*'s distributed more specimens than any other living Man—they are in *all* the foreign collections private & public. My names are such as long investigations proved satisfactory to my mind, and reputation even as a Nomenclator is dear to me, far too dear, to be taken away in this manner even by implication. I do not wish to be forced to speak of this Catalogue to my Correspondents Abroad

as in justice to myself I shall be compelled to if no correction is made in it —A supplement should at once be published containing the rejected list of Names & thus some little justice be done such Authors as Say, Conrad, & Rafinesque who are at least *equal* to Lea, however much he may endeavor to produce a contrary impression.

One other *Grand Error* in the Catalogue is in the *Margaritana* where Mr. Lea unhesitatingly places his name as author to 25 out of the 26 species enumerated, while the fact is that he never described more than 16 of the whole number—how ridiculous to place his name to a shell which was named almost before he was born, as in the case of *M. margaritifera*—Mr. Lea's only claim being in Consequence merely of his having so placed them in a Catalogue as "*Margaritana*" instead of "*Alasmodon*" a very cheap way of attaining authorship truly & tomorrow somebody else may transfer the entire lot to some other Genus and claim the authorship in like manner in *his* turn—how much easier this is than troubling oneself to describe a species—"*Authorship made easy*" with a vengeance—Mr. Lea in this way has his name printed as author to one species which he at the same time confesses he has *Never Seen!!!* how much further can absurdity go—In *Anodonta* Mr. Lea claims two species at least which he never described viz *A. edentula* & *fluviatilis*—the first being Says & the last Mr. Lea himself states was Lister's "*Mya fluviatilis*"—Now if the removal into its proper Genus be a sufficient claim certainly Mr. Say could rightly claim this species since he honestly described it as *A. cataracta*" whereas Mr. Lea never described it at all still claims it by stealing Listers name and clapping his own at the end as Author—just as he did with Solanders "*complanatus*"—If I had time & Patience I could point out other as glaring errors but I have said enough—excuse my plainness—my Quaker blood and training never taught me to mince matters where injustice was concerned.

Please let me hear from you on the subject.

Very truly yrs

John G. Anthony

In 1838 Mrs. Thomas Say presented Anthony with two new species of shells which she had collected at the Falls of Kanawha in Virginia. These were given with the distinct understanding that one of them should be named after her particular friend, Dr. J. P. Kirtland, who was also a friend of Anthony. This he says "accounts for the departure from a long cherished rule not to name species after individuals. . . . thus to propitiate the inordinate vanity of some ignorant collector." Consequently *Anculosa kirtlandiana* and *Amnicola sayana* are unique in being Anthony's only patronymics. All other species published by him have descriptive names. According to Anthony's notes Mrs. Say illustrated a number of shells for him; among them were *Anculosa kirtlandiana* and *A. carinata*, the two she had collected.

By 1863 Anthony had published five papers on fossils and ten on mollusks, several of which were read before the Boston Society of Natural History, of which Agassiz was a member. By this time Anthony's correspondence and exchanges had grown to considerable proportions, and he hoped for a position in a museum or other institution in which he could earn a living while working on shells. At that time the Museum of Comparative Zoölogy at Harvard was four years old and growing rapidly, and though Agassiz had considerable student help he was looking for an assistant in Mollusks. Their letters crossed in the mail—the one Anthony wrote to Agassiz asking for a position and that of Agassiz offering the position to Anthony.

Louis Agassiz in his annual report of the Museum of Comparative Zoölogy for 1863 writes "It has been my good fortune to secure the co-operation of Mr. J. G. Anthony, who has been for nearly forty years one of the leading conchologists of America, and his zeal and activity, as well as his exquisite neatness in putting up specimens will soon change the whole aspect of that department of the museum." Thus, in August 1863 Anthony, at the age of 60, arrived in Cambridge to become a part of one of the most active and important institutions of its kind in the new world.

During the fourteen years in which Anthony was Assistant at the Museum of Comparative Zoölogy he did much to build up the Department of Mollusks. It is to him that we must give credit for the presence in the collection of many of the type

specimens of the early workers in conchology. At this formative period in the development of malacology, Anthony's interest in the collection was paramount and, because of his willingness to carry on extensive exchanges with Hugh Cuming, Lovell Reeve, Temple Prime, James C. Cox, H. Dohrn and others, material poured into the laboratory almost faster than Anthony was able to absorb it. The Cuming material, especially that from the Philippines, was an invaluable addition to the collection as it was composed almost entirely of types. Anthony also sold his collection to the museum and with it came numerous types which he had previously obtained as well as his large collection of North American fresh-water shells.

Following the accepted procedure of the day Anthony aimed to have every species of mollusk on exhibit and consequently he spent a large part of his time carefully gluing specimens to slate, glass and wooden plaques. Carefully written, detailed records were kept of the exact number of specimens mounted each month. The following excerpt was taken from his annual report for 1869. "In the past 12 months we have added 9250 tablets to the 17 [thousand] then on hand so that we have 26250 tablets mounted with 67749 specimens. Of this number 22403 tablets have been mounted by the writer during the six years he has been connected with the museum, and the remaining 3847 tablets have been added by the three female assistants, who under the policy recently adopted have been mostly employed in preparing tablets, but who have also occasionally been allowed to mount the specimens under proper supervision." Again in 1870 he wrote "Besides the important addition of 2417 mounted tablets to our previous number, I have, in the process of re-arrangement, found it necessary also to remount a very large number of the species. This has been owing to the unsatisfactory nature of the cement first used for the purpose, the very dry atmosphere of our exhibition rooms operating unfavorably upon all the cements known, at the time when we commenced this mode of exhibiting shells. Much time and labor has been bestowed upon this problem of the best cement for the purpose, and I am happy to be able to say that I have so far succeeded in removing all difficulties that we may reasonably hope to be spared hereafter the time and labor of remounting, our present cement seeming to be all that we could desire or expect."

With the change in curatorial procedure those who have followed Anthony have had to spend a great deal of time removing these same specimens from their plaques. The glue was certainly all that Anthony had hoped it would be! In working up the Anthony types in our collection we came across a box of *Amnicola cincinnatiensis* Anthony containing over 2000 specimens and the following note was left by W.F. Clapp "These were all glued on tablets, 12 per tablet." Obviously these could not all have been for exhibit but had probably been prepared for exchange.

Anthony had an unusually beautiful handwriting, his labels looked like steel engravings and his notes were so neatly and perfectly written that one would think that they had been printed. Agassiz, appreciating this art, often asked Anthony to copy addresses and poems which were to be presented to friends and benefactors of the museum. In a letter to his wife Anthony tells of copying the address written by Oliver Wendell Holmes on the occasion of the dinner given to Agassiz before leaving on the Thayer Expedition. Holmes also wrote a poem on this expedition which was presented to the Emperor of Brasil and again it was copied by Anthony.

In 1865 Anthony accompanied Louis Agassiz and others of his staff on the Thayer Expedition to Brasil. Anthony's letters to his wife written during the early part of the trip continually refer to his improved health and his increased ability to eat, for he had been suffering for some time with a chronic stomach ailment. However, despite his improved condition Anthony did but little collecting for the expedition as he contracted yellow fever shortly after arriving in Río de Janeiro and consequently returned to Cambridge. While other members of the party continued to collect mollusks to some extent there was no published report made on the material collected on this expedition.

John Henry Blake became a member of the Museum staff in 1867 and for the next ten years was a close friend of Anthony. The following notes have been taken from Blake's letter to William J. Clench in which he gives an informal picture of the museum's first curator of mollusks as he remembered him.

"From the time I first knew him [Anthony] until his death

we were the best of friends, although there was friction between him and others in the Museum.

"I have even thought I was assigned a table next to him, by Prof. Agassiz, partly because of his disposition to be easily disturbed.

"The first section of the museum only was then built, and the accommodations for workers were limited. In this room, at one time, there were nine or ten persons, and in some places, the trays of specimens were piled much higher than one could reach. There were no cases for trays in this room.

"He did not go home to lunch but brought a brown, pint bottle containing milk, egg and a little brandy which was his lunch, and he left the museum for the day at 3 o'clock P.M. Before he left, however, he brushed all his dirt out by my table and left it there. This act was as regular as the day but I never remonstrated. When he was sick at his home, corner of Magazine and Green Streets, Cambridgeport, he always wrote to me and I visited him many times on errands in connection with his Museum work. If he wanted acid, or chemicals to make the glue used extensively in his work I would buy it at John Hubbard's in Harvard Square, on my way to my boarding place on Mt. Auburn Street.

"I do not remember his writing a scientific paper, not counting his regular annual reports, while at the Museum. His time seemed to be taken chiefly in preparing specimens for exhibition or exchanges. He devoted much time in mounting specimens on wood, card, slate and painted glass. He was always making improvements in his glue as I heard him tell Professor Agassiz a number of times.

"He was a very steady worker and hardly left his chair from the time he came 'til he went. He did not attend Prof. Agassiz's lecture in the next room with the rest of us. These lectures by Professor Agassiz were very popular. Although they were regular College lectures I have seen the room crowded, floor and gallery, extra chairs taken in and yet Mr. Anthony remained at his work.

"He often made puns or played upon words. He liked to tell a joke but did not like to have a joke played on him. As an example: One 1st of April Dr. Wilder and I attempted a joke. We got an old dry "mermaid" from the attic, put it in a box

and got Mr. Roetter to put on it in German script Mr. Anthony's address with "you are an April Fool" in the corner. Mr. Anthony came in saw the box and with some gusto said he had received a box of shells. He was a little puzzled over the address so took off the cover, saw the contents and took the cover to Mr. Roetter to read. Mr. Roetter read it ending with the "you are an April Fool." Mr. Anthony was so mad he took the box out of the room, and I have not seen the "mermaid" since, he never spoke to Dr. Wilder after. I told Mr. Anthony I was as guilty as Dr. Wilder but he said he could excuse me as I was young, but Dr. Wilder was too old to play such a joke."

As is evidenced from J. Henry Blake's letter, Anthony's ill health not only caused his absence from the Museum for long periods of time, but was no doubt partially responsible for his lack of research after 1866.

On October 16, 1877 Anthony, then 73 years old, died at his home in Cambridgeport of cancer of the stomach. He was buried at the Swan Point Cemetery in Providence, Rhode Island.

The year of his death, Alexander Agassiz, then Director of the Museum of Comparative Zoölogy, paid Anthony the following tribute in his Annual Report. ". . . his time and energies were given to the department of Conchology with such assiduous and entire devotion as is rarely equaled. He had held correspondence and conducted exchanges with almost all active conchologists and shell collectors of his time, who never failed to appreciate the remarkable skill in exchanging, the complete knowledge of the relative value of specimens, and the wide acquaintance with the traditions of conchology, which were the fruits of his long experience."

Though a great many of Anthony's species have fallen into synonymy he made many important contributions to Conchology and to the Museum of Comparative Zoölogy in particular. The following note by Calvin Goodrich, who today is the man most capable of judging Anthony's work on the Pleuroceridae.

"I would say that Anthony was of very real importance in his day in that he made collections when collectors were few and far apart, that he did this when contacts with other nat-

uralists were almost non-existent—a very lonesome sort of career—that he made descriptions according to his lights, and these were no worse, and sometimes better, than those of his contemporaries. In the end, the collection remained intact, and available—a thing it would be difficult for us to put too high a price upon.”

\* \* \* \*

#### ACKNOWLEDGMENTS

The author is indebted to Miss Fanny Garrison, granddaughter of J.G. Anthony, for much valuable information and especially for the gift to the Museum of Comparative Zoölogy of many of Anthony's letters and unpublished notes. Thanks are extended to Professor W. B. Hendrickson of MacMurray College for the loan of material which he had gathered on the Western Academy of Natural Sciences. For copies of Anthony's letters and other information on his life we are indebted to Dr. Harald Rehder, the United States National Museum; Dr. Henry Vander Schalie, the Museum of Zoölogy at the University of Michigan; Miss Lillian C. Wuest, reference Librarian of the Historical and Philosophical Society of Ohio; Miss Ethel L. Hutchins, Reference Department of the Public Library of Cincinnati, Ohio; and Mr. George F. Johnson, Deputy City Registrar, Providence, Rhode Island. Mr. Calvin Goodrich gave many valuable suggestions, especially on the evaluation of Anthony's work. Lastly this paper could never have been completed except for the guidance and encouragement of William J. Clench.



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- [No date], List of the Land and Fresh-water Shells found chiefly in the vicinity of Cincinnati (First Edition). [We have not seen this publication but Binney lists the species included; he, however, could not date it. It appears to be a very rare publication and is not to be found in any of the large museums].
- 1840, September, On the Byssus of *Unio*. *Annals and Magazine of Natural History* **6**, p. 77.
- 1840, January, Descriptions of three new species of shells. *Boston Journal of Natural History* **3**, pp. 278-279, pl. 3, fig. 1-3.
- 1840, July, Descriptions of two new species of *Anculotus*. *Boston Journal of Natural History* **3**, pp. 394-395, pl. 3, fig. 4-5.
- 1841, Letter synonymizing *Anculotus kirtlandianus* Anthony under *Melania rogersii* Conrad. *Proceedings of the Boston Society of Natural History* **1**, p. 5.
- 1843, January, Catalogue of the Terrestrial and Fluvial Shells of Ohio, Second Edition, Cincinnati, Ohio.
- 1843, March, Letter on *Schizostoma*, *Melatoma* and *Apella*. *Proceedings of the Academy of Natural Sciences of Philadelphia*, p. 251.
- 1850, December, Descriptions of Sixteen new species of *Melania*. *Proceedings of the Boston Society of Natural History* **3**, pp. 359-363.
- 1854, March, Descriptions of New Fluvial Shells of the Genus *Melania* Lam. from the Western States of North Amer-

- ica. Annals of the Lyceum of Natural History of New York **6**, pp. 80-130, pl. 1-3.
- 1855, October, Descriptions of New Species of *Ancylus* and *Anculosa* from the Western States of North America. Annals of the Lyceum of Natural History of New York **6**, pp. 158-160, pl. 5, fig. 20-23.
- 1860, February, Descriptions of New Species of American Fluvial Gastropods. Proceedings of the Academy of Natural Sciences of Philadelphia, pp. 55-72.
- 1862, Catalogue of Shells from John G. Anthony, Cincinnati, Ohio. Fifteenth Report on the Cabinet of Natural History, Senate no. 116.
- 1865, February, Descriptions of Two New Species of *Gonio-basis*. American Journal of Conchology **1**, p. 36, pl. 1, fig. 2-3.
- 1865, April, Descriptions of New Species of North American Unionidae. American Journal of Conchology **1**, pp. 155-164, pl. 12-16.
- 1865, July, Descriptions of Two New Species of *Monocondy-loea*. American Journal of Conchology **1**, p. 205, pl. 18, fig. 1-2.
- 1865, July, Descriptions of a New Exotic *Melania*. American Journal of Conchology **1**, p. 207, pl. 18, fig. 3.
- 1866, April, Descriptions of New American Fresh-water Shells. American Journal of Conchology **2**, pp. 144-147, pl. 6-7.
- 1863-1876, Annual Reports of the Museum of Comparative Zoölogy at Harvard College.

*A List of Recent Mollusks described by J. G. Anthony with their original references and type localities.*

The initials BJNH refer to the Boston Journal of Natural History, PBSNH to the Proceedings of the Boston Society of Natural History, PANSP to the Proceedings of the Academy of Natural Sciences Philadelphia, ALNHNY to the Annals of the Lyceum of Natural History New York, AJC to the American Journal of Conchology, and MCZ to the Museum of Comparative Zoölogy.

Most of Anthony's species of Pleuroceridae [*Melania*] which were not figured with the original descriptions were figured by Tryon from Anthony's specimens in 1873; Land and Fresh-water Shells of North America, Part 4, Strepomatidae, Smithsonian Miscellaneous Collections no. 253.

All locality data in brackets in this report were taken from the original labels or Anthony's unpublished notes.

- abbreviata, *Melania*:** 1850, PBSNH **3**, p. 360 (Maury's Creek, Tennessee) [Holotype MCZ 50240].
- abscida, *Melania*:** 1860, PANSP, p. 56 (Alabama) [Holotype MCZ 161716].
- adusta, *Melania*:** 1860, PANSP, p. 55 (Tennessee) [Holotype MCZ 47368].
- artilis, *Cyclas*:** 1844, PANSP **2**, p. 161, Ohio [nude name].
- artilie 'Anthony' Prime, *Pisidium*:** 1852, BJNH **6**, p. 353, pl. 11, fig. 10-12. (Canandaigua Lake, New York and Miami Canal, near Cincinnati, Ohio) [Cotypes MCZ 154406].
- altipeta, *Melania*:** 1854, ALNHNY **6**, p. 87, pl. 2, fig. 5a-b (Raccoon Creek, Vinton County, Ohio) [Cotypes MCZ 161755].
- amazonica 'Anthony' Prime, *Corbicula*:** 1870, ALNHNY **9**, p. 299 (Amazon River, Brasil - from the stomach of a fish) [Cotypes MCZ 143095].
- ambusta *Melania*:** 1854, ALNHNY **6**, p. 94, pl. 2, fig. 13 (Alabama) [Holotype MCZ 74191].
- ampla, *Anculosa*:** 1855, ALNHNY **6**, p. 159, pl. 5, fig. 22-23 (Alabama) [Cotypes MCZ 161803].
- ampla, *Gyrotoma*:** 1860, PANSP, p. 66 (Coosa River, Alabama) [Holotype MCZ 85803].
- ampla, *Melania*:** 1854, ALNHNY **6**, p. 93, pl. 2, fig. 12 (Alabama) [Holotype MCZ 161735].
- angulata, *Melania*:** 1854, ALNHNY **6**, p. 117, pl. 3, fig. 17 (Tennessee) [Holotype MCZ 161845].
- angusta 'Anthony' Reeve, *Melania*:** 1860, Conch. Icon. **12**, pl. 48, species 359 (United States) [Types in Cuming Collection].
- angustispira, *Melania*:** 1860, PANSP, p. 55 (Tennessee) [Holotype MCZ 161719].

- Apella** 'Mighels' Anthony:\* 1843, PANSP, p. 251. This manuscript name of Mighels was first introduced by Anthony as a synonym of *Schizostoma* Lea 1843 (*non* Bronn 1834; *non* Schlaeter 1838) in a letter which was published as above. As *Apella* 'Mighels' Anthony equals *Schizostoma* Lea, it is the next available name for this genus as *Schizostoma* Lea is a homonym. This will replace *Gyrotoma* Shuttleworth 1845, as *Apella* has two years priority.
- arachnoidea, Melania:** 1854, ALNHNY **6**, p. 95, pl. 2, fig. 14 (small stream emptying into the Tennessee River near Loudon, Tennessee) [Holotype MCZ 50236].
- assimilis, Melania:** 1860, PANSP, p. 60 (Tennessee) [Cotypes MCZ 161827].
- athleta, Melania:** 1854, ALNHNY **6**, p. 83, pl. 2, fig. 1 (Tennessee [Bacon Creek near Mumfordsville, Kentucky]) [Holotype MCZ 161751].
- attenuata** 'Anthony' Reeve, **Melania:** Conch. Icon. **12**, pl. 56, species 438 (Cuba [Anthony received this species from Poey]) [Cotypes MCZ 74771].
- baculum, Melania:** 1854, ALNHNY **6**, p. 98, pl. 2, fig. 16 (Tennessee) [Holotype MCZ 161820].
- bicincta, Melania:** 1860, PANSP, p. 56 (Tennessee [North Carolina]) [Cotypes MCZ 161823].
- bicolor** 'Anthony' Reeve, **Melania:** 1860, Conch. Icon. **12**, pl. 38, species 265 (United States).
- bicolorata, Melania:** 1850, PBSNH **3**, p. 361 (Camp Creek near Madison, Indiana) [Holotype MCZ 161721].
- bicostata, Melania:** 1860, PANSP, p. 56 (near Athens, Tennessee) [Holotype MCZ 161778].
- brevis, Io:** 1860, PANSP, p. 69 (Tennessee) [Holotype MCZ 50551].
- brevispira, Melania:** 1850, PBSNH **3**, p. 361 (Ohio) [Cotypes MCZ 161690].
- brunnea, Melania:** 1854, ALNHNY **6**, p. 92, pl. 2, fig. 10 (Alabama) [Cotypes MCZ 74208].
- bulbosa** 'Anthony' Prime, **Cyclas:** 1853, PBSNH **4**, p. 283 (Arkansas) [Cotype MCZ 19436].
- bulbosa, Gyrotoma:** 1860, PANSP, p. 65 (Coosa River, Alabama) [Cotypes MCZ 50661].
- canalifera, Anculosa:** 1860, PANSP, p. 68 (Dan River, North Carolina) [Cotypes 161791].
- carinatus, Anculotus:** 1840, BJNH **3**, p. 394, pl. 3, fig. 5 (Falls of the Kanawha, [West] Virginia, collected by Mrs. Thomas Say) [Cotypes MCZ 143103].
- carinifera, Gyrotoma:** 1860, PANSP, p. 66 (Coosa River, Alabama) [Holotype MCZ 45149].
- casta, Melania:** 1854, ALNHNY **6**, p. 100, pl. 2, fig. 19 (Alabama) [Holotype MCZ 74189].
- cerinoidea, Helix:** 1865, AJC **1**, p. 351, pl. 25, fig. 3 (North Carolina).

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\*This as well as similar cases of manuscript names published in the synonymies of described species is covered in Article 25 and Opinion 53 of the International Commission on Zoological Nomenclature.

- chalybea** 'Anthony' Brot, **Melania**: 1862, Catalogue systématique des espèces qui composent la Famille des Mélaniens, Genève, p. 37 [nude name listed under the synonymy of *M. abbreviata* Anthony. Its later use by Goodrich (1940, p. 6) as a synonym of *Lithasia obovata* Say is untenable as the first listing of a nude name as a synonym automatically causes that name to take the description of that species]. (Tennessee) [Cotypes MCZ 156350].
- cincinnatiensis**, **Paludina**: 1840, BJNH **3**, p. 279, pl. 3, fig. 3 (in canal near Cincinnati, Ohio) [Cotypes MCZ 142813].
- cingenda**, **Goniobasis**: 1866, AJC **2**, p. 146, pl. 7, fig. 3 (North Carolina) [Holotype MCZ 161807].
- cinnamomea** 'Anthony' Reeve, **Melania**: 1861, Conch. Icon. **12**, pl. 50, species 379 (Alabama) [Holotype MCZ 161816].
- clara**, **Melania**: 1854, ALNHNY **6**, p. 119, pl. 3, fig. 19 (Alabama) [Holotype MCZ 72329].
- cognata**, **Melania**: 1860, PANSP, p. 60 (Tennessee) [Cotypes MCZ 161836].
- compacta**, **Melania**: 1854, ALNHNY **6**, p. 122, pl. 3, fig. 22 (Alabama) [Holotype MCZ 72063].
- concauus**, **Planorbis**: 1843, Catalog of the Terrestrial and Fluvial Shells of Ohio. (Ohio) [nude name].
- concauus** 'Anthony' Binney, **Planorbis**: 1865, Smithsonian Miscellaneous Publication no. 143, Land and Fresh-water Shells of North America Part 2, p. 133 [nude name listed under the synonymy of *Planorbis parvus* Say]. [Cotypes MCZ 156352].
- concolor** 'Anthony' Brot, **Anculosa**: 1862, Catalogue systématique des espèces qui composent la Famille des Mélaniens, Genève, p. 24 [nude name listed under the synonymy of *Leptaxis integra* Say].
- consanguinea**, **Melania**: 1854, ALNHNY **6**, p. 125, pl. 3, fig. 26 (Indiana) [Holotype MCZ 58411].
- constricta** 'Anthony' Prime, **Cyclas**: 1853, PBSNH **4**, p. 274 ( [Miami Canal near Cincinnati] Ohio) [Cotypes MCZ 19511].
- coracina**, **Melania**: 1850, PBSNH **3**, p. 361 (Cany Fork [of Cumberland River] Tennessee) [Holotype MCZ 161847].
- corneola**, **Melania**: 1860, PANSP, p. 61 (Alabama) [Holotype MCZ 161822].
- coronilla**, **Melania**: 1854, ALNHNY **6**, p. 126, pl. 3, fig. 27 (Tennessee) [Cotypes MCZ 50243].
- corpulenta**, **Anculosa**: 1860, PANSP, p. 68 ( [Dan River] North Carolina) [Cotypes MCZ 161800].
- corpulenta**, **Melania**: 1854, ALNHNY **6**, p. 127, pl. 3, fig. 28 (Alabama) [Holotype MCZ 161744].
- costatus**, **Anculotus**; 1840, BJNH **3**, p. 278, pl. 3, fig. 1 (on pebbly shore [Ohio River] near Cincinnati, Ohio) [Cotypes MCZ 143101].
- crebristriata**, **Monocondyloea**: 1865, AJC **1**, p. 205, pl. 18, fig. 1 (Pegu, British Burmah) [Holotype MCZ 161872].
- cristata**, **Melania**: 1854, ALNHNY **6**, p. 108, pl. 3, fig. 8 (Alabama) [Holotype MCZ 47794].
- cubicoides**, **Melania**: 1860, PANSP, p. 60 (Wabash River, Indiana) [Holotype MCZ 161696].

- cuspidata, Melania:** 1850, PBSNH 3, p. 362 (Maumee River, Ohio) [Paratypes MCZ 79430].
- curvicostata 'Anthony' Reeve, Melania:** 1861, Conch. Icon. 12, pl. 58, species 462 (Florida, United States) [Types in Cuming Collection].
- curvilabris, Melania:** 1854, ALNHNY 6, p. 102, pl. 3, fig. 1a-b (Tennessee) [Holotype MCZ 50245].
- decapitata, Paludina:** 1860, PANSP, p. 71 (Tennessee) [Holotype MCZ 161888].
- decorata, Melania:** 1860, PANSP, p. 55 (Oostanulla River, Georgia) [Cotypes MCZ 50231].
- demissa, Gyrotoma:** 1860, PANSP, p. 64 (no locality given [Coosa River, Alabama]) [Holotype MCZ 50693].
- densa, Melania:** 1850, PBSNH 3, p. 360 (Maury's Creek, Tennessee) [Holotype MCZ 161734].
- deviatus 'Anthony' Reeve, Unio:** 1864, Conch. Icon. 16, pl. 15, species 61 (North America) [Types in Cuming Collection].
- deviatus, Unio:** 1865, AJC 1, p. 156, pl. 12, fig. 2 (Tennessee) [Holotype MCZ 161895].
- distans, Unio:** 1865, AJC 1, p. 156, pl. 13, fig. 2 (Ohio) [Holotype MCZ 146978].
- eburnea 'Anthony' Prime, Cyclas:** 1853, PBSNH 4, p. 279 (Arkansas) [Cotypes MCZ 19496].
- elata, Melania:** 1851, PBSNH 3, p. 362 (Maumee River [at Perrysburgh] Ohio) [Holotype MCZ 79423].
- elator, Ancyclus:** 1855, ALNHNY 6, p. 158, pl. 5, fig. 20-21 (Green River, Kentucky [near Mumfordsville]) [Cotypes MCZ 161851].
- elegans, Anculosa:** 1860, PANSP, p. 69 (Alabama) [Holotype MCZ 161798].
- elegantula, Melania:** 1854, ALNHNY 6, p. 103, pl. 3, fig. 2 (Kentucky) [Holotype MCZ 50251].
- eliminata, Melania:** 1854, ALNHNY 6, p. 97, pl. 2, fig. 15 (near Owenboro, Kentucky) [Cotype MCZ 161839].
- ellipticum 'Anthony' Reeve, Melatoma:** 1861, Conch. Icon. 12, pl. 3, species 21 (Coosa River, Alabama) [Cotypes MCZ 50669].
- excavata, Melania:** 1854, ALNHNY 6, p. 99, pl. 2, fig. 18 (Alabama) [Holotype MCZ 161738].
- exilis, Paludina:** 1860, PANSP, p. 71 (Mississippi) [Holotype MCZ 161885].
- eximia, Melania:** 1854, ALNHNY 6, p. 107, pl. 3, fig. 7 (Tennessee) [Holotype MCZ 161759].
- fastigiata, Melania:** 1854, ALNHNY 6, p. 113, pl. 3, fig. 13 (Tennessee) [Holotype MCZ 161766].
- flava, Anodon:** 1865, AJC 1, p. 160, pl. 14, fig. 3 (Michigan) [Holotype MCZ 161866].
- formosa 'Anthony' Reeve, Melania:** 1861, Conch. Icon. 12, pl. 51, species 387 (Alabama).
- fragosa 'Anthony' Reeve, Melania:** 1861, Conch. Icon. 12, pl. 57, species 543 [453] (no locality given [Alabama]) [Cotypes MCZ 161739].

- funnebralis, Melania:** 1860, PANSP, p. 56 (Tennessee) [Holotype MCZ 161723].
- fuscocincta, Melania:** 1854, ALNHNY **6**, p. 120, pl. 3, fig. 20 (Alabama) [Holotype MCZ 74206].
- germana, Melania:** 1860, PANSP, p. 61 (Cahawba River, Alabama) [Holotype MCZ 72806].
- gibbosa 'Anthony' Reeve, Io:** 1861, Conch. Icon. **12**, pl. 3, species 17 (Southern United States [Tennessee]) [Holotype MCZ 50558].
- glandula, Melania:** 1860, PANSP, p. 60 [new name for *Melania glans* Anthony, non V. d. Busch 1842].
- glandulosa, Anodon:** 1865, AJC **1**, p. 163, pl. 16, fig. 3 (Michigan) [Holotype MCZ 161869].
- glans, Melania:** 1854, ALNHNY **6**, p. 123, pl. 3, fig. 23 (Tennessee) [Holotype MCZ 161773] [is *Melania glandula* Anthony].
- glauca, Melania:** 1860, PANSP, p. 57 (Tennessee) [Holotype MCZ 161746].
- gloriosa, Melania:** 1865, AJC **1**, p. 207, pl. 18, fig. 2 (Pegu, [British Burma]) [Holotype MCZ 74106].
- gracilior, Melania:** 1854, ALNHNY **6**, p. 129, pl. 1, fig. 5 [new name for *M. gracilis* Anthony, non Lea 1841] (Congress and Springfield Lakes, Stark County, Ohio).
- gracilis, Melania:** ? List of the Land and Fresh-water Shells found chiefly in the vicinity of Cincinnati (First Edition) [nude name].
- gracilis, Melania:** 1842, [in] S. S. Haldeman, A Monograph of the Fresh-water Univalves Mollusca of the United States, Philadelphia, outside of back cover of no. 4 (Stark County, Ohio) [Holotype MCZ 161731] [is *M. gracilior* Anthony].
- gracillima, Melania:** 1860, PANSP, p. 62 (South Carolina) [Cotypes MCZ 161846].
- gradata, Melania:** 1854, ALNHNY **6**, p. 112, pl. 3, fig. 12 (Alabama) [Holotype MCZ 45375].
- grata, Melania:** 1860, PANSP, p. 61 (Alabama) [Cotypes MCZ 36219].
- gravida, Melania:** 1860, PANSP, p. 59 (Alabama) [Holotype MCZ 74187].
- grisea, Melania:** 1860, PANSP, p. 61 (Tennessee River, north Alabama) [Holotype MCZ 161741].
- grossa, Melania:** 1860, PANSP, p. 59 (Tennessee) [Holotype MCZ 161768].
- hastata, Melania:** 1854, ALNHNY **6**, p. 85, pl. 2, fig. 3 (Alabama) [Holotype MCZ 161753].
- humerosa, Paludina:** 1860, PANSP, p. 71 (Alabama) [Holotype MCZ 72332].
- hybrida, Melania:** 1860, PANSP, p. 60 (Tennessee) [Cotypes MCZ 161810].
- imbricata, Anodon:** 1865, AJC **1**, p. 159, pl. 14, fig. 1 (Camp Lake, Michigan) [Holotype MCZ 161860].
- imbricata, Melania:** 1854, ALNHNY **6**, p. 105, pl. 3, fig. 5 (Alabama) [Holotype MCZ 74199].
- impressa, Alasmodon:** 1865, AJC **1**, p. 157, pl. 12, fig. 4 (Tennessee) [Holotype MCZ 150666].



- incrassata, Melania:** 1854, ALNHNY **6**, p. 99, pl. 2, fig. 17 (locality unknown) [Holotype MCZ 45374].
- incurta** 'Anthony' Reeve, **Melania:** 1860, Conch. Icon. **12**, pl. 41, species 300 (United States) [Types in Cuming Collection].
- inemta, Melania:** 1850, PBSNH **3**, p. 362 (Virginia) [Paratypes MCZ 31065].
- inermis, Io:** 1860, PANSP, p. 70 (Tennessee) [Holotype MCZ 50228].
- infraciata, Melania:** 1860, PANSP, p. 57 (Tennessee) [Cotypes MCZ 161772].
- inornata, Anodon:** 1866, AJC **2**, p. 145, pl. 7, fig. 1 (Slawson's Lake, Michigan) [Holotype MCZ 161867].
- inornata, Melania:** 1850, PBSNH **3**, p. 360 (Lorrain County, Ohio [Maumee River, Ohio]) [Holotype MCZ 161692].
- intensa, 'Anthony' Reeve, Melania:** 1860, Conch. Icon. **12**, pl. 49, species 371 (United States) [Types in Cuming Collection].
- interlineata, Goniobasis:** 1865, AJC **1**, p. 36, pl. 1, fig. 3 (Christy Creek, Indiana [Clifty Creek]) [Holotype MCZ 161726].
- intertexta, Melania:** 1860, PANSP, p. 62 ([Loudon] Tennessee) [Holotype MCZ 50235].
- iostoma, Melania:** 1860, PANSP, p. 62 (Tennessee) [Holotype MCZ 161756].
- iota, Melania:** 1854, ALNHNY **6**, p. 86, pl. 2, fig. 4 (locality unknown [Raccoon Creek, Vinton County, Ohio]) [Lectotype MCZ 161811].
- irisans, Anodon:** 1865, AJC **1**, p. 163, pl. 16, fig. 2 (Bostwick's Lake [Kent County] Michigan) [Holotype MCZ 161870].
- kirtlandianus, Anculotus:** 1840, BJNH **3**, p. 395, pl. 3, fig. 4 (Falls of the Kanawha, [West] Virginia, from Mrs. Thomas Say) [Cotypes MCZ 143104].
- lachryma 'Anthony' Reeve, Melania:** 1861, Conch. Icon. **12**, pl. 59, species 473 (United States [Alabama]) [Cotypes MCZ 161745].
- latitans, Melania:** 1854, ALNHNY **6**, p. 88, pl. 2, fig. 6 (Mammoth Cave, Kentucky) [Holotype MCZ 161992].
- ligata, Anculosa:** 1860, PANSP, p. 67 (Alabama) [Cotypes MCZ 161788].
- lima, Paludina:** 1860, PANSP, p. 70 (South Carolina) [Holotype MCZ 161887].
- lurida 'Anthony' Reeve, Io:** 1861, Conch. Icon. **12**, pl. 3, species 20 (Southern United States [Tennessee]) [Holotype MCZ 50229].
- mcnielii, Anodon:** 1866, AJC **2**, p. 144, pl. 6, fig. 1 (Michigan [Sand Lake]) [Holotype MCZ 150644].
- Melatoma:** 1843, PANSP, p. 251, *non* Swainson 1840. [This name was introduced by Anthony for a genus of the Pleuroceridae under the assumption that he was dealing with Swainson's genus. Swainson's *Melatoma* is a marine genus in the family Turridae.]
- micans, Anodon:** 1865, AJC **1**, p. 162, pl. 16, fig. 1 (Texas) [Cotypes MCZ 161856].
- napella, Melania:** 1851, PBSNH **3**, p. 362 (Ohio) [Lectotype MCZ 79431].
- neglecta, Melania:** ALNHNY **6**, p. 128, pl. 3, fig. 29 (Great Miami River near Dayton, Ohio) [Holotype MCZ 161784].

- nigrocincta, Melania:** 1854, ALNHNY **6**, p. 90, pl. 2, fig. 8 (Tennessee) [Holotype MCZ 74195].
- nigrostoma** 'Anthony' Reeve, **Melania:** 1861, Conch. Icon. **12**, pl. 58, species 463 (Locality unknown [Tennessee] ) [Holotype MCZ 161764].
- nucleola, Melania:** 1850, PBSNH **3**, p. 360 (Tennessee) [Holotype MCZ 72064].
- nucula** 'Anthony' Reeve, **Melatoma:** 1861, Conch. Icon. **12**, pl. 3, species 19 (Coosa River, Alabama) [Cotypes MCZ 50694]. Anthony says in his notes that this species was sent to Reeve under the name of *M. obliqua*. Reeve changed the name to *nucula* in publishing.
- obesa** 'Anthony' Reeve, **Melania:** 1861, Conch. Icon. **12**, pl. 59, species 469 (Alabama) [Types in the Cuming Collection].
- obliqua** 'Anthony' Tryon, **Gyrotoma:** 1873, Smithsonian Miscellaneous Collection no. 253, Land and Fresh-water Shells of North America, Part 4, Strepomatidae, p. 378 [nude name listed under the synonymy of *Schizostoma incisum* Lea] (Alabama) [Cotypes MCZ 50694].
- occulta, Melania:** 1860, PANSP, p. 57 (Wisconsin [Madison] ) [Holotype MCZ 79427].
- opaca, Melania:** 1860, PANSP, p. 58 (Alabama) [Holotype MCZ 161762].
- opalina, Anodon:** 1865, AJC **1**, p. 159, pl. 14, fig. 2 (Shears Lake [Kent Co.] Michigan) [Holotype MCZ 150633].
- opalinus, Unio:** 1866, AJC **2**, p. 146, pl. 7, fig. 2 (Michigan) [Holotype MCZ 161893]. [This species has been synonymized by Simpson (Catalogue of the Freshwater Mussels, Detroit, Michigan, 1941, **1**, p. 116) under *Lampsilis iris* Lea. An examination of the types, however, places *opalinus* Anthony as a synonym under *L. siliquoides* Barnes and not *iris* Lea].
- ornata, Anculosa:** 1860, PANSP, p. 67 (North Carolina) [Cotypes MCZ 161795].
- ornatum** 'Anthony' Reeve, **Melatoma:** 1861, Conch. Icon., **12**, pl. 2, species 11 (North Carolina, United States) [Coosa River, Alabama] ) [Holotype MCZ 50650].
- osculata**, 'Anthony' Goodrich, **Melania:** 1937 Occasional Papers Museum of Zoology, University of Michigan no. 404, p.4 [error for *M. occulta* Anthony].
- ovalis, Gyrotoma:** 1860, PANSP, p. 65 (Coosa River, Alabama) [Cotypes MCZ 50662].
- pagodiformis, Melania:** 1854, ALNHNY **6**, p. 106, pl. 3, fig. 6 (Battle Creek, Tennessee) [Cotypes MCZ 161833].
- pallida, Anodon:** 1865, AJC **1**, p. 162, pl. 15, fig. 3 (Michigan) [Holotype MCZ 161871].
- pallidula, Melania:** 1854, ALNHNY **6**, p. 115, pl. 3, fig. 15 (Tennessee) [Holotype MCZ 74193].
- papillosa**, 'Anthony' Reeve, **Melania:** 1861, Conch. Icon. **12**, pl. 59, species 467, fig. a-b (Florida) [Cotypes MCZ 50233].
- papyracea, Anodon:** 1865, AJ **1**, p. 161, pl. 15, fig. 2 (locality unknown [Potomac River, Virginia] ) [Holotype MCZ 150656].
- patula, Anculosa:** 1860, PANSP, p. 68 (Tennessee) [Cotypes MCZ 161890].

- paucicosta, Melania:** 1860, PANSP, p. 57 (Tennessee) [Cotypes MCZ 161813].
- paucicostata 'Anthony' Goodrich, Melania:** 1940, University of Michigan, Occasional Papers Museum of Zoology no. 417, p. 14 [error for *M. paucicosta* Anthony].
- paula 'Anthony' Brot, Melania:** 1862, Catalogue systématique des espèces qui composent la Famille des Mélaniens, Genève, p. 40 (no locality given [Kentucky]) [nude name].
- paula 'Anthony' Tryon, Melania:** 1873, Smithsonian Miscellaneous Collections no. 253, Land and Fresh-water Shells of North America, Part 4, Streptomatidae, p. 269 [Listed as a synonym of *Goniobasis sordida* Lea] [Cotypes MCZ 161713].
- peguensis, Monocondyloea:** 1865, AJC **1**, p. 205, pl. 18, fig. 3 [2] (Pegu [British Burma]) [Holotype MCZ 161877].
- peguensis, Unio:** 1865, AJC **1**, p. 351, pl. 25, fig. 2 (Pegu, British Burma) [Holotype MCZ 161875].
- planogyra, Melania:** 1854, ALNHNY **6**, p. 111, pl. 3, fig. 11 (Alabama) [Holotype MCZ 161776].
- planospire, Melania:** 1854, ALNHNY **6**, p. 123, pl. 3, fig. 24 (Tennessee [Kentucky]) [Holotype MCZ 161750].
- plebejus, Melania:** 1850, PBSNH **3**, p. 362 (Saline County, Arkansas) [Cotypes MCZ 161725].
- plebeius, Melania:** emended spelling for *plebejus*.
- plena, Melania:** 1852, ALNHNY **6**, p. 121, pl. 3, fig. 21 (Alabama) [Holotype MCZ 161763].
- ponderosa, Melania:** 1860, PANSP, p. 59 (Tennessee) [Holotype MCZ 92970].
- proscissa, Melania:** 1854, ALNHNY **6**, p. 109, pl. 3, fig. 9 (Alabama) [Holotype MCZ 51326].
- pulchella, Melania:** 1851, PBSNH **3**, p. 361 (Locality not given [Mad River near Springfield Clark Co., Ohio]) [Cotypes MCZ 161728].
- pulcherrima, Melania:** 1860, PANSP, p. 58 (North Carolina) [Cotypes MCZ 161830].
- pupoidea, Melania:** 1854, ALNHNY **6**, p. 104, pl. 3, fig. 3 (Alabama) [Holotype MCZ 161714].
- quadrata, Gyrotoma:** 1860, PANSP, p. 65 (Coosa River, Alabama) [Cotypes MCZ 50678].
- rarinodosa 'Anthony' Reeve, Melania:** 1860, Conch. Icon. **12**, pl. 38 species 268 (United States).
- recta, Gyrotoma:** 1860, PANSP, p. 64 (Coosa River, Alabama) [Cotypes MCZ 50685].
- recta 'Anthony' Reeve, Io:** 1861, Conch. Icon. **12**, pl. 3, species 18 (Tennessee, United States) [Holotype 50554].
- rhombica, Alasmodon:** 1865, AJC **1**, p. 158, pl. 12, fig. 5 (Michigan) [Holotype MCZ 50296].
- rhombica 'Anthony' Reeve, Io:** 1861, Conch. Icon. **12**, pl. 3, species 16 (Southern United States [Tennessee]) [Cotypes MCZ 50557].

- rhombica**, *Melania*: 1854, ALNHNY **6**, p. 116, pl. 3, fig. 16 (Alabama [Tennessee]) [Holotype MCZ 74185].
- rigida**, *Melania*: 1860, PANSP, p. 62 (Tennessee) [Cotype MCZ 161770].
- robulina**, *Melania*: 1850, PBSNH **3**, p. 363, ([Cany Fork] Cumberland River, Tennessee) [Holotype MCZ 51073].
- robusta**, *Gyrotoma*: 1860, PANSP, p. 67 (Coosa River, Alabama) [Cotypes MCZ 50689].
- sacculus** 'Anthony' Reeve, *Unio*: 1864, Conch. Icon. **16**, pl. 15, species 67 (North America) [Types in the Cuming Collection].
- sacculus**, *Unio*: 1865, AJC **1**, p. 157, pl. 12, fig. 3 (Tennessee) [Holotype MCZ 161898].
- salebrosa**, *Gyrotoma*: 1860, PANSP, p. 66 (Coosa River, Alabama) [Holotype MCZ 50687].
- sayana**, *Amnicola*: 1842, [in] S.S.Haldeman, A Monograph of the Fresh-water Univalve Mollusca of the United States, Philadelphia. On the outside of the back cover of no. 4 (no locality given [near Cincinnati, Ohio]) [Cotypes MCZ 142805].
- scabrella** 'Anthony' Reeve, *Melania*: 1861, Conch. Icon. **12**, pl. 51, species 388 (Georgia, United States) [Holotype MCZ 161841].
- scissura** 'Mighels' Anthony, *Apella*: 1843, PANSP, p. 251 [nude name].
- sphaerica** 'Anthony' Prime, *Cyclas*: 1853, PBSNH **4**, p. 275 (Loraine County, Ohio) [Cotypes MCZ 19524].
- sphaericum** 'Anthony' Reeve, *Melatoma*: 1861, Conch. Icon. **12**, pl. 2, species 8 (Coosa River, Alabama) [Holotype MCZ 50697].
- spirostoma**, *Io*: 1860, PANSP, p. 70 (Tennessee) [Holotype MCZ 50553].
- striatella**, *Helix*: 1840, BJNH **3**, p. 278, pl. 3, fig. 2 (Cincinnati [Ohio]) [Cotype MCZ 165522].
- striatissimus**, *Unio*: 1865, AJC **1**, p. 155, pl. 12, fig. 1 ([Clinch River] Tennessee) [Holotype MCZ 17356].
- subangulata**, *Anodon*: 1865, AJC **1**, p. 158, pl. 13, fig. 1 ([Shears Lake, Kent County] Michigan) [Holotype MCZ 150645].
- subangulata**, *Melania*: 1854, ALNHNY **6**, p. 91, pl. 2, fig. 9 (Alabama) [Holotype MCZ 74203].
- subcarinata** 'Anthony' Reeve, *Melania*: 1860, Conch. Icon. **12**, pl. 40, species 282 (United States) [Cotypes MCZ 161817].
- subgibbosa**, *Anodon*: 1866, AJC **2**, p. 144, pl. 6, fig. 2 (Black Lake, Michigan) [Holotype MCZ 161854].
- sub-inflata**, *Anodon*: 1865, AJC **1**, p. 160, pl. 15, fig. 1 (Michigan) [Holotype MCZ 161863].
- subsolida**, *Paludina*: 1844, PANSP **2**, p. 161 (Ohio) [nude name given in a list of shells presented to the Academy by Anthony].
- subsolida**, *Paludina*: 1860, PANSP, p. 71, (Illinois) [Holotype MCZ 161882].
- succinulata**, *Melania*: 1850, PBSNH **3**, p. 363 (Ohio [Clifty Creek, near Madison, Indiana]) [Lectotype MCZ 31066].
- sulcosa** 'Anthony' Reeve, *Anculotus*: 1861, Conch. Icon. **12**, pl. 6, species 44 (Alabama) [Holotype MCZ 73953].

- tabulata, Melania:** 1854, ALNHNY **6**, p. 118, pl. 3, fig. 18 (Tennessee).
- taeniolata, Melania:** 1860, PANSP, p. 59 (Alabama) [Holotype MCZ 161718].
- tecta, Melania:** 1854, ALNHNY **6**, p. 105, pl. 3, fig. 4 ( [Congress Lake] Ohio) [Cotypes MCZ 161685].
- tenebrocineta, Melania:** 1860, PANSP, p. 58 (Tennessee) [Holotype MCZ 161848].
- tenera, 'Anthony' Reeve, Melania:** 1861, Conch. Icon. **12**, pl. 53, species 407 (Alabama) [Cotypes MCZ 36218].
- textilosa, Melania:** 1854, ALNHNY **6**, p. 101, pl. 2, fig. 20 (Georgia) [Holotype MCZ 161740].
- torulosa, Melania:** 1854, ALNHNY **6**, p. 110, pl. 3, fig. 10 [Sinking Spring near Loudon] Tennessee) [Holotype MCZ 79295].
- tracta, Melania:** 1851, PBSNH **3**, p. 361 (Ohio [Tanner's Creek] Dearborn County, Indiana) ) [Holotype MCZ 119098].
- translucens, Goniobasis:** 1865, AJC **1**, p. 36, pl. 1, fig. 1-2 (Canada) [Holotype MCZ 31068].
- turrita, Io:** 1860, PANSP, p. 69 (Tennessee) [Holotype MCZ 50555].
- undososa, Melania:** 1854, ALNHNY **6**, p. 124, pl. 3, fig. 25 (Nolen River, Kentucky) [Holotype MCZ 58407].
- valida, Melania:** 1860, PANSP, p. 59 (Tennessee) [Cotypes MCZ 161774].
- vermetus, Bulimus:** 1841, [in] S.S.Haldeman, A Monograph of the Fresh-water Univalve Mollusca of the United States, Philadelphia. Inside of the back cover of no. 3 (Ohio near Cincinnati). Binney (A Manual of American Land Shells, 1885, p. 409) lists *vermetus* among the spurious species of *Bulimus* and states "is unknown to me, nor during my intimate acquaintance with him, lasting for many years, could he ever give me any information about it." Pilsbry (The Manual of Conchology, 1901, **14**, p. 173) states "is a lost species which American students have not been able to trace." Among Anthony's unpublished notes is the following "The only *Bulimus* herein described is *Bulimus vermetus* and it is somewhat doubtful if this is clearly entitled to be included in that genus. Its round, continuous aperture, it is true, would indicate that as its appropriate position but as some of the *Limnaea* occupy localities nearly or quite as dry as this was found in, and, as but for its connected aperture, it much resembles *L. humilis*, it is not improbable that closer observation may prove it to belong to the later genus. Its unusual thinness and sharp linear form are more indicative of *Limnaea* than they are of *Bulimus*. Only three specimens have as yet been noticed, when numerous individuals shall have been examined some definite conclusions will no doubt be arrived at with regard to its generic character."

Anthony never found any more specimens, or if he did his *vermetus* proved

to be nothing more than malformed *L. humilis* and he no longer kept the specimens separated. We have been unable to find any specimens in the collection labeled *B. veremetus*.

**versipellis, Melania:** 1860, PANSP, p. 60 (Tennessee) [Cotypes MCZ 161809].

**vicina, Melania:** 1854, ALNHNY **6**, p. 114, pl. 3, fig. 14 (Alabama) [Holotype MCZ 74201].

**virens, Melania:** 1854, ALNHNY **6**, p. 93, pl. 2, fig. 11 (Alabama [Tennessee]) [Holotype MCZ 74194].

**viridula, Anculosa:** 1860, PANSP, p. 68 (Tennessee) [Cotypes MCZ 161789].

**viridula, Melania:** 1854, ALNHNY **6**, p. 84, pl. 2, fig. 2 (Tennessee) [Cotypes MCZ 161780].

**vittata, Melania:** 1854, ALNHNY **6**, p. 89, pl. 2, fig. 7 (Alabama [White Co., Georgia]) [Holotype MCZ 50246].

**zebra, Anculosa:** 1860, PANSP, p. 69 (Alabama) [Cotypes MCZ 161793].

\* \* \* \*

#### ANTHONY'S GLUE

The following formula was taken from Anthony's unpublished notes. We have not tried it but if this is Anthony's improved formula it will certainly make an effective glue. Fortunately for us this glue was partially water soluble so that shells and labels were easily removed from their plaques by soaking in water.

"Cut 2 lb Indian Rubber into thin small slices put them into a vessel of tinned sheet iron and 12 to 14 oz. of Sulphide of Carbon — place in another vessel heated to 86° fahrenheit [water bath?] solution rapid.

To keep liquid add:

Cut 1 lb. Caoutchouc into thin small slices, heat them in a suitable vessel over a moderate fire until fluid. Add  $\frac{1}{2}$  lb. of powdered Resin & melt both at moderate heat when fluid add 3 to 4 oz. of spirits of Turpentine gradually in small portions and stir well."

# Occasional Papers On Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

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VOLUME 1

AUGUST 2, 1946

NUMBER 9

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## *Anodonta implicata* Say

By RICHARD I. JOHNSON

Since Thomas Say first described *A. implicata* in 1829, there has been much confusion regarding its identity. This was brought about chiefly by a misunderstanding as to what specific characters separate this species from the other members of the Genus *Anodonta*, and by an absence of good ecologic data.

The following description and remarks are based mainly on a rather extensive collection of this species in the Museum of Comparative Zoölogy. I wish to express my thanks to Dr. H. A. Pilsbry of the Academy of Natural Sciences of Philadelphia and to Dr. H. A. Rehder of the United States National Museum for the privilege of studying the specimens of this species in their collections.

### *Anodonta implicata* Say

*Anodonta implicata* Say 1829, New Harmony [Indiana] Disseminator **2**, no. 22, p. 340 (Pond in Danvers, Massachusetts); Simpson 1914, Descriptive Catalogue of the Naiades, Detroit, Michigan, p. 391; Ortmann 1919, Memoirs Carnegie Museum **8**, p. 159, pl. 11, fig. 2-3; Clench and Russell 1940, Biological Survey of the Connecticut Watershed, Survey Report no. 4, Concord, New Hampshire, p. 224, pl. 4, fig. 1, 5.

*Anodon implicata* Gould 1841, Invertebrata of Massachusetts, p. 118, fig. 78; Edition of Binney 1870, p. 180, fig. 481 (both printed by the State of Massachusetts); DeKay 1843, Zoölogy of New York, Albany, New York, Part 5, Mollusca and Crustacea, p. 202.

*Anodonta newtonensis* Lea 1838, Transactions of the American Philosophical Society **6**, p. 79, pl. 21, fig. 66 (Newtown Creek, New Jersey, near Philadelphia; also Schuylkill, at Fair Mount).

*Anodonta housatonica* Linsley 1845, American Journal of Science, (ser. 1) 48, p. 277 (Housatonic [River] at Corum, Connecticut) [nomen nudum]; Gould 1848, *ibid.*, (2) 6, p. 234, fig. 45.

*Description.* Shell often large, reaching from 130 to 165 mm., rather solid and heavy for an *Anodonta*. Outline elongate-elliptical to elongate-ovate. Valves quite inflated, somewhat sub-cylindrical. Anterior end regularly rounded; posterior end more acutely rounded, older specimens often becoming sub-truncated. Ventral margin slightly rounded, becoming straight or somewhat arcuate in old specimens. Posterior slope slightly compressed, sometimes elevated and slightly alate at the upper posterior angle. Posterior ridge usually well developed and biangulated. Hinge ligament prominent. Beaks well forward of the center, slightly swollen and moderately convex, their sculpture consisting of four or five wavy recurved ridges. Surface of the shell rather smooth, save for growth lines and occasional plaiting of the periostracum. The latter is usually heavy, yellowish brown or greenish brown, sometimes becoming reddish brown or almost black in old specimens. Young specimens are sometimes greenish and may be obscurely rayed. Hinge edentulous, forming a moderately curved line. Beak cavities rather shallow. Muscle scars distinct, well impressed in old specimens. Shell distinctly thickened along the anterior margin below the pallial line. Nacre dull opalescent, generally pale copper, pinkish, or more rarely white or bluish white, usually with a bluish cast toward the margins. There is a difference in the shape of the shell in the two sexes, but it is sometimes difficult to recognize with certainty. The female is usually more swollen than the male in the middle portion of the disk, which tends to make the lower margin more curved and the shell somewhat shorter and higher than that of the male.

	Length	Height	Width				
large (male)	162	77	66 mm.	Agawam River,	Plymouth,	Mass.	
male	116	54	45	"	"	"	"
female	105	60	50	"	"	"	"

*Types.* Thomas Say's type of *A. implicata* does not exist, nor, strictly speaking, does his type locality, since there are no ponds in Danvers, Massachusetts today. We hereby select



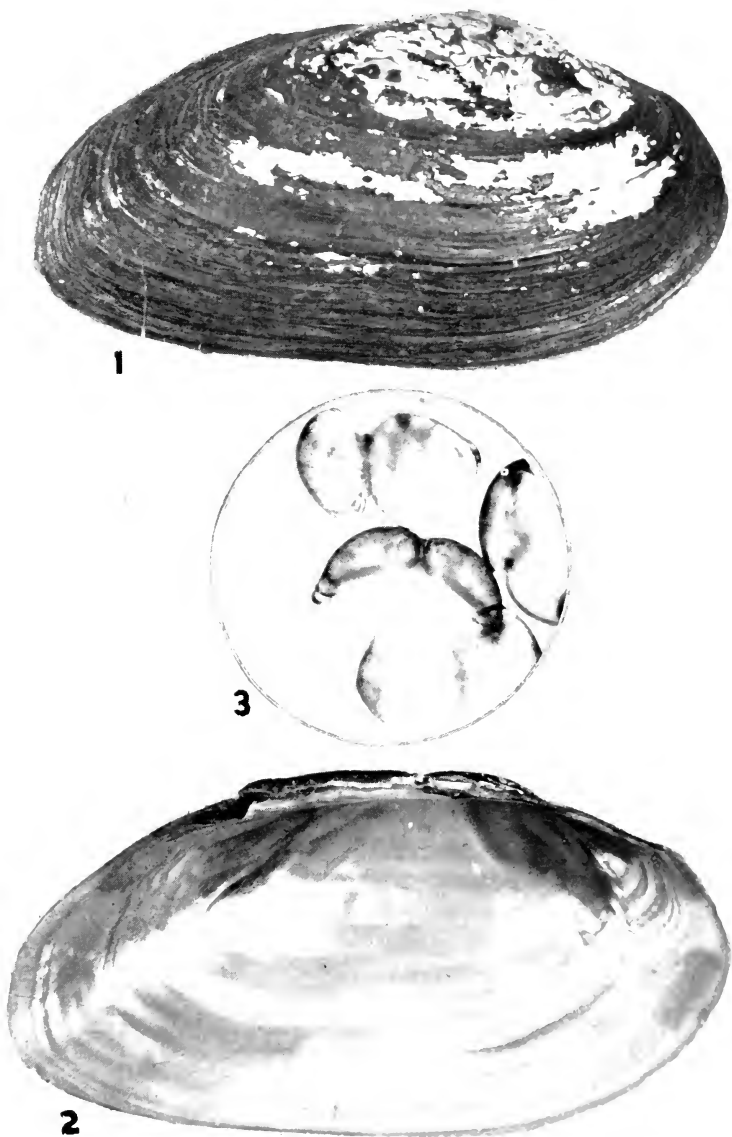


Plate 16. Fig. 1 and 2. *Anodonta implicata* Say. Neoholotype MCZ No. 176769 from the Agawam River, Plymouth, Massachusetts (reduced from 120 mm.) (photographs by F. P. Orchard). Fig. 3. Glochidia, greatly enlarged (photograph by J. R. Miller).

as neoholotype MCZ no. 176769 from the Agawam River (outlet of Halfway Pond), Plymouth, Massachusetts. Neoparatypes from the same locality. This locality is still relatively close to Say's and is about in the center of the range of the species. Dr. Harald Rehder of the United States National Museum has been unable to locate the holotype of Lea's *Anodonta newtonensis*, therefore we select Lea's paratype USNM no. 86561, Schuylkill [River, Fair Mount] near Philadelphia, [Pennsylvania], as lectotype. The location of Linsley's type of *A. housatonia* is uncertain, but it is probably in the A. A. Gould collection, now in the New York State Museum.

*Breeding Season.* According to Ortmann (1911, p. 303) all *Anodonta* are bradyctic, or winter breeders, the marsupia filling sometime in summer between July and September. The eggs develop rapidly, and the glochidia are generally fully developed in September or October. However, they are not then discharged, but are usually carried through the winter in the marsupium and are not set free until warmer weather begins, that is in April, May or June of the following year. I have collected gravid females on May 8, 1943, and on June 9, 1946.

*Glochidia.* The glochidia are typical of the genus *Anodonta*, being rather large, subtriangular, with a spine at the tip of each valve. According to Coker (1921, p. 144) all hooked glochidia generally, though not invariably, attach to the exterior and exposed parts of the fish, the fins and scales. The glochidia of *A. implicata* have been found, by the author, on the gills of the host as well as the fins.

*Host.* The Alewife, *Pomolobus pseudoharengus* (Wilson)<sup>1</sup>, which serves as host for the glochidia of *A. implicata*, ranges from Nova Scotia to North Carolina. "The first alewives appear early in April in the few streams tributary to Massachusetts Bay that they still frequent, but are seldom seen in Maine rivers or in the St. John until late April or early May. Thereafter successive runs follow (the last part of May seeming the

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<sup>1</sup> Identified by W. C. Schroeder, Associate Curator of Fishes, Museum of Comparative Zoölogy.

heaviest) until well into June.”<sup>2</sup> Closely allied to *P. pseudoharengus* is another alewife *Pomolobus aestivalis* (Mitchell), whose range overlaps the former’s, but extends farther south. Although this species has not been examined for glochidia, it might possibly serve as a host to *A. implicata*.

*Distribution.* Simpson (1914, p. 391) gives the range of this species as “St. Lawrence-drainage north to Lake Winnipeg; south in streams flowing into the Atlantic to Virginia.” It is certain that Simpson did not understand this species. So far as known, it ranges from New Brunswick and Nova Scotia south to Virginia, being restricted to ponds and streams near the coast that are frequented by the alewife.

*Ecology.* Although often found in relative abundance in ponds, this species seems to prefer a stream environment, and it is from a relatively swift stream that the largest examples have been taken. It is generally found on a sand or gravel bottom, rarely in mud.

*Records.* NOVA SCOTIA: Grand Lake, Halifax Co. (MCZ). NEW BRUNSWICK: Grand Lake, Queens Co. (MCZ). MAINE: Eastport; St. Georges River, Warren Village; Damariscotta Pond, Lincoln Co.; Portland (all MCZ). MASSACHUSETTS: Merrimac River, Haverhill; Lynn; Horn Pond, Woburn; Upper Mystic Pond, Medford; Fresh Pond, Cambridge; Whitman’s Pond, Weymouth; Weir River, Hingham; Agawam River, Plymouth; Snipatuit Pond, Rochester; Silver Lake, Kingston; Redbrook, Bourne; Megansett; Onset; Harwich (all MCZ). RHODE ISLAND: Cunliff Pond, Providence; Warwick Pond, Warwick (both MCZ). CONNECTICUT: Connecticut River (ANSP); Housatonic River, Corum (Linsley as *A. housatonica*). NEW YORK: Troy (MCZ). NEW JERSEY: Millstone River, Kingston; Outlet of Roosevelt Lake, Metuchen (both MCZ). PENNSYLVANIA: Schuylkill River, near Philadelphia (USNM); Delaware River, Torresdale (ANSP). DISTRICT OF COLUMBIA: Potomac River (USNM).

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<sup>2</sup> Bigelow, H. B., 1925, U. S. Bureau of Fisheries 40, pt. 1, p. 109.

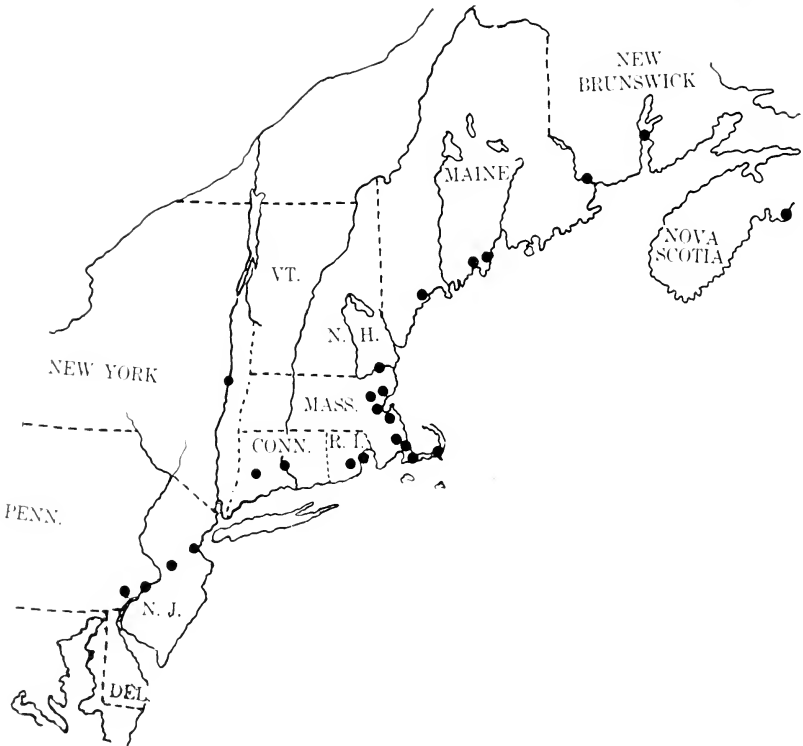


Plate 17. Distributional pattern of *Anodonta implicata* Say in the Northern Atlantic States. Since the plate was prepared an additional record of this species was received from the Potomac River, District of Columbia, which extends the range about one hundred miles farther south. (Map drawn by R.D. Turner)

*Remarks.* Since the original description of this species was based on an immature specimen (measuring 3.5 by 1.5 inches) and was not figured, it has often been confused with other species of *Anodonta*. Nevertheless, traditionally this is the species generally accepted as representing Say's description and to avoid confusion in the future we have selected a neoholotype (see under *Types*) pl. 16, fig. 1-2.

The most reliable and constant feature in identifying adults of this species is the pronounced thickening of the anterior margin below the pallial line. This is not always pronounced in young specimens but may still be detected. In addition, the dark and usually yellowish or brownish, rayless periostracum and the pale copper or salmon color of the nacre will ordinarily serve to distinguish this species from any other *Anodonta* in eastern North America.

This species has never been found in any pond or stream which is not frequented by the alewife. During the last century *A. implicata* was very abundant in Fresh Pond, Cambridge, Massachusetts; but in recent times, since the outlet has been closed, and the alewife no longer frequents the pond, *A. implicata* has become extinct, and today *A. cataracta* is the only *Anodonta* to be found at this locality. At one time *A. implicata* must have been found in many more localities than it is today, but the alewife has become more and more restricted locally in its distribution because of damming and stream pollution, with the result that *A. implicata* also has become extinct over portions of its range.

As has been mentioned, Simpson (1914, p. 391) seems not to have understood this species. Ortmann (1919, p. 161) on the other hand, even with but little material, has described *A. implicata* well, and has listed several records from the extreme coastal region of Pennsylvania, thus indicating he had considerable knowledge of its distribution.

F. C. Baker (1942, p. 75) has erroneously reported this species from several ponds in Carroll Co., New Hampshire, claiming that *A. implicata* and *A. cataracta* are very variable and often difficult to separate. He bases his differences on the beak sculpture and coloration both of which are at best variable characters. He also claims that the periostracum of *A. implicata* is often a vivid green near the posterior end. Baker's speci-

mens were certainly only off-colored *A. cataracta*. In addition he has reported *A. implicata* from Oneida Lake, New York (1916, p. 253, fig. 41, no. 2). Here again, this is another species of *Anodonta*. The figured specimen is not *A. implicata* and the locality, as well, is outside of the known range of the alewife.

\* \* \* \*

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# Occasional Papers On Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

VOLUME 1

AUGUST 10, 1946

80304

NUMBER 10

## A Catalogue of the Genus *Liguus* with a Description of a New Subgenus

By WILLIAM J. CLENCH



Various species and color forms of *Liguus* are found in Hispaniola, Cuba, the Isle of Pines and southern Florida. They are arboreal in habit, feeding mainly on bark-growing lichens and descending from the trees only to lay their eggs in the moist ground. After hatching, the young snails ascend the trees and generally feed first on the leaf-growing lichens, but soon start feeding on the twigs and small branches and then later the lichen-covered bark of the main branches and trunk.

It is possible that this genus may survive on many of the remote hammocks in the Everglades, at least for a time. I doubt very much, however, that they can survive indefinitely, in spite of collecting restrictions, even within a park area. Drainage and the consequent fires during the dry period will reduce their numbers until eventually they will disappear.

The situation in Cuba and Hispaniola has a much brighter outlook, though even on these two islands the same factors are at work and many colonies which were common a few years ago are now extinct. The main difference is that here *Liguus* is far more extensively distributed even though localized as to colonies. They are not at all coextensive with the forested areas.

*Liguus* appear to be colonial in habit. This is certainly true in Hispaniola and Cuba where colonies exist which have very definite limits in the territory they occupy. In Florida the situation is different only because there are very specific limits to the type of habitat they can occupy; i.e., the hammocks or islands of the Everglades and the hammock land of deciduous trees which exists along the Miami ridge and on the lower keys. *Liguus* in this regard is similar to *Cerion* in Cuba. A colony of either may occupy only a small portion of a larger region of uniform habitat. The flora, general geology of the terrain and other factors appear to be exactly the same, yet the snails are found in but a small portion of what appears to be an entirely uniform ecological situation.

*Liguus*, in common with many other land shells, possesses two color phases, exhibited mainly in the embryonic whorls. In the *fasciatus* complex, this color occurs on the parietal wall as well. Thus shells with a similar color pattern will occur with white embryonic whorls and a white parietal area, or with a pink spire tip and parietal area. Unfortunately, classification as to species was arbitrarily made on the basis of white or pink tipped shells. A yellow banded shell with a pink tip was called *Liguus fasciatus roseatus* and a similar yellow banded shell with a white tip was called *Liguus crenatus cingulatus*. Though still separated as "forms" the best grouping is to consider all under the older species name of *fasciatus*. The name *crenatus* is limited to the white shells in the central Cuban region that are all apparent albinistic forms of *Liguus fasciatus* s.s. This classification is, of course, still highly artificial but it is far better than the older procedure where the progeny of a single individual were automatically classified under two species.



The following abbreviations for serials, museums and museum publications are used in order to reduce the length of the references.

ANSP – Academy of Natural Sciences, Philadelphia, Pennsylvania.

JANSP – Journal Academy of Natural Sciences, Philadelphia.

JWAS – Journal Washington [D.C.] Academy of Science.

LFW – In Lower Florida Wilds, by Charles Torrey Simpson, G.P.Putnam's Sons, New York, 1920, p. 15 + 404, frontispiece.

MCZ – Museum of Comparative Zoology, Cambridge, Massachusetts.

✕ M of C – Manual of Conchology, Philadelphia (2) **12**, p. 160–186.

N – Nautilus, Philadelphia.

NM – Nature Magazine, Washington, D.C.

OPBSNH – Occasional Papers Boston Society of Natural History.

PBSW – Proceedings Biological Society of Washington, D.C.

PUSNM – Proceedings United States National Museum, Washington, D.C.

RSM – Revista Sociedad Malacologica, Habana, Cuba.

USNM – United States National Museum, Washington, D.C.

Under the original reference names (bold face type) the following abbreviations are used for the various name combinations.

**L.** – **Liguus**

**L. b.** – **Liguus blainianus**

**L. c.** – **Liguus crenatus**

**L. f.** – **Liguus fasciatus**

**L. fl.** – **Liguus flammellus**

**L. s.** – **Liguus solidus**

The holotypes of the several species described by C.T.Simpson are probably in the collection of the University of Miami (Florida). Those of Ledón and Guitart are in their own private collections. The location of the remainder, not indicated, are unknown to us.

The genus *Liguus* as now understood consists of a multitude of color forms in five species grouped in three subgenera. Some of these color forms may well rank as subspecies as outlined for the Florida groups (Clench and Fairchild 1939, Proc. New England Zoölogical Club **17**, p. 77–86). As yet no attempt has been made to group similarly the many color forms existing in Cuba, particularly those in the *fasciatus* complex.

The following outline classification lists only the subgenera and species, the catalogue lists all of the color forms as well as the higher groups which have been referred to this genus.

Genus **Liguus** Montfort

(Genotype, *Bulla virginea* Linné).

Subgenus **Liguus** Montfort

(Subgenotype, *Bulla virginea* Linné).

*Liguus virgineus* Linné. Hispaniola

Subgenus **Liguellus** Clench (see p. 123)

(Subgenotype, *Achatina vittata* Swainson)

*Liguus vittatus* Swainson. Cuba

Subgenus **Oxystrombus** Mörch

(Subgenotype, *Buccinum fasciatum* Müller)

*Liguus fasciatus* Müller. Florida, Cuba and the Isle of Pines

*Liguus blainianus* Poey. Cuba

*Liguus flammellus* Clench. Cuba

### Catalogue of the genus **Liguus**

**aguayoi** Clench, **L.f.**: 1934, OPBSNH **8**, p. 109, pl. 7, fig. 2 (Punta Roja, Holguin, Cuba) [Holotype MCZ 76696].

**alternatus** Simpson, **L.f.**: 1920, LFW, frontispiece, fig. 8 (Timb's [Timm's] Hammock, Dade Co., Florida) [Paratype MCZ 85895].

**anais** Lesson, **Achatina**: 1840, Revue Zoologie **3**, p. 356 (locality unknown) [is *fasciatus* Muller, Pilsbry 1899, p. 168].

**angelae** Clench and Aguayo, **L.f.**: 1934, OPBSNH **8**, p. 110, pl. 7, fig. 3 (Punta Roja, Holguin, Cuba) [Holotype MCZ 76698].

**archeri** Clench, **L.f.**: 1934, OPBSNH **8**, p. 106, pl. 7, fig. 5 (Mogote de Ramon Millo, Viñales, Cuba) [Holotype MCZ 80901].

**aspirs** 'Gmelin' Reed, **L. blianianus** [sic]: 1946, Mollusca **1**, no. 9, no pagination (Cuba) [nude name; no such name by Gmelin exists. A copy of the original label has just been received from Mr. Reed. The name "*aspirs*" is an error for *Aspiro*, a locality 3 miles north of Santa Cruz de los Pinos, Pinar del Río, Cuba].

**aurantius** Clench, **L.c.**: 1929, N **43**, p. 19 (hammock no. 5, Pinecrest region, central Everglades, Florida) [Holotype MCZ 84624].

**austinianus** Guitart, **L.f.**: 1945, RSM **3**, p. 27, pl. 4, fig. 1-2 (Loma de la Cruz, near Sancti Spiritus, Cuba) [Paratypes MCZ 153819 and 153820].

- barbouri** Clench, L.c.: 1929, N 43, p. 18 (hammock no. 21, Pinecrest region, central Everglades, Florida) [Holotype MCZ 84527] [is *marmoratus* Pilsbry; Clench 1939, p. 85].
- bermudezi** Clench, L.fl.: 1934, OPBSNH 8, p. 122, pl. 6, fig. 2 (Mogote la Gueca, Viñales, Cuba) [Holotype MCZ 80945].
- blainiana** Poey, *Achatina*: 1851, Mem. Sobre la Hist. Nat. de la Isla de Cuba 1, p. 206, pl. 12, fig. 4-6 (Loma de Rangel, Pinar del Río, Cuba) [Cotypes MCZ 154122 and 161228].
- capensis** Simpson, L.c.: 1920, PBSW 33, p. 122 (northwest Cape Sable, Florida) [Paratype MCZ 85892] [is *elliottensis* Pilsbry; Clench 1939, p. 82].
- carbonarius** Clench, L.fl.: 1934, OPBSNH 8, p. 121, pl. 6, fig. 3 (Mogote de Pita, Viñales, Cuba) [Holotype MCZ 80933].
- caribaeus** Clench, L.f.: 1935, N 49, p. 68, pl. 3, fig. 3 (Monte Dios, Santa Lucia, north coast of Pinar del Río, Cuba) [Holotype MCZ 109050].
- caroli** Bartsch, L.c.: 1937, JWAS 27, p. 131, text fig. 1, (Isla Turiguano, north coast of Camagüey, Cuba) [Holotype USNM 428810].
- castaneozonatus** Pilsbry, L.f.: 1912, JANSP (2) 15, p. 460, pl. 39, fig. 23-23a (back of Charles Point, Key Largo, Florida) [Holotype ANSP].
- castaneus** Simpson, L.f.: 1920, PBSW 33, p. 126 (Cox hammock, Paradise Keys, Florida [this locality is just west of Goulds, Florida and not in the region of Paradise Key] ).
- cervus** Clench, L.fl.: 1934, OPBSNH 8, p. 120, pl. 6, fig. 4 (Mogote de Vigil, Viñales, Cuba) [Holotype MCZ 80935].
- Chersina** 'Humphrey' Beck 1836: Index Molluscorum, p. 74; *non* Gray 1831. [As this subgenus was considered a replacement and completely synonymous with *Liguus* by Beck himself, it will automatically take the same genotype, namely *Bulla virginea* Linné.]
- cingulatus** Simpson, L.c.: 1920, PBSW 33, p. 123 (Brickell hammock, Miami, Florida).
- clenchi** Frampton, L.f.: 1932, PBSW 45, p. 56 (hammock no. 46, Pinecrest region, central Everglades, Florida) [is *testudineus* Pilsbry; Clench 1939, p. 85] [Paratypes MCZ 112395].
- crassus** Simpson, L.s.: 1920, PBSW 33, p. 121 (Watson's hammock, Big Pine Key, Florida).
- crenata** Swainson, *Achatina*: 1821, Zoological Illustrations 1, text and pl. 58, fig. 1-2 (Cuba).
- cubensis** Clench, L.fl.: 1934, OPBSNH 8, p. 123, pl. 6, fig. 1 (Mogote la Gueca, Viñales, Cuba) [Holotype MCZ 80951].
- deckerti** Clench, L.f.: 1935, N 48, p. 122, pl. 7, fig. 4 (hammock no. 55, east end of Long Pine Key, south central Everglades, Florida) [Holotype MCZ 81549].
- delicatus** Simpson, L.s.: 1920, PBSW 33, p. 122 (upper end of Lower Matecumbe Key, Florida).
- dohertyi** Pflueger, L.s.: 1934, N 47, p. 121, pl. 13, fig. 2-3 (Lower Matecumbe Key, Florida) [Holotype MCZ 139000].

- dryas** Pilsbry, **L.s.**: 1932, N **45**, p. 106 (No Name Key, Florida); [figured in Pilsbry 1912, JANSF (2) **15**, pl. 37, fig. 16] [Holotype ANSP].
- eburneus** Simpson, **L.c.**: 1920, LFW, frontispiece, fig. 10 (Timb's [Timm's] hammock [near Naranja] Dade County, Florida) [is *elliottensis* Pilsbry; Clench 1939, p. 82].
- elegans** Simpson, **L.f.**: 1920, LFW, frontispiece, fig. 5 (island near and east of Whitewater Bay, Florida) [Paratypes MCZ 85893] [is *lineolatus* Simpson; Clench 1939, p. 84].
- elliottensis** Pilsbry, **L.c.**: 1912, JANSF (2) **15**, p. 447, pl. 37, fig. 3-3b (Elliott's Key, Florida) [Holotype ANSP; Paratypes MCZ 48154].
- emarginata** Swainson, **Achatina**: 1821, Zoological Illustrations **2**, pl. 84 (locality unknown [Jacmel, Haiti; is *virginicus* Linné; Pilsbry 1899, p. 164]).
- excisus** v. Martens, **Liguus**: 1885, Conchologische Mittheilungen **2**, p. 160, 173, pl. 35, fig. 1-2, 4-5 (near Popayan, Colombia) [is in the genus *Hemibulimus*].
- fairchildi** Clench, **L.b.**: 1934, OPBSNH **8**, p. 117, pl. 7, fig. 4 (road between Habana and Santiago de las Vegas, Cuba) [Holotype MCZ 91907].
- farnhami** Doe, **L.c.**: 1937, NM **29**, text fig. 5, no. 6 (Florida) [error for *farnumi* Clench].
- farnumi** Clench, **L.c.**: 1929, N **43**, p. 19 (hammock no. 7, Pinecrest region, central Everglades, Florida) [Holotype MCZ 84586].
- fasciatum** Müller, **Buccinum**: 1774, Vermium Terrestrium et Fluviatilium **2**, p. 145 (The Indies) [Pinar del Río to Camagüey, Cuba].
- feriai** Clench, **L.f.**: 1934, OPBSNH **8**, p. 108, pl. 7, fig. 6 (La Sierra, Holguín, Cuba) [Holotype MCZ 72559].
- flammellus** Clench, **L.fl.**: 1934, OPBSNH **8**, p. 119, pl. 6, fig. 7, (Mogote de Roja, Viñales, Cuba) [Holotype MCZ 80924].
- floridanus** Clench, **L.c.**: 1929, N **43**, p. 20 (hammock no. 8, Pinecrest region, central Everglades, Florida) [Holotype MCZ 84559].
- fuscoflammellus** Frampton, **L.f.**: 1932, PBSW **45**, p. 55 (Timm's hammock, mainland ridge, [near Naranja] Florida).
- gloria-sylvatica** Doe, **L.c.**: 1937, NM **29**, no. 2, p. 83, text fig. 3, no. 7 (Florida) [is *marmoratus* Pilsbry; Clench 1939, p. 85].
- goodrichi** Clench, **L.f.**: 1934, OPBSNH **8**, p. 111, pl. 7, fig. 7 ( $\frac{3}{4}$  mile below Castillo de Jagua, Cienfuegos, Cuba) [Holotype MCZ 59533].
- graphicus** Pilsbry, **L.s.**: 1912, JANSF (2) **15**, p. 463, pl. 37, fig. 1-1a (No Name Key, Florida) [Holotype ANSP].
- guillermi** Guitart, **L.b.**: 1943, RSM **1**, p. 83, text fig. (Horno de Cal de Guara, Prov. of Habana, Cuba) [Paratypes MCZ 153816].
- helianthus** Clench, **L.f.**: 1934, OPBSNH **8**, p. 112, pl. 7, fig. 9 (Mogote del Palmarito, Viñales, Cuba) [Holotype MCZ 80911].
- hepatica** Röding, **Helix**: 1798, Museum Boltenianum **2**, p. 106, no. 1358 [is *fasciatus* Müller; Pilsbry 1929, p. 141].

**Ilotia** Pfeiffer and Clessin: 1881, Nomenclator Heliceorum Viventium, p. 260. Under the synonymy of *Liguus virgineus* Linné, Pfeiffer and Clessin have listed *Ilotia virginea* and *I. puellaris* Bolten [Roding]. Pilsbry (Manual of Conchology (2) 12, p. 164, 1899) following these two authors, did the same. 'Ilotia' Bolten is an error for *Plotia* Bolten. Later Pilsbry and Bequaert (Nautilus 37, p. 36, 1923) made *Plotia lineata* Roding (Pyramidellidae) the genotype of *Plotia*, thus eliminating the possibility that *Plotia* Bolten could be substituted for *Liguus* Montfort. To avoid any later confusion in the use of the name *Ilotia* Pfeiffer and Clessin 1881, it is here designated that *Bulla virginea* Linné is the genotype, thus making it an absolute synonym of *Liguus* Montfort 1810 which has the same genotype.

**innominatus** Pilsbry, L.s.: 1930, N 44, p. 32; figured in the M of C (2) 12, pl. 59, fig. 97, 1899 (No Name Key, Florida) [Holotype ANSP].

**jaumei** Clench and Aguayo, L.b.: 1932, N 45, p. 99, pl. 6, fig. 10 (Mangas, on road between Mangas and Candelaria, Pinar del Rio, Cuba) [Holotype MCZ 91720].

**josefae** Guitart, L.f.: 1945, RSM 3, p. 29, pl. 4, fig. 3-4 (Cortinas de Corenque, Sierra de Cantú, Sancti Spiritus, Cuba) [Paratypes MCZ 153815; Museo Poey].

**leonorae** Pequeño, L.f.: 1938, Memorias Sociedad Cubana Historia Natural 12, p. 347, pl. 26, fig. 1-4 (Monte del Limón, near Cueva de la Pintura, La Grifa, Guane, Pinar del Rio, Cuba).

**lignumvitae** Pilsbry, L.f.: 1912, JANSF (2) 15, p. 461, pl. 37, fig. 4-4d (Lignum Vitae Key, Florida) [Holotype ANSP; Paratypes MCZ 48153].

**Lignus** Gray 1834: Proceedings Zoological Society London 2, p. 66 (? Africa) [genotype, *Lignus tenuis* Gray, monotypic; non *Lignus* Nevill 1878. See also under *Pseudotrochus*].

**Lignus** Nevill 1878: Hand List of Mollusca in the Indian Museum 1, p. 200 [error for **Liguus**; non **Lignus** Gray 1834].

### **Liguellus**, new subgenus

Shells are characterized by being ovate in shape, somewhat smaller than other *Liguus* in size and having moderately convex whorls. The interior of the aperture is generally pink. The color pattern is in spiral arrangement with no axial flames.

Subgenotype, *Achatina vittata* Swainson

This subgenus is closely related to *Liguus* s.s. It possesses a spiral color pattern and the interior of the aperture is pink. It differs from *Liguus* s.s. by having more rounded whorls, being ovate in outline and being smaller in size. It does not appear to be closely related to either *L. fasciatus* or to *L. blainianus* in the subgenus *Oxystrombus*. The number of colors in the spiral pattern is far more limited in *Liguellus*, than in *Liguus* s.s. There is a complete absence of green, red, and purple; colors which are generally present in *L. virgineus*, while *L. vittatus* possesses only black, brown and yellow.

Only a single species (*vittatus*) of *Liguellus* is known to exist and that is rather remarkably uniform in shape and color pattern throughout its rather

limited range in the Province of Oriente, Cuba. It appears to be indifferently sinistral and dextral, that is, most colonies contain specimens of both forms. This is not to be confused with the rare examples of sinistral specimens which may occur sporadically in any color form of the other species of *Liguus*. A few such cases are on record.

- Liguus** Denys de Montfort 1810: *Conchyliologie Systématique* **2**, p. 422 (genotype, *Bulla virginea* Linné, original designation).
- lineata** Valenciennes, **Achatina**: 1827, [in] Humboldt, *Voy. Intér. Amér., Recueil d'Observations de Zoologie* **2**, p. 248, pl. 55, fig. 2 (New Spain), non *lineatus* Simpson 1920.
- lineatus** Simpson, **L.s.**: 1920, LFW, frontispiece, fig. 3, (Lignum Vitae Key, Upper Keys, Florida) [Paratypes MCZ 85888] [is *simpsoni* Pilsbry, non *lineata* Valenciennes 1827; Pilsbry 1921, p. 140].
- lineolatus** Simpson, **L.f.**: 1920, LFW, frontispiece, fig. 2 (Totten's Key, Upper Keys, Florida).
- livingstoni** Simpson, **L.f.**: 1920, PBSW **33**, p. 124, (north end, Brickell hammock, Miami, Florida) [Paratype MCZ 85896] [is *roseatus* Pilsbry; Clench 1939, p. 83].
- lossmanicus** Pilsbry, **L.c.**: 1912, JANSF (2) **15**, p. 448, pl. 37, fig. 8-8b (Lossman's hammock [S.W.] Florida) [Holotype ANSP; Paratypes MCZ 48156].
- lucidovarius** Doe, **L.c.**: 1937, NM **29**, no. 2, p. 82, text fig. 2, no. 6 (Florida) [is *floridanus* Clench; Clench 1939, p. 86].
- lutea** Anton, **Achatina**: 1839, *Verzeich. der Conchylien.*, p. 44, no. 1588 [nude name; non *luteus* Simpson].
- lutea** 'Anton' Pilsbry, **Achatina**: 1899, M of C (2) **12**, p. 168 [is *fasciatus* Müller; Pilsbry 1899, p. 168].
- luteolozonatus** Guitart, **L.c.**: 1945, RSM **3**, p. 30, pl. 4, fig. 5-6 (Finca Ojo de Agua, Lomas de Banao, Sancti Spíritus, Cuba) [Paratypes MCZ 153817; Museo Poey].
- luteus** Simpson, **L.c.**: 1920, PBSW **33**, p. 123 (above Conchtown, Key Vaca, Florida) [Paratype MCZ 85890] [is *lossmanicus* Pilsbry; Clench 1939, p. 83, non *lutea* 'Anton' Pilsbry].
- mariae** Clench, **L.f.**: 1936, N **48**, p. 123, pl. 7, fig. 3 (Ojo de Agua, near Cayo Magueyal, Pinar del Río, Cuba) [Holotype MCZ 94224].
- marmoratus** Pilsbry, **L.f.**: 1912, JANSF (2) **15**, p. 453, pl. 37, fig. 9-9d, 10 (Key Vaca and Chokoloskee, Florida) [Holotype ANSP].
- matecumbensis** Pilsbry, **L.c.**: 1912, JANSF (2) **15**, p. 446, pl. 37, fig. 5-5a (Upper Matecumbe Key, Florida) [Holotype ANSP].
- mcgintyi** Clench, **L.f.**: 1934, OPBSNH **8**, p. 116, pl. 7, fig. 10 (Cueva del Chivo, Mariel, Cuba) [Holotype MCZ 47384].
- miamiensis** Simpson, **L.f.**: 1920, PBSW **33**, p. 124 (Miami hammock [Brickell hammock], Miami, Florida) [is *castaneozoneatus* Pilsbry; Clench 1939, p. 84].

- mosieri** Simpson, L.c.: 1920, PBSW **33**, p. 123 (upper end, Brickell hammock, Miami, Florida) [Paratypes MCZ 85899] [is *elliottensis* Pilsbry; Clench 1939, p. 82].
- multilineatus** Ledón, L.f.: 1944, RSM **2**, p. 13, pl. 3, fig. 2 (Monte del Tarabico, Hoyo de Padilla, Cienfuegos, Cuba) [Paratypes Museo Poey].
- murrea** Reeve, *Achatina*: 1849, Conch. Icon. **5**, pl. 7, fig. 22a-b (locality unknown) [fig. 22a is *fasciatus* Müller, and fig. 22b is *L. f. roseatus* Pilsbry; Clench 1932, p. 106].
- nebulosus** Doe, L.c.: 1937, NM **29**, p. 82, text fig. 2, no. 4 (Florida) [is *floridanus* Clench; Clench 1939, p. 86].
- nobilis** Clench and Aguayo, L.f.: 1932, N **45**, p. 98, pl. 6, fig. 9 (Cayo Juan Tomas, Cabañas Bay, Pinar del Río, Cuba) [Holotype MCZ 47904].
- organensis** Clench, L.fl.: 1934, OPBSNH **8**, p. 124, pl. 6, fig. 8 (Ensenada del Valle, El Queque, Viñales, Cuba) [Holotype MCZ 80958].
- ornatus** Simpson, L.f.: 1920, PBSW **33**, p. 124 (Paradise Key [Royal Palm Park] Florida).
- Orthalicinus** Fischer and Crosse 1878: Mission Scientifique au Mexique Zoologie pt. 7, **1**, p. 436 (subgenotype, *Orthalicus fasciatus* Müller, original designation) [This is a synonym of *Oxystrombus* Mörch; Pilsbry 1899, p. 162].
- osmenti** Clench, L.f.: 1942, Proceedings of the New England Zoological Club **19**, p. 69 (Lower Florida Keys (Pine Islands) Florida) [Holotype MCZ 137792].
- Oxystrombus** 'Klein' Mörch 1852: Catalogus Conchyliorum, p. 21; Mörch 1865, Journal de Conchyliologie **13**, p. 270 [subgenotype here selected, *Buccinum fasciatum* Müller].
- pallida** Swainson, *Achatina*: 1821, Zoological Illustrations **1**, text and pl. 41, fig. 1-2 (locality unknown [Cayo Magueyal, near Cortez, Cuba; Clench 1934, p. 104] ).
- picta** Reeve, *Achatina*: 1842, Proc. Zool. Soc. London **10**, p. 56 (Cuba [Florida] ); 1842 Conchologia Systematica **2**, pl. 178, fig. 10.
- This species very probably came only from Key West, Florida as nothing approximating this species has since been found in Cuba. As *Liguus* was known to occur in Cuba long before any Florida forms were known, unlocalized material was assumed to be Cuban. Very probably *L. picta* was early exterminated. The island of Key West was the only island in the early days that was readily accessible from the sea among the lower Florida Keys. Wood for fuel and other uses was at hand but limited so that the hammock land was soon cleared with a consequent extermination of any *Liguus* population. Also the nearest color form to *picta* is *L. solidus solidulus* which still exists or did exist up to a very short time ago on Stock Island, the next island east of Key West.
- pilsbryi** Clench, L.b.: 1935, N **48**, p. 123, pl. 7, fig. 1 (Campo de Tiro, 7 km. N. of Fierro, Pinar del Río, Cuba) [Holotype MCZ 94213].
- pinarensis** Clench, L.f.: 1934, OPBSNH **8**, p. 115, pl. 6, fig. 9 (Punta del Este, Isle of Pines, Cuba) [Holotype MCZ 58806].

- poeyana** Pfeiffer, **Achatina**: 1857, Malakozologische Blätter **4**, p. 173, pl. 4, fig. 3-4 (Cabo Cruz, Cuba) [is *vittatus* Swainson; Clench 1934, p. 102].
- pseudopictus** Simpson, **L.s.**: 1920, PBSW **33**, p. 122 (upper end of Lower Matecumbe Key, Florida).
- Pseudotrochus** 'Klein' Herrmannsen 1847: Indicis Generum Malacozoorum **2**, p. 341.

Herrmannsen was the first post-Linnean author to use this old name of Klein. He lists only two species, namely, *Achatinam virgineam* Linné and *Cerithium telescopium* Linné. *Achatinam virgineam* Linné is here designated to be the genotype, thus making it an absolute synonym of *Liguus* Montfort which has the same type designation.

In the M of C (2) **12**, 1899, p. 161, Pilsbry clearly indicated *Pseudotrochus* as a synonym of *Liguus* s.s. and credited the genus to Mörch 1852. In a later volume (M of C (2) **16**, 1904, p. 219) he overlooked this earlier usage and dated it from H. and A. Adams 1855 for an African genus. This later use is invalid under the rules of the International Commission of Zoological Nomenclature inasmuch as Herrmannsen's Index and the Catalogue of the Comes de Yoldi Collection by Mörch are accepted publications, and as such, names proposed in them are valid.

*Pseudotrochus* of authors (non Herrmannsen 1847; Mörch 1852; Heilprin 1887; Kittl 1899) will have to take the name *Liguus* Gray 1834, Proceedings of the Zoological Society London **2**, p. 66, with the genotype, *Liguus tenuis* Gray here selected. Gray very probably intended to write *Liguus* to include this species, but he did not correct it in any later volumes of the Proceedings and it is listed in the index as *Liguus*. Neave (Nomenclator Zoologicus **2**, 1939, p. 942) lists it as a validly introduced genus.

- puellaris** 'Roeding' Pfeiffer and Clessin, **Hotia**: 1881, Nomenclator Heliceorum Viventium, p. 260 (Haiti) [is *virginus* Linné, Pfeiffer and Clessin above].
- puellaris** Roeding, **Plotia**: 1798, Museum Boltenianum, p. 96 (no locality given) [is *Bulla virginica* Linné, Roeding above].
- roseatus** Pilsbry, **L.f.**: 1912, JANSF (2) **15**, p. 448, pl. 38, fig. 11-11b (Goodland Point, Marco Island, Lee Co., Florida) [Holotype ANSP].
- roseus** Pilsbry, **L.f.**: 1912, JANSF (2) **15**, p. 461 [error for *roseatus* Pilsbry].
- russelli** Clench, **L.fl.**: 1935, N **48**, p. 125, pl. 7, fig. 2 (Mogote Mina Constancia, Viñales, Cuba) [Holotype MCZ 82980].
- sanchezi** Ledón, **L.f.**: 1944, RSM **2**, p. 11, pl. 3, fig. 3 (Loma de Ponce, pasado el Río Caburni, Trinidad, Province of Las Villas,\* Cuba) [Paratype, Museo Poey].
- sanctispiritensis** Guitart, **L.f.**: 1945, RSM **3**, p. 31, pl. 4, fig. 7-10 (Loma Caja de Agua, Finca Las Delicias, Tuinucú, Sancti Spíritus, Cuba) [Paratypes MCZ 153814; Museo Poey].

\* This is the Province of Santa Clara. The name has recently been changed to Las Villas, a name formerly used for this Province.



- septentrionalis** Pilsbry, **L.c.:** 1912, JANSF (2) **15**, p. 447, pl. 37, fig. 6-6a (New River below Ft. Lauderdale, Florida) [Holotype ANSP].
- simpsoni** Pilsbry, **L.f.:** 1921 N **34**, p. 140 [new name for *lineatus* Simpson 1920, non *lineatus* Valenciennes 1827].
- sinistralis** 'Maltzan' Crosse, **L.:** 1891, Journal de Conchyliologie **39**, p. 129 (Miragoane, Haiti) [is *virginicus* Linné].
- solida** Say, **Achatina:** 1825, JANSF **5**, p. 122 (Florida) [Holotype ANSP].
- solidulus** Pilsbry, **L.s.:** 1912, JANSF (2) **15**, p. 463, pl. 37, fig. 2a (Big Pine Key, Florida [also Stock Island, Key West, Florida]) [Holotype ANSP].
- solisoccasus** de Boe, **L.f.:** 1933, N **47**, p. 68, pl. 6, fig. 5-6 (hammock CC6, central Everglades, Collier Co., Florida) [is *testudineus* Pilsbry; Clench 1939, p. 85] [Paratypes MCZ 40161].
- splendidus** Frampton, **L.s.:** 1932, PBSW **45**, p. 57 (middle hammock, Lower Matecumbe Key, Florida) [Paratypes MCZ 80454].
- subcrenatus** Pilsbry, **L.c.:** 1912, JANSF (2) **15**, p. 445, pl. 37, fig. 7-7a ([east end] Lower Matecumbe Key, Florida) [Holotype ANSP; Paratypes MCZ 48155].
- sulphurea** Mörch, **L.:** 1852, Catalogus Conchyliorum Comes de Yoldi, p. 21 (Cuba) [nude name].
- testa-ovi** Röding, **Helix:** 1798, Museum Boltenianum **2**, p. 106, no. 1359 [is *fasciatus* Müller, Pilsbry 1929, p.141].
- testudineus** Pilsbry, **L.f.:** 1912, JANSF (2) **15**, p. 457, pl. 39, fig. 20-20f (south side of Miami River [Brickell Hammock] Miami, Florida) [Holotype ANSP].
- tigre** Ledón, **L.f.:** 1944, RSM **2**, p. 12, pl. 3, fig. 1 (Monte de Lewis, San Juan, Cienfuegos, Cuba) [Paratypes Museo Poey].
- torrei** Clench, **L.f.:** 1934, OPBSNH **8**, p. 114, pl. 6, fig. 5-6 (Punta del Este, Isle of Pines, Cuba) [Holotype MCZ 58805].
- vacaensis** Simpson, **L.c.:** 1920, PBSW **33**, p. 122 (southwest of Conchtown, Key Vaca, Florida) [is *elliottensis* Pilsbry; Clench 1939, p. 82].
- versicolor** Simpson, **L.f.:** 1920, LFW, frontispiece, fig. 12 (Big Hammock, Long Key [Osteen's hammock, Long Pine Key] Everglades, Florida) [Paratypes MCZ 85894].
- vexillum** Bruguière, **Bulimus:** 1792, Encyclopédie Méthodique **1**, pt. 2, p. 362 (Grandes Indes); non *vexillum* DeKay [is *fasciatus* Müller; Pilsbry 1899, p. 167].
- vexillum** 'Humphrey' DeKay, **Achatina:** 1843, Natural History of New York, Mollusca **5**, p. 56, pl. 4, fig. 56 (Florida); non *vexillum* Bruguière [is *virginicus* Linné; Pilsbry 1899, p. 164].
- vignalensis** 'Pilsbry' Richards, **L. murreus:** 1933, Proceedings Pennsylvania Academy of Sciences **7**, p. 171, [nude name; is *fasciatus* Müller; Clench 1934, p. 102].
- violafumosus** Doe, **L.c.:** 1937, NM **29**, p. 83, text fig. 4, no. 8 (Florida) [is *floridanus* Clench; Clench 1939, p. 86].

- virginea** Linné, **Bulla**: 1767, Systema Naturae, ed. 12, p. 1186 (Rivers of Africa [Hispaniola]).
- viridis** Clench, **L.f.**: 1934, OPBSNH **8**, p. 105, pl. 6, fig. 11 (La Caoba, Dolores, Central Soledad, Cienfuegos, Cuba) [Holotype MCZ 59507].
- vittata** Swainson, **Achatina**: 1822, Zoological Illustrations **2**, text and plate 84, middle figures (locality not given) [Cabo Cruz, Cuba; Pilsbry 1899, p. 166].
- vittata** 'Humphrey' Pfeiffer and Clessin, **Chersina**: 1881, Nomenclator Heliceorum Viventium, p. 260 (Haiti) [is *virginicus* Linné; Pfeiffer and Clessin 1881, p. 260].
- walkeri** Clench, **L.f.**: 1933, N **46**, p. 91, pl. 7, fig. 7-9 (hammock no. 9, Pinecrest region, central Everglades, Florida) [Holotype MCZ 79299] [is *castaneozonatus* Pilsbry; Clench 1939, p. 84].
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# Occasional Papers On Mollusks

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Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

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VOLUME 1

SEPTEMBER 20, 1947

NUMBER 11

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## **Edward Sylvester Morse** **With a Bibliography and a Catalogue of his Species**

*By* MERRILL E. CHAMPION

It is often remarked that scientific men nowadays tend more and more to become specialists, usually in quite narrow fields. Graduate collegiate degrees are the rule rather than the exception. Edward Morse, however, was not of this pattern. He had no college degree and had to educate himself, yet he became outstanding in the fields of zoölogy, ceramics and ethnology; he even got some reputation in astronomy. Four universities gave him honorary degrees. The brief outline of his career which follows is intended to focus attention on some of the accomplishments of this remarkable man.

Edward Sylvester Morse was born in Portland, Maine, June 18, 1838. His father, Johnathan, a partner in a firm dealing in furs, was a deacon in the church and a rather narrow-minded individual who failed to understand this son whose interest centered in the collection and study of mollusks. His mother, more broad-minded and more perceptive than the father, retained a profound influence over Edward as long as she lived. The boy had also a friend of his own age, John M. Gould, of kindred tastes, who through the many years ahead was a source of friendship, encouragement and even of financial aid. Many of Morse's most self-revealing letters were to this friend.

At the age of twenty Edward began a diary which he kept up all his life. This diary serves as a rich source of information about the writer himself, his way of reacting to life, and the chief events of his career.

Young Morse did not take very kindly to the sort of schooling then provided in his native Maine. He got expelled from the Academy at Bridgton and went to work as a draftsman. Returning to another school—this time at Bethel—he received encouragement to continue his interest in natural science, an interest which dated back to his childhood when he had begun to collect shells at the age of twelve. It was while at school in Bethel that he found a mollusk new to science which he named *Helix asteriscus* and reported to the Boston Society of Natural History. This was in 1856 when he was eighteen years old. Two years later he reported another new mollusk to the Boston Society, which he named, *Helix milium*.

In spite of this early introduction to science, Morse evidently failed to get from his early schooling the elementary knowledge of the humanities which high schools are supposed to impart to their students. He had to learn by experience and contact with the world. He did learn and later in life held his own with the best on three continents. His progress can be gauged by the entries in his diary and by his letters.

Edward Morse's scientific interest in malacology did not go unnoticed. Word got round about his cabinet of shells. Judge Cooper came to look it over. William Stimpson, then at the Smithsonian Institution, also made a visit. Results of great import to the future career of Morse followed. First came an invitation from Stimpson to accompany him on a scientific trip to Mount Desert. This had to be refused because of the certain disapproval of the elder Morse. Then there came a letter from W. G. Binney, at that time an outstanding figure in conchology, inviting the young amateur to correspond.

Not long after these events, and following words with his father, "Ned" Morse went to Boston to take a job as a draftsman. This gave him the opportunity of attending the meetings of the Boston Society of Natural History where he saw Louis Agassiz. However, after a short time, out of money, he had to return to Maine.

Up to this point nothing that had happened seemed to give promise of a permanent career in science. Nevertheless events were in the making which were to change the complexion of things for Edward Morse. A visit from another well-known conchologist was the starting point. In May, 1859, P. P. Car-



*Very truly  
Ed. Morse*

1838-1925

Plate 18. From an original photograph

penter, over from England and working at the Smithsonian Institution, called on Morse at Portland to see his shell collection. Not long afterwards a letter came from Carpenter stating that he had told Agassiz of Morse's interest in shells and of his drafting ability. Carpenter went on to say that Agassiz had expressed a wish to see the young conchologist. Morse started for Boston that night. Next day he saw Agassiz, saw the Museum of Comparative Zoölogy with him and was told to return in the fall as a student-assistant at the Museum. This he did on November 1, 1859.

Morse began his Cambridge experiences when he was twenty-one years old. His position was that of student-assistant at the new Agassiz Museum and his salary was \$300 and found. This was to prove an interesting and formative period in Morse's life, both because of the educational opportunities involved and because of personal contacts with Agassiz and with a group of younger men all of whom were to become famous in later life: Verrill, Hyatt, Packard, Shaler, to mention a few. Nevertheless after a time dissatisfaction grew on him. He was not getting all the salary promised him. Agassiz had not paid him anything for the collection of shells he had made in Maine and turned over to the Museum. Then there was the unsettled state of his mind caused by the beginning of the Civil War. Morse wanted to enlist but was being urged not to do so by his mother and his fiancée.

Finally at the end of 1861, after two years at Cambridge, Morse resolved to quit the Museum and go back to Maine in the hope of making a living as a draftsman and lecturer. He made a start at this, doing work for Binney, Bland, Prime and others. Nonetheless the urge to have a share in the Civil War was still with him and led him to enlist on August 25, 1862. Rejected on the physical examination, he went to work for the Portland Cement Company at nine dollars a week. Within a year he married Elizabeth Owen to whom he had long been engaged.

In 1864, one of the disappointments which had been at the bottom of Morse's leaving Cambridge was removed: Agassiz paid him \$250 for the shells given the Museum in 1860. In March of this same year appeared Morse's first long article "Observations on the Terrestrial Pulmonifera of Maine, In-

cluding a Catalogue of all the Species of Terrestrial and Fluviatile Mollusca known to Inhabit the State." Morse did the illustrations himself. This scientific effort brought him appreciation and praise from such men as William Stimpson of the Smithsonian Institution and Isaac Lea, but very little financial return.

During this period, Morse did a good deal of lecturing at which he was quite successful. He was a ready speaker and was able to enliven his talks by blackboard illustrations, using both hands at once.

Back in Portland, Morse continued his interest in malacology. He was made Curator of the Portland Society of Natural History. However, the fire that ravaged Portland in 1866 destroyed the rooms occupied by the Natural History Society. Morse and others saved some of the contents but the job of Curator lapsed for lack of money.

In spite of this setback, the year 1866 saw Edward Morse started on a permanent career. He went to Salem, Massachusetts to make some drawings for a work by Hyatt and Salem became his home for the rest of his life.

In November of this year 1866 Morse and three of his friends, A. S. Packard Jr., Alpheus Hyatt and Frederick W. Putnam, joined in starting a scientific magazine which was given the name of the *American Naturalist*. This publication lasted until 1878. Those interested in Morse's early contributions to malacology have occasion to refer often to the issues of the *American Naturalist*. In fact the leading article in the first number of the new magazine, which is dated March, 1867, was by Morse on the shells of New England.

A large gift of money by the famous philanthropist George Peabody made possible the establishment of the Peabody Academy of Science in 1867 at Salem, Massachusetts. Edward Morse and some of his former companions at the Museum of Comparative Zoölogy became members of the staff, Frederick W. Putnam being named Director. Morse himself served as a curator from 1868 to 1871; as Director from 1880 to 1914; and as Director emeritus from 1914 until his death in 1925.

In 1871 Morse separated himself — temporarily as it turned out — from the Peabody Academy in order to travel throughout the United States giving popular lectures on science. At

the same time research was not neglected, and he lectured on zoölogy at Bowdoin, Maine State and Harvard. This period of the seventies was one of great activity and accomplishment and included academic recognition of his scientific attainments. In 1871 Bowdoin College gave him the degree of Doctor of Philosophy. In 1873 Agassiz invited him to lecture at his Summer School of Science at Pennikese Island in Buzzards Bay, Massachusetts. In 1876 he became vice-president (and in 1886, president) of the American Association for the Advancement of Science. In 1877, Morse turned down an invitation to build up a department of science at Princeton.

Dr. Walter B. Cannon in one of his essays discusses that form of indirection to which the term "serendipity" has been applied. He quotes Horace Walpole regarding the Three Princes of Serendip: "As their highnesses travelled, they were always making discoveries by *accident* or *sagacity*, of things which they were not in quest of." In 1877 Edward Morse gave us a beautiful example of serendipity: he went to Japan to study brachiopods and returned a world authority on Japanese pottery. It came about in this way.

For years Morse had been interested in the brachiopoda which, up to his time, had been classified with the mollusca. Painstaking investigation, however, starting with early fossil forms, convinced him that the brachiopods belong with the worms instead of the mollusks. This represents an outstanding piece of research and was recognized as such throughout the world, drawing a letter of praise from Charles Darwin. Incidentally, the labors that enabled him to write his essay "The Brachiopoda, A Division of Annelida" (1870) resulted in his becoming a convinced Darwinian, thus separating him from the teachings of his old master, Agassiz.

It was these same brachiopods that took Morse to Japan in 1877. Arrived there, he soon made such an impression on the Japanese authorities that they invited him to organize a department of zoölogy at the newly-established Imperial University of Tokyo and to set up a museum of natural history. Morse agreed to sign a two-year contract. Thus, without knowing it, he took the first step on a road that was to lead to fame in an entirely new field of endeavor.

The lucky accident which initiated this -- as given in Dorothy



Wayman's highly interesting and complete biography of Morse—happened as follows. Morse was having some trouble with indigestion in 1878. His Tokyo physician prescribed a five-mile daily walk and a hobby to make the tramp more interesting. The hobby was found by chance. During one of his rambles he came upon a saucer in the form of a shell. This led to a search for similar pieces of pottery. Then his Japanese friends undertook to improve his taste in this field of art and he took lessons from the greatest living Japanese expert. On the death of this expert, Morse became *the* expert himself. Ultimately he became consultant on Japanese pottery to the British Museum, the Royal Museum in Dresden, the Freer Art Gallery and the Boston Museum of Fine Arts. Thus it would seem that Morse as a serendipitist outdid the Princes of Serendip themselves.

One other incident must be mentioned before taking leave of Morse's Japanese experiences. Soon after his arrival in Japan, while travelling by train to Tokyo, he caught sight of some shells on the railroad embankment near the village of Omori. These were fossil *Arca granosa* which Morse considered to be part of a prehistoric kitchen midden. This glimpse into Japanese archaeology formed the basis of a paper on the Shell Mounds of Omori and played its part in determining Morse's relationship to Japan. It is interesting to note that this paper was the first publication of the University of Tokyo.

Late in 1879 Morse returned with his family to Salem, refusing to renew his contract at the Imperial University. Apparently he had become a bit homesick and besides he wanted to finish his research on brachiopods and to do some lecturing and writing. The year following his departure from Japan he was offered and accepted the directorship of the Peabody Museum in Salem—a position which he retained until his death.

In spite of his many activities at home, Morse again felt an urge to visit Japan if only for a short time. This he did in 1883, returning by way of China, France and England.

Pre-eminence in two widely-separated fields of research would seem to most men enough for one lifetime. But not so Edward Morse. While in Japan he became interested in the methods of arrow release of various races. From then on he spent many years in investigation of this field of ethnology.

To him, the progress of civilization was reflected in five types of arrow release. The results of his studies were embodied in a bulletin of the Essex Institute entitled *Ancient and Modern Methods of Arrow-Release* (1885) and a later publication, *Additional Notes on Arrow-Release* (1922).

While president of the American Association for the Advancement of Science, Morse went to England in 1887 as a delegate to a meeting of the corresponding British association. After taking part in their proceedings, he travelled for a while on the Continent, visiting museums in Norway, Denmark, Sweden, Germany and Switzerland and conferring with men interested in his own diversified fields. Again in 1888 he visited Europe, this time as a delegate to the Congress of Americanists in Berlin. His last visit was in 1889 to perfect his collection of pottery.

The remainder of Edward Morse's long life—some thirty-five years—was spent in his native country with Salem, Massachusetts as his home base. His amazing diversity of interests continually led him into new projects and new studies. Not content with being a specialist in zoölogy, Japanese pottery and ethnology, he took up the study of astronomy with Percival Lowell at the Harvard Observatory. He even wrote a book called *Mars and its Mysteries* (1906) which won commendation from at least some of those qualified to judge.

More significant, however, than his excursion into astronomy was the publication of his *Catalogue of Japanese Pottery* (1891)—considered to be unique in its field—and of his journal entitled *Japan Day by Day* (1917). The journal—in two volumes—not only is a mine of information about Japan but throws much light on Morse himself.

For the twenty-year period between 1881 and 1901, Morse published little in the field of zoölogy; then in 1901 appeared his *Observations on Living Brachiopoda*. Other papers followed dealing with various molluscan species. These continued until the end of his life. His last published paper (in 1925) dealt with *Shell Mounds and Changes in the Shells Composing Them*.

On December 20, 1925, Edward S. Morse died at his home in Salem at the age of 87.

Edward Morse's many-faceted nature and surprisingly varied attainments make it hard to get an adequate picture of

him. Those in search of "success stories" can find ample material in his life. To quote Dorothy Wayman once more: "Edward Morse, without esthetic culture, without wealth, without a fully conceived purpose accomplished through his enthusiasm and appreciation the building of an artistic heritage for all humanity." His scientific curiosity led him into various fields of research. Zoölogy, however, was his lifelong interest.

Morse did not describe many mollusks. His taxonomic researches produced one variety, eleven new species, one subgenus, eight genera, and one subfamily. He certainly did not belong to the race of "splitters" who grasp at every chance to create new genera, species or subspecies even if it means merely adding to the synonymy. He quoted with approval Professor Keith's protest against the newer terminology: "Cursed be he that removeth his neighbor's landmarks: and all the people shall say, Amen" (Deuteronomy xxvii: 17). Old and established names, he thought, ought to be let alone and what Morse thought he phrased in vigorous language.

As a zoölogist, Morse was a careful observer, a good draftsman and an indefatigable collector. He wrote well and was notably successful as a lecturer. In fact it may be said that in all of his varied activities he showed originality, boundless energy and enthusiasm, and catholicity of interests. He was an individual who did things, who questioned where others only accepted and who left behind him solid and permanent accomplishments; he was a distinguished scientist and a dynamic personality.

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#### ACKNOWLEDGMENTS

The data on which this account of Morse's life is based come largely from Dorothy G. Wayman's highly interesting and complete biography. Her account has been accepted as the accurate one where disagreement has been encountered among those who have written about Morse.

I am indebted to Mr. L. R. Jenkins, Director of the Peabody

Museum in Salem, Massachusetts for interesting information about his predecessor, Edward Morse and for the opportunity of looking over material pertaining to Morse.

Finally, I wish to acknowledge with thanks the assistance of William J. Clench, especially in the matter of decisions regarding types.

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*A List of Recent Mollusks described by Edward S. Morse with the original references and type localities.*

The initials PBSNH refer to the Proceedings of the Boston Society of Natural History; JPSNH to the Journal of the Portland Society of Natural History; ALNHNY to the Annals of the Lyceum of Natural History of New York; ARPAS to the Annual Report of the Peabody Academy of Science; and MCZ to the Museum of Comparative Zoölogy.

The Museum of Comparative Zoölogy has the original Morse Collection. It has also the shells of the Peabody Museum of Salem and types from the New England (formerly Boston) Society of Natural History, with both of which institutions Morse was connected for much of his life. Nevertheless it has been impossible to trace certain of the Morse types.

**Anguispira:** 1864, JPSNH **1**, no. 1, p. 11, new genus.

**asteriscus, Helix:** 1857, PBSNH **6**, p. 128 (Bethel, Maine) [Lectotype here selected MCZ 17480].

**binneyana, Hyalina:** 1864, JPSNH **1**, p. 13, 61; figs. 25-26; pl. 2, fig. 9; pl. 6, fig. 27 (southern Maine: type locality here restricted to Gorham, Maine) [Lectotype here selected (label marked "author's type") MCZ 11734].

**blandii, Pupilla:** 1865, ALNHNY **8**, p. 211, fig. 8 (Drift on the Missouri River, near Fort Berthold [No. Dakota] ). [Lectotype here selected (label marked "figured specimen") MCZ 13110]. [see, *Pupa blandi* W. G. Binney; U.S. Explorations in Nebraska. Ex. Doc. 35th Congress, 2nd Session, Vol. 2, part. 2, 725 (1859) nude name].

- bollesiana, Isthmia:** 1865, ALNHNY **8**, p. 209, figs. 4-6 (Orono, Maine). [Lectotype here selected (from Peabody Museum, label marked "sp. nov." MCZ 161427)].
- borealis, Ancyclus:** 1864, JPSNH **1**, p. 45, figs. 103-104 (Patten, Maine) [Type cannot be located].
- corpulenta, Isthmia:** 1865, ALNHNY **8**, p. 210, fig. 7 (Little Valley, Washoe Co., Nevada) [Lectotype here selected MCZ 161426].
- ferrea, Striatura:** 1864, JPSNH **1**, p. 17, figs. 36-39; pl. 2, fig. 10; pl. 7, fig. 40 (Maine; type locality here restricted to Gorham Maine) [Lectotype here selected (label marked "type" and "author's type") MCZ 12007].
- Helicodiscus:** 1864, JPSNH **1**, no. 1, p. 5, new genus.
- miliun, Helix:** 1859, PBSNH **7**, p. 28, not figured (Mt. Independence, Westbrook, Maine). [In the Bland Collection at the Museum of Comparative Zoölogy there is a specimen from Morse (MCZ 12029), with the author's label, according to Bland, and marked "author's type" with the locality given as Gorham, Maine. Morse himself, however, in his original description of this mollusk, under "distribution" mentions five Maine localities, none of which is Gorham. Furthermore he says "This little shell I found at Mt. Independence, Westbrook, Me." Westbrook is one of the towns mentioned under "distribution." The Morse Collection in the Museum of Comparative Zoölogy does not contain this type nor can it be found among the Peabody Museum or the Boston Society of Natural History shells].
- novangliae, Cyclocardia:** 1869, ARPAS **1**, p. 76, 2 figs. (Essex County [Mass.]) [Type not located].
- nylanderi, Pyramidula rupestris** var.: 1920, Nautilus **34**, pp. 58-59, 3 figs. (Riley, Maine). [Two specimens only, found by Morse. These cannot be located].
- ovalis, Ancyclus:** 1864, JPSNH **1**, p. 44, figs. 101-102 (Androscoggin River at Bethel, Maine) [Type not located].
- Pallifera:** 1864, JPSNH **1**, no. 1, p. 8, new genus.
- Planogyra:** 1864, JPSNH **1**, no. 1, p. 24, new subgenus.
- Pseudohyalina:** 1864, JPSNH **1**, no. 1, p. 15, new genus.
- Punctinae:** 1864, JPSNH **1**, no. 1, p. 27, new subfamily.
- Punctum:** 1864, JPSNH **1**, no. 1, p. 27, new genus.
- Striatura:** 1864, JPSNH **1**, no. 1, p. 17, new genus.
- Strobila:** 1864, JPSNH **1**, no. 1, p. 26, new genus.
- ventricosa, Isthmia:** 1865, ALNHNY **8**, p. 207, figs. 1-3 (throughout Maine; type locality here restricted to Westbrook, Maine) [Lectotype here selected (from Peabody Museum label marked "nov. sp.," Westbrook, Me.) MCZ 161429].
- Zoogenetes:** 1864, JPSNH **1**, no. 1, p. 32, new genus.

# Occasional Papers On Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

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VOLUME 1

SEPTEMBER 22, 1947

NUMBER 12

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## **Lampsilis cariosa Say and Lampsilis ochracea Say**

By RICHARD I. JOHNSON

Thomas Say described *Lampsilis cariosa* and *Lampsilis ochracea* in the first edition of Nicholson's Encyclopedia which appeared early in the year 1817. The present paper is an attempt to clarify the position of both species, for although they are distinct species, they have often been confused. The paper is based mainly on the extensive collections of both species in the Museum of Comparative Zoölogy and the United States National Museum. I wish to thank Dr. H. A. Rehder for the loan of the National Museum material and Dr. H. A. Pilsbry of the Academy of Natural Sciences of Philadelphia and Dr. J. R. Dymond of the Royal Ontario Museum of Zoölogy for allowing me to examine their collections. I am also indebted to Dr. Henry Vander Schalie of the Museum of Zoölogy of the University of Michigan for several records; to Dr. Gilbert Ranson of the Paris Museum for checking the identification of Lamarck's type of *Unio luteola*; and to Mr. H. D. Athearn for specimens from Massachusetts.

In the text, the initials USNM refer to the United States National Museum; MZM, to the Museum of Zoölogy of the University of Michigan; ANSP to the Academy of Natural Sciences of Philadelphia; and MCZ to the Museum of Comparative Zoölogy.

### **Lampsilis cariosa Say**

*Unio cariosus* Say 1817, Nicholson's Encyclopedia [no pagination], pl. 3, fig. 2 (Delaware and Schuylkill Rivers; [Susquehanna River], Wilkesbarre [Pennsylvania] ).

*Unio luteola* Lamarck 1819, Animaux sans Vertèbres **6**, p. 79 (La rivière Susquehana et celle Mohancks [sic] ).

*Lampsilis pallida* Rafinesque 1820, Annales Générales des Sciences Physiques, Bruxelles **5**, p. 299 (Hudson River).

*Lampsilis ovata* Valenciennes 1833, [in] Humboldt and Bonpland, Voyage des Régions Equinoxiales du Nouveau Continent (2) **2**, p. 266, pl. 50, figs. 1a-c; non Say 1817.

*Lampsilis cariosa* Say, Simpson 1900, Proc. United States Nat. Mus. **22**, p. 528; Simpson 1914, Descriptive Catalogue of the Naiades, Detroit, Michigan **1**, p. 43; Ortmann 1919, Memoirs Carnegie Museum **8**, p. 313, pl. 20, figs. 3-5; Clench and Russell 1940, Biological Survey of the Connecticut Watershed, Survey Report no. 4, Concord, New Hampshire, pl. 4, fig. 4.

*Description.* Shell usually medium in size, about 90 to 100 mm. in length. Outline subovate or obovate, sometimes elliptical; rather short and high, except male specimens which may be somewhat elongated. Valves usually not much inflated. Anterior end regularly rounded, posterior end more broadly rounded and sometimes developed to a distinct blunt point. Ventral margin slightly curved or almost straight. Posterior ridge rounded and poorly defined. Dorsal margin straight or somewhat convex, usually terminating in a blunt angle with the obliquely descending posterior margin. Hinge ligament prominent. Beaks moderately swollen but not much elevated above the hinge line and located at the anterior third of the shell. The sculpture consists of four or five wavy, recurved ridges (see Marshall 1890, p. 182, fig. 8). Periostracum smooth and shining, usually bright wax or straw-yellow, infrequently greenish-yellow, sometimes becoming a dirty brownish-yellow or reddish-brown in old specimens. Rays either entirely absent or, if present, almost always limited to the posterior slope; they are usually greenish or blackish and form a sharp contrast against the light background. Hinge well developed. Pseudocardinals usually two in each valve, those in the left valve being compressed and serrated. The anterior tooth is somewhat triangular, the hinder one is low and rather long, located directly under the beak. The anterior tooth in the right valve is vestigial, the hinder one stumpy, serrated and triangular. Interdentum narrow. Two straight or gently curved laterals, which are somewhat elevated, truncated and raised toward their posterior ends are located in the left valve. One lateral tooth in the right valve. Beak cavities moderately deep, con-

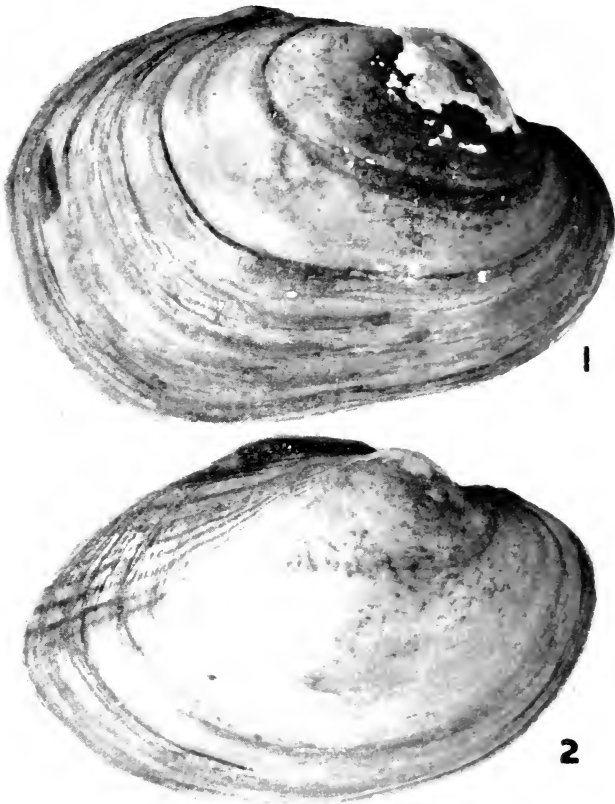


Plate 19. Fig. 1. Female *Lampsilis cariosa* Say. Neoholotype MCZ 178839 from the Schuylkill River, near Philadelphia, Pennsylvania (natural size). Fig. 2. Male *Lampsilis cariosa* Say. Neallotype MCZ 151644 from the Schuylkill River, near Philadelphia, Pennsylvania (natural size) (photographs by F.P.Orchard).

taining dorsal muscle scars. Anterior adductor muscle scars well impressed, posterior ones not very distinct. Pallial line distinct. Nacre bluish-white or tinged with salmon. Sexual differences well marked in the shell. The male shell forms more or less of a point posteriorly, but the female shell is swollen in the post-basal area, which renders the posterior end broadly truncated.

	Length	Height	Width	
large (male)	137	87	58 mm.	Connecticut River, Hadley, Mass.
male (neotype)	73	45	30	Schuylkill River, Philadelphia, Pa.
female (neoholotype)	78	53	35	" " " "

*Anatomy.* Ortmann (1912, p. 353) claims that the anatomy of *L. cariosa* is similar to that of *Lampsilis ovata ventricosa* Barnes.

*Types.* As Thomas Say's type of *Unio cariosa* does not exist, we here restrict the type locality to the Schuylkill River, near Philadelphia, Pennsylvania and select as neoholotype MCZ no. 178839, a female specimen whose measurements correspond approximately to those given by Say in the original description. A male shell from the same locality, MCZ no. 151644 is here selected as neotype. Neoparatypes, United States National Museum no. 84924. Lamarck's type of *Unio luteola* is in the National Museum in Paris. The description and type localities of this species would place it in the synonymy of *L. cariosa*. Lea, however, claimed (1833, Transactions of American Philosophical Society, n.s. 5, p. 91) that the type specimen was identical with *L. siliquoides* Barnes, and as Dr. Gilbert Ranson of the Paris Museum assures me that Lea's identification is correct, it is doubtful if this specimen in question is truly Lamarck's type. The type of Rafinesque's *L. pallida* is not known to exist.

*Breeding Season.* According to Ortmann (1919, p. 315) this species is probably bradyctictic. In Pennsylvania gravid females have been collected in the month of August.

*Host.* The specific host of the glochidia of this species is unknown, but as *L. cariosa* is restricted in its distribution to ponds and streams which drain into the Atlantic, it might possibly parasitize the alewife or some similar migratory fish.

*Distribution.* Simpson (1914, p. 44) gives the range of this species as "the Atlantic drainage from Georgia to the lower St. Lawrence." Ortmann (1919, p. 317) questioned the occurrence of this species in the lower St. Lawrence drainage, but specimens from the Raquette River in New York (a stream which flows into the St. Lawrence River) MCZ no. 97981 seem to be this species and not the closely related *Lampsilis ovata ventricosa* Barnes. Lachford (1882, p. 50) has reported *cariosa* from Black Bay, Eardley, Province of Quebec, and La Rocque and Oughton (1937, p. 152) have reported it from the Lake Ontario drainage and the Ottawa River and its tributaries. Having seen at least a portion of this material at the Royal Ontario Museum of Zoölogy, I am inclined to regard it as misidentified.

Gould (1870, p. 173) reports *L. cariosa* from ponds in Plymouth County, Massachusetts. The author and H. D. Athearn have collected in the area over a period of years and have found only *L. ochracea*. It is probable that Gould's record was based on a misidentification. The most southern record from the Ogeechee River, Georgia is based on a specimen in the Isaac Lea collection USNM no. 84915. It has a rather peculiar brownish-yellow periostracum, but it is undoubtedly this species.

*Ecology.* In general *L. cariosa* prefers the swift waters of larger streams, being found on gravelly bottoms and on sand bars.

*Records.* MAINE: [Penobscot River], Alton; Seven Tree Pond, Union; North Pond, Warren; South Pond, Warren; Chickawaukie Pond, Rockland; Kennebec River, Augusta (all MCZ). MASSACHUSETTS: Merrimac River, Haverhill; Connecticut River at Deerfield, Hadley and Chicopee (all MCZ). CONNECTICUT: Connecticut River, Windsor; Housatonic River, Kent (both USNM). NEW YORK: Raquette River, Potsdam; Champlain Canal; Hudson River, Albany; Canal at Troy; Mohawk River, Mohawk; Eaton (all MCZ). PENNSYLVANIA: Schuylkill River, near Philadelphia; Delaware River, Bucks County; Chester Creek, 18 miles south of Philadelphia; Susquehanna River, Sunbury and Duncannon (all MCZ). DISTRICT OF COLUMBIA: Potomac River (MCZ). NORTH CAROLINA: Neuse River, 5 miles

south of Raleigh (MCZ); Cape Fear River, Cumberland County (USNM). SOUTH CAROLINA: Congaree River (MCZ); [Savannah River] Edgefield and Abbeville Counties (both USNM). GEORGIA: Ogeechee River (USNM).

*Remarks.* As Ortmann (1919, p. 313) has pointed out, DeKay (1843, pl. 21, figs. 243, 244) has figured *Lampsilis ovata ventricosa* and not *L. cariosa*. Although related to the western *L. ovata ventricosa*, *L. cariosa* is quite distinct from it. In general, the latter is a smaller, less inflated shell, with hardly a trace of the posterior ridge which is usually present on the former. *L. cariosa* has a distinctive bright yellow, glossy periostracum; when rays are present they are almost always limited to the posterior slope. *L. ovata ventricosa* usually has a duller, olivaceous tint and is more inclined to be rayed over the entire surface.

Generally *L. cariosa* has been confused with *L. ochracea*. Hartmann and Michener (1874, fig. 183, 184) have figured the two sexes of *L. cariosa*, the male as *cariosa* and the female as *ochracea*. Simpson (1895, Nautilus 8, p. 121), trying to clarify these species, recopied these figures and inadvertently perpetuated the error. Gould (1870, fig. 475) has correctly figured a female specimen of *L. cariosa*, and though Ortmann (1919, p. 215) thought Gould's figure 476 was a male *L. cariosa* it is actually a male *L. ochracea*, the figure being based on a specimen in our collection (MCZ no. 89723).

Simpson (1914, p. 43) placed *Unio oratus* Conrad in the synonymy of *L. cariosa*, but its type locality, the Flint River, Georgia, would indicate that *oratus* is probably close to *L. virescens* Lea and not to our Atlantic drainage species.

#### **Lampsilis ochracea Say**

*Pectunculis Fluvialibus* [sic] Lister 1685, Synopsis Methodicae Conchyliorum, pl. 157, fig. 12 (Virginia).<sup>1</sup>

<sup>1</sup> Gmelin 1791. Systema Naturae, ed. 13, 1, pt. 6, p. 3359, named a shell from Europe *Mytilus fluvialilis*, referring to this figure of Lister as a shell which *approximated* the European shell he was then describing. As he did not specifically apply this name to Lister's figure, the name cannot be used for an American shell. Further, though Conrad (1836, p. 37) considered Lister's figure to represent Say's *L. ochracea*, the figure is sufficiently ambiguous so that Isaac Lea was successful for over fifty years in claiming that *M. fluvialilis* Gmelin was *Anodonta cataracta* Say!



*Unio ochraceus* Say 1817, Nicholson's Encyclopedia **2** [no pagination] pl. 3, fig. 8 (Delaware and Schuylkill Rivers).

*Lampsilis rosea* Rafinesque 1820, Annales Générales des Sciences Physiques, Bruxelles **5**, p. 299 (Hudson River).

*Unio rosaceus* Conrad 1850, Journal Acad. Nat. Sci. Philadelphia (2) **1**, p. 275, pl. 37, fig. 5 (Savannah River, Georgia).

*Unio affinis* var. Sowerby 1866, Conchologia Iconica **16**, pl. 63, fig. 318 *non* Lea 1852.

*Lampsilis ochracea* Say, Simpson 1900, Proc. United States Nat. Mus. **22**, p. 530; Simpson 1914, Descriptive Catalogue of the Naiades, Detroit, Michigan **1**, p. 49; Ortmann 1919, Memoirs Carnegie Museum **8**, p. 318, pl. 20, fig. 6, 7; Clench and Russell 1940, Biological Survey of the Connecticut Watershed, Survey Report no. 4, Concord, New Hampshire, pl. 4, fig. 3.

*Description.* Shell usually rather small, seldom exceeding 70 mm. in length. Rather strong, thin and often translucent. Outline ovate or subovate. Valves subinflated. Anterior end regularly rounded; posterior end usually produced to a blunt point. Ventral margin gently curved. Posterior ridge rounded and not very distinct. Dorsal margin slightly curved, terminating in a blunt angle with the obliquely descending posterior margin. Hinge ligament prominent. Beaks moderately full, but not much elevated above the hinge line; they are located slightly more than one third from the anterior end. Their sculpture consists of several recurved ridges (see Marshall 1890, p. 180, fig. 7). Periostracum smooth or slightly wrinkled, especially in the post-dorsal region. It may be brownish-olive, greenish-yellow, brownish, yellow, reddish-yellow, or grayish-green, and is seldom shiny. Rays may be entirely absent or if present, are often found over the entire surface of the shell to a varying degree. They are usually dull green, rather fine, and often not very distinct. Hinge not well developed. Left valve with two, in rare instances three, long, narrow, somewhat compressed pseudocardinals which are located in front of the beak. Right valve with two triangular, narrow, compressed pseudocardinals, separated by a deep narrow pit. The more anterior tooth is the smaller and lower one. They are both almost parallel to the hinge margin. Interdentum absent. The left valve has two thin gently curved, narrow laterals; the right valve one. Beak cavities shallow, containing dorsal muscle scars well impressed; posterior ones not very distinct. Pallial line not distinct. Nacre silvery-white, bluish-white and iri-

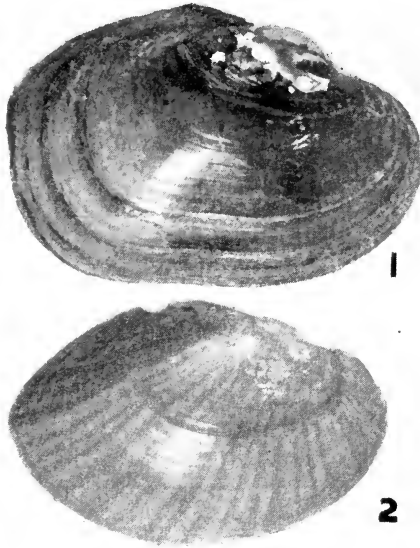


Plate 20. Fig. 1. Female *Lampsilis ochracea* Say. MCZ No. 159150 from Halfway Pond, Plymouth, Massachusetts (natural size). Fig. 2. Male *Lampsilis ochracea* Say. Neoholotype MCZ No. 178838 from the Schuylkill River, near Philadelphia, Pennsylvania (natural size) (photographs by F. P. Orchard).

descent; sometimes salmon or pinkish. Sexual differences similar to those of *L. cariosa* Say, but not always so well marked.

	Length	Height	Width	
large (male)	98	60	47 mm.	Bristol, Pennsylvania
male	65	36	28	Sampson Pond, South Carver, Mass.
female	60	42	26	" " " " "

*Anatomy.* Reardon (1929, p. 1) has made a rather complete study of the anatomy of this species.

*Types.* As Thomas Say's type of *Unio ochracea* does not exist, we here restrict the type locality to the Schuylkill River, near Philadelphia, Pennsylvania and select as neoholotype, MCZ no. 178838, a male specimen measuring 44 mm. in length, 30 mm. in height, and 18 mm. in width. These measurements correspond closely to those given by Say in the original description. Neoparatypes United States National Museum no. 84898. The type of Rafinesque's *L. rosea* is not known to exist. The figured holotype of Conrad's *Unio rosaceus*, is MCZ no. 178779. This specimen and nearly all the examples I have seen from the Savannah River have an attractive rose-tinted nacre.

*Breeding Season.* Lea (1863, Journal Academy of Natural Sciences of Philadelphia n.s. 5, p. 455) reports this species gravid in the autumn. I have found gravid females on May 3, 1943 in Plymouth, Massachusetts.

*Host.* The specific host of the glochidia is unknown, but like *L. cariosa*, *L. ochracea* seems to be restricted in its distribution to ponds and streams which drain into the Atlantic; but unlike *L. cariosa* which ascends rivers for a considerable distance, *L. ochracea* is restricted to the lower regions of streams. In view of the fact that it is found only in waters directly connected with the ocean, it may well parasitize the alewife or some similar migratory fish.

*Distribution.* Simpson (1914, p. 49) gives the range of this species, as "the Atlantic drainage from New England to the Ogeechee River, Georgia." Simpson's record from the Ogeechee River was based on Lea's *U. crocatus* which he placed in the synonymy of *L. ochracea*; however as *U. crocatus* is not

this species, the most southern authentic record of *ochracea* is from the Savannah River, Georgia.

*Ecology.* Unlike *L. cariosa* this species prefers ponds, canals and portions of rivers where the current is not too strong. It is usually found on a sandy or somewhat muddy bottom.

*Records.* MAINE: Seven Tree Pond, Union; South Pond, Warren; Chickawaukee Pond, Rockland (all MCZ). MASSACHUSETTS: Silver Lake, Kingston; Ashumet Pond, Hatchville; Wakeby Pond, Mashpee; Sampson Pond, South Carver; Halfway Pond and South Pond, Plymouth; Middleboro; Monponset Pond, Halifax (all MCZ). CONNECTICUT: Connecticut River (ANSP); Housatonic River, Kent (USNM). NEW YORK: Champlain Canal; Hudson River, Ulster County (both MCZ); Troy (USNM). NEW JERSEY: Delaware River at Burlington and Kaighns Point, Camden (both ANSP); Passaic River (USNM). PENNSYLVANIA: Schuylkill River, near Philadelphia; Delaware River, Bucks County; Bristol (all MCZ). DELAWARE: Seaford, Sussex County (ANSP). DISTRICT OF COLUMBIA: Potomac River; Anacostia River (both MCZ). MARYLAND: Mill Pond, Radcliff River, Chestertown (ANSP); Susquehanna River, Havre de Grace (MZM). VIRGINIA: Petersburg; James River (both USNM); Little Hunting Creek, near Mount Vernon; Canal, Alexandria; Matapike River, Matapike; York River (all MZM). NORTH CAROLINA: Lake Waccamaw, Columbus County (MCZ); Roanoke River, Weldon (USNM). GEORGIA: Savannah River (MCZ and USNM).

*Remarks.* Though *L. ochracea* has often been confused with *L. cariosa* they are quite distinct. In general *L. ochracea* has a thinner, smaller shell and unlike *L. cariosa* which is rarely rayed, *L. ochracea* is often rayed over the entire surface of the shell and has a rougher, duller, more greenish periostracum. The hinges are quite different: the pseudocardinals of *L. cariosa* are pyramidal, and a narrow interdentum is present, but in *L. ochracea* the teeth are lamellar and almost parallel to the hinge line and there is no interdentum.

Frierson (1927, p. 68) claimed that DeKay (1843, pl. 19, figs. 237, 238) correctly figured *L. ochracea*, but I am inclined to

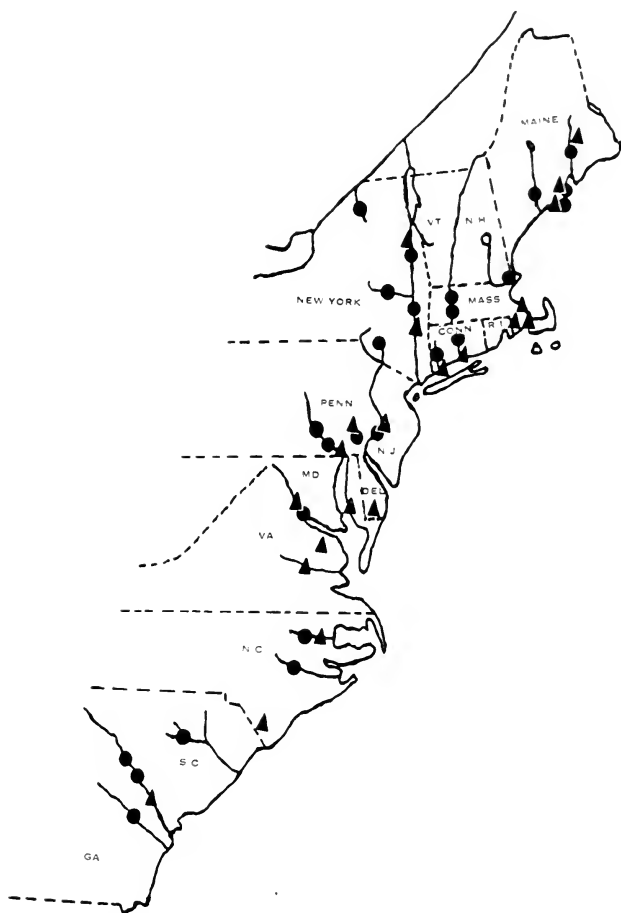


Plate 21. Distributional patterns of *Lampsilis cariosa* Say and *Lampsilis ochracea* Say in Eastern North America. The circles indicate the distribution of *L. cariosa* and the triangles the distribution of *L. ochracea*.

agree with Ortmann (1919, p. 292) that the figures represent *L. radiata* Gmelin.

Simpson (1914, p. 50) placed *Unio crocatus* Lea in the synonymy of *ochracea*, but from an examination of the figured type, USNM no. 84908, here selected as lectotype, it appears to be closer to *Lampsilis constricta* Conrad. Frierson (1927, p. 68) points out that *Unio troostensis* (Conchologia Iconica 1866, **16**, pl. 38, fig. 210) *non* Lea, does not represent *L. ochracea* as thought by Simpson (1914, p. 50) but is *Nodularia aegyptiaca* Cailliaud.

Frierson (1927, p. 68) places *Unio boydianus* Lea in the synonymy of *Lampsilis ochracea* but the figured type, USNM 87126, here selected as lectotype, reveals it to be a young specimen of *Lampsilis siliquoidea* Barnes.

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# Occasional Papers On Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

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VOLUME 1

JUNE 22, 1948

NUMBER 13

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## A Catalogue of the Family Truncatellidae with Notes and Descriptions of New Species

By WILLIAM J. CLENCH AND RUTH D. TURNER

In this report we consider the genera *Truncatella*, *Geomelania*, *Blandiella* and *Taheitia* as members constituting the family Truncatellidae.

The genus *Cecina* A. Adams, generally considered a member of the family Truncatellidae, belongs, in our opinion, to the family Amnicolidae. We have a cotype of *Cecina manchurica* A. Adams (MCZ 178837) and this specimen has all of the characteristics of a member of the latter family. It is dark green in color, devoid of sculpture and is truncated as the result of corrosion rather than mechanical stress.

The radulae of the genera in the Truncatellidae have a central tooth which is triangular, thus differing, so far as we can determine, from other closely allied groups which usually have the central or rachidian tooth subquadrate in outline. Also the adult shell is generally mechanically truncated. This, at first, may seem a superficial character, but nevertheless it has resulted in a definite pattern of profound structural changes in the shell. The loss of the early whorls necessitates the formation of a septum, a rounded and concave plug, in the region of the mid-whorls. Fracture of the early whorls takes place along the outer margin of this septum where it joins the side of the shell. The point of fracture is remarkably constant for any one species, though the number of whorls remaining may vary from four to six or seven, depending upon the species.

This is not in any way to be confused with the corrosive

effect of certain environments which causes the loss of a few of the very early whorls in many freshwater gastropods. This, of course, stimulates the individual to wall off this area with a lime deposit to prevent any subsequent exposure of the soft parts. In the case of members of the Truncatellidae there is a definite reaction when the animal approaches maturity and at this time the plug is formed and the subsequent fracture takes place. It is probably equivalent to the reaction which causes a gastropod to produce a lip on the adult shell, a reaction remarkably different from the one that is responsible for the forward-growing shell structure.

The genus *Truncatella* is widely distributed in the tropical and south temperate coastal regions. In a few areas, notably coastal Europe, it survives beyond these limits. The genus, however, is not present everywhere within its range even when ecological conditions appear favorable. It is sporadic in occurrence and usually exists in isolated colonies. This is probably due to the rather hazardous niche in the environment that they attempt to occupy, namely, the region just below high water line. Becoming established by means of flotsam, a colony flourishes for a time, builds up a population and then succumbs or is scattered by a storm. There appear to be other limitations to its distribution, principally the ability to survive a long journey at sea. So far as we can trace it, the genus has never reached the Hawaiian Islands, nor any other island group in the central Pacific to the east of the Society Islands.

In the Eastern Pacific, *Truncatella* has been recorded only between southern California and Panama. In the Western Atlantic, it occurs from northern Florida south to Trinidad. Though an occasional colony has been found north of Florida, such an occurrence appears to be sporadic.

We are deeply indebted to R. Humes, D. Thaanum, J. R. leB. Tomlin and T. van der Feen for the gift of much valuable material in this family. To C. G. Aguayo, J. Armstrong, C. M. Cooke, C. Guthe and H. A. Rehder we are grateful for the use of the collections under their charge. These collections combined with our own represent well over 2000 lots, approximately 75,000 specimens. This has made possible a far better understanding of the family and its complexities than if we



had depended only upon our own material and such data as we could glean from the published record.

Much is still unknown about this family, particularly regarding the genus *Truncatella*. Field studies are very important and attention is directed toward the variation and extent of costation within single colonies. Nothing, so far as we have been able to determine from the literature, is known about their life histories, such as length of life, breeding habits, mode of dispersal and many other factors that are important to an understanding of geographical distribution.

Synopsis of the genera and subgenera in the Truncatellidae

Genus **Truncatella** *Risso*

Subgenus **Truncatella** *Risso*

Subgenus **Tomlinitella** *Clench and Turner*

Genus **Geomelania** *Pfeiffer*

Subgenus **Geomelania** *Pfeiffer*

Subgenus **Chittia** *H. and A. Adams*

Subgenus **Scalatella** *von Martens*

Subgenus **Merrilliana** *Clench and Turner*

Genus **Blandiella** *Guppy*

Genus **Taheitia** *H. and A. Adams*

We outline below all the known species in *Geomelania* and *Taheitia*. In *Truncatella*, only the synonymies of a few of the Indo-Pacific species are given. We have considered elsewhere the species occurring in the Western Atlantic (*Johnsonia* 2, pp. 149-164, 1948). In the catalogue at the end of this report, however, are listed all of the published names that we have been able to trace in the Truncatellidae.

## Plate 22. Radulae of the Truncatellidae

Fig. 1. *Blandiella reclusa* Guppy

Fig. 2. *Truncatella pulchella* Pfeiffer

Fig. 3. *Taheitia arcasiana abbotti* Clench and Turner

Fig. 4. *Geomelania* (*Geomelania*) *minor* C. B. Adams

Fig. 5. *Geomelania* (*Merrilliana*) *elegans* C. B. Adams

The radulae of the various generic and subgeneric elements in this family so far examined are essentially quite similar. The greatest differences appear to be in the shape of the rachidian teeth and the number of denticles these teeth support on the mid portion.

Comparisons between the few species that we have examined in the genus *Truncatella* show no specific differences in the structure of the radula (*T. pulchella*, *T. bilabiata* and *T. guerini*).

The only radular figures of *Taheitia* that we have seen are those of I. Rensch (1937, pp. 627-630). The rachidian teeth are incompletely drawn and we believe rather inaccurately as to detail.

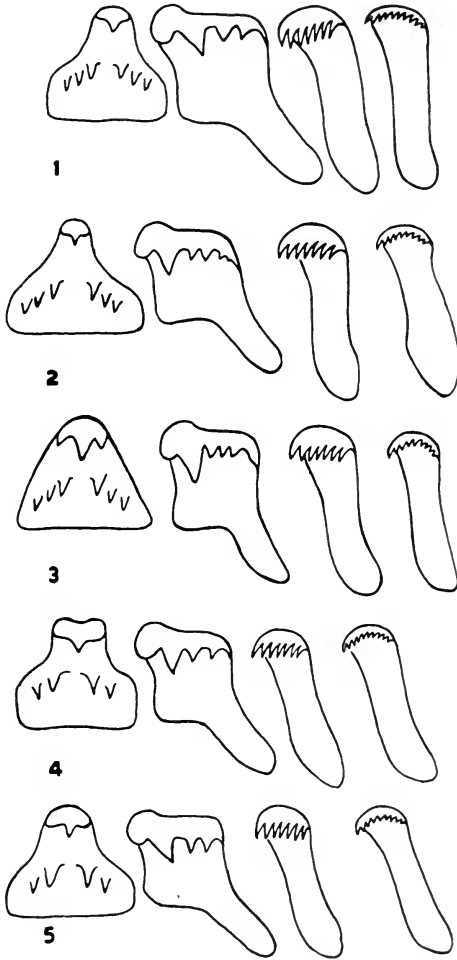


Plate 22  
*Drawn by Ruth D. Turner*

Genus *Truncatella* Risso

*Acmea* of authors, not of Hartmann in Strum's Deutschlands Fauna; Iredale 1915, Proc. Malacological Soc., London **11**, p. 332; Pilsbry 1926, Nautilus **40**, p. 32; Keene 1946, Minutes of the Conchological Club of Southern California no. 56, p. 7.

*Acmea* Hartmann 1821, Neue Alpina **1**, p. 204-212. This use of *Acmea* was for a *Truncatella* but was published after his use of *Acmea* and *Acme* in Strum's Deutschlands Fauna for a species which is not in the genus *Truncatella*.

For a full discussion, see Clench and Turner 1948, *Johnsonia* **2**, p. 151.

*Truncatella* Risso 1826, Histoire Naturelle de l'Europe Méridionale **4**, p. 124; Gude 1921, Fauna of British India, Mollusca **3**, p. 360.

*Fidelis* Risso 1826, Histoire Naturelle de l'Europe Méridionale **4**, p. 121 (genotype, *Fidelis theresa* Risso, monotypic).

*Truncatella* Lowe 1832, Zoological Journal **5**, p. 300 (genotype, *Cyclostoma truncatulum* Draparnaud, monotypic).

*Erpetometra* Lowe 1832, Zoological Journal **5**, p. 300 (genotype, *Cyclostoma truncatulum* Draparnaud, monotypic).

*Choristoma* J. de Cristophori and Jan 1832, Cat. Mus. (Mantissa Test.) p. 3, non Hartmann 1840. [We have not seen this publication.]

*Truncatula* Leach 1847, Annals and Magazine of Natural History (1) **20**, p. 271 (genotype, *Truncatula truncata* Montagu = *truncatus* Montagu = *Helix subcylindrica* Linné, subsequent designation, Clench and Turner 1948, *Johnsonia* **2**, p. 152).

*Zcanoë* Leach 1852, Synopsis of the Mollusca of Great Britain, London, p. 198 (genotype, *Turbo nitida* Adams, monotypic).

*Glaucothoë* Leach 1852, Synopsis of the Mollusca of Great Britain, London, p. 199 (genotype, *Glaucothoe montaguana* Leach, monotypic).

*Herpetometra* 'Lowe' Gray 1856, Proc. Zool. Soc., London, p. 22 [error for *Erpetometra* Lowe].

*Albertisia* Issel 1880, Ann. del Museo Civico di Storia Nat. di Genova **15**, p. 275 (genotype, *Albertisia punica* Issel, monotypic).

*Truncatula* 'Risso' Caziot, 1910, Étude Moll. Princip. Monaco, p. 450 (error for *Truncatella* Risso); non Leach 1847, non Hagenow 1851.

Genotype. *Truncatella laevigata* Risso, subsequent designation, Gude 1921 (= *Helix subcylindrica* Linné).

Shells small, rarely exceeding 10 mm. in length in the adult truncated form. The shell has many whorls but most of these are lost when the animal becomes adult. Sculpture, when present, consists of rather strong axial costae which may extend from suture to suture or disappear on the whorl periphery. In a few species or members of a single species this sculpture may be entirely absent. Operculum paucispiral with or without a thin accessory plate of calcium on its outer surface.

Members of the genus *Truncatella* are prosobranchiate mollusks with the sexes separate, are aquatic or semiaquatic and live in the vicinity of high water line. They rarely occur where there is much brackish water. In relationship they are close to the Bulimidae and Rissoidae.

### Subgenus **Truncatella** *Risso*

*Truncatella* Risso 1826, Histoire Naturelle de l'Europe Méridionale **4**, p. 124.

Subgenotype, *Truncatella laevigata* Risso, subsequent designation, Gude 1921 (= *Helix subcylindrica* Linné).

This subgenus is characterized by having shells which may be smooth or which may exhibit more or less numerous costae. However, costae are seldom completely absent. Operculum corneous, with or without a thin calcified plate on its outer surface.

### **Truncatella (Truncatella) marginata** *Küster*

*Truncatella marginata* Küster 1855, Conchy.-Cab. (2) **1**, pt. 23, p. 12, pl. 2, fig. 24-26 (Labuan, Borneo).

*Truncatella ceylanica* Pfeiffer 1856 [1857] Proc. Zool. Soc. London, p. 336 (Ceylon).

*Truncatella pfeifferi* v. Martens 1861, Malak. Blätt. **7**, p. 43 (Japan).

*Truncatella semicostata* Montrouzier 1862, Jour. de Conchyliologie **10**, p. 243, pl. 9, fig. 10 (Island of Art and New Caledonia).

*Truncatella cerea* Gassies 1878, Jour. de Conchyliologie **26**, p. 339 (Ilot Koutoumo, Ile de Pins, New Caledonia).

*Truncatella nitida* 'Gassies' Garrett 1887, Proc. Zool. Soc. London, p. 300 [nude name].

*Truncatella japonica* Pilsbry and Hirase 1905, Proc. Acad. Nat. Sci. Philadelphia **57**, p. 707 (Futami Island [Japan] ).

This is a dimorphic species, the extremes being strongly costate and completely smooth, As a consequence a host of names have been employed, not only designating these forms but also as a result of the wide geographic range of this species. Differences certainly exist between the two extremes, but there are often connecting forms in a series from one locality. For convenience, the name *teres* Pfeiffer can be retained for the strongly costate forms, *marginata* Küster for those that are nearly smooth and *pellucida* Dohrn for those that are small

and entirely smooth. Geographically there is a slight size difference, but from one locality, the specimens are all approximately the same size. Different localities may show a size difference of nearly 2 mm.

### ***Truncatella marginata* form *teres* Pfeiffer**

*Truncatella teres* Pfeiffer 1856 [1857], Proc. Zool. Soc. London, p. 336 (Isle of Mauritius and Trinity Bay, Australia).

*Truncatella labiosa* Souverbie 1862, Journ. de Conchyliologie **10**, p. 242, pl. 9, fig. 9, (Island of Art [New Caledonia] ).

*Truncatella scalarina* Cox 1867, Proc. Zool. Soc. London, p. 40 (Port Lincoln [South] Australia); 1868, Monograph of Australian Land Shells, p. 93, pl. 15, fig. 10a-b.

### ***Truncatella marginata* form *pellucida* Dohrn**

*Truncatella pellucida* Dohrn 1860, Malak. Blätt. **6**, p. 203 (Arabia).

*Truncatella semicostulata* Jickeli 1874, Nova Acta der Ksl. Leop. Carol. Deutschen Akad. der Naturforsch. **37**, p. 189, pl. 7, fig. 8 (Dahlak [Daalac, Eritrea] ).

*Truncatella quadrasi* v. Möllendorff 1893, Bericht der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt, p. 137, pl. 5, fig. 10a-b (Magalanes, Sibuyan, Philippine Islands).

### ***Truncatella (Truncatella) rustica* Mousson**

Plate 25, fig. 2

*Truncatella rustica* Mousson 1865, Journ. de Conchyliologie **13**, p. 186, pl. 14, fig. 8 (Nucuiona, Uvea [Wallis Island] ).

*Truncatella futunaensis* Mousson 1869, [in] Museum Godeffroy, Hamburg, Catalog 4, p. 76 [nude name]; Mousson 1871, Journ. de Conchyliologie **19**, p. 30 (Futuna Island [Horne Islands] ).

*Truncatella costellifera* Pease 1871, Proc. Zoological Soc., London, p. 468 (Vavau Id. [Tonga Islands] ).

This species is generally very strongly costate and bilabiate. It would appear to be quite rare even though widely distributed. See also remarks under *T. granum* Garrett.

We have seen specimens from the following localities: Uvea (Wallis Island); New Caledonia; Zanzibar; Mombassa, Kenya, East Africa.

So far as we can determine, *T. futunaensis* Mousson is only a rather large *T. rustica*.

**Truncatella (Truncatella) kiusiuensis** Pilsbry

Plate 25, fig. 5

*Truncatella kiusiuensis* Pilsbry 1902, Proc. Acad. Nat. Sciences Philadelphia **53**, p. 615 (Tane-ga-shima, Hirado Hizen, Japan).

This species is very close to *T. rustica* Mousson, differing mainly in that the parietal margin of the lip is in close attachment to the body whorl with no indication of a gap.

We possess specimens from Tane-ga-shima, Awaji and Tsushima-Iki, Japan.

**Truncatella (Truncatella) granum** Garrett

Plate 25, fig. 4

*Truncatella granum* Garrett 1872, American Journal Conchology **7**, p. 225 (N. E. end of Taviuni Id., Fiji Islands).

This is a very small species, about  $4\frac{1}{2}$  mm. long, possessing a duplex lip, a rather strong basal ridge and having a very thin calcareous plate on the operculum. There are about 28 rather narrow and low axial costae on the body whorl.

This species differs quite noticeably from *T. rustica* Mousson by its much smaller size, finer and more delicately formed costae and, especially, in the type of the duplex or bilabiate lip. In *rustica* the lip is a simple duplex formation. In *granum*, however, it actually consists of a strongly developed outer lip, and an inner lip consisting of a series of "nested" aperture margins. This actually causes the aperture to become smaller during late adult life.

**Truncatella (Truncatella) thaanumi**, new species

Plate 25, fig. 6

*Description.* Shell about  $5\frac{1}{2}$  mm. in length. Whorls  $4\frac{1}{2}$  and moderately convex. Color a pale straw-yellow. Aperture small but surrounded by an exceedingly thickened duplex lip with a broad parietal gap. Basal ridge remarkably developed, so much so that it appears below the aperture and merges into the duplex lip. Sculpture consisting of about 20 strong axial blade-like costae which pass over the basal ridge. Operculum with a rather thin calcareous plate.

length	width	
5.5	2.4 mm.	Holotype
6.2	2.8	Yap Island, Caroline Islands
5	2.2	Na Islet, Ponape, Caroline Islands

*Types.* Holotype, Museum of Comparative Zoölogy no. 159379 from Ulali Island, Truk Group, Caroline Islands, ex. D. Thaanum. Paratypes, B. P. Bishop Museum no. 157080 and Museum of Comparative Zoölogy no. 157478, from Na Islet, Ponape Id., Caroline Islands.

*Remarks.* This species appears nearest in its relationships to *T. granum* Garrett. It differs, however, by being larger, having fewer and more blade-like axial ribs and possessing a remarkably developed basal ridge.

*Range.* Known only from the Caroline Islands.

*Records.* CAROLINE ISLANDS: Ulali Island, Truk Group (MCZ); Yap Island (B. P. Bishop Museum and MCZ); Na Islet, Ponape Island (B. P. Bishop Museum and MCZ); Lele, Kusaie Island (B. P. Bishop Museum).

### ***Truncatella thaanumi insularis*, new subspecies**

*Description.* Shell similar in general outline to *thaanumi* with 20–23 blade-like costae on the body whorl. This subspecies differs, however, in being a little larger and in lacking the remarkably developed basal ridge. Both this subspecies and *thaanumi* have a rather broad parietal gap, much greater than that existing in *T. granum*. Operculum may or may not have a thin calcified plate on a chitinous base.

length	width	
6.4	2.3 mm.	Holotype
7.2	2.5	Paratype

*Types.* Holotype, B. P. Bishop Museum no. 87796 from near Houma, Tongatabu, Tonga Islands, H. S. Ladd, collector. Paratypes in the Museum of Comparative Zoölogy.

*Remarks.* This subspecies differs quite sharply from the typical form by the reduction of the basal ridge. Both have



the sleeve-like type of aperture as discussed under *T. granum* Garrett. This subspecies is known only from the type locality.

**Truncatella (Truncatella) avenacea** Garrett

Plate 25, fig. 3

*Truncatella avenacea* Garrett 1887, Proc. Zool. Soc. London, p. 301 (Vanua Levu [Fiji Islands] ).

The B. P. Bishop Museum possesses specimens of this rare species from Vanua Mbalavu collected by Y. Kondo. This locality is in the Lau group of islands which lie to the east of Vanua Levu.

**Truncatella (Truncatella) guerinii** A. and J. B. Villa

Plate 23, fig. 12-13

*Truncatella guerinii* A. and J. B. Villa 1841, Conchyliarum Terrestrium et Fluvialium, Mediolani [Milan], p. 59 (Bourbon [Réunion Id., Indian Ocean] ).

*Truncatella valida* Pfeiffer 1846, Zeitschrift für Malakozoologie **3**, p. 182 (Philippine Islands).

*Truncatella aurantia* Gould 1847 [1848] Proc. Boston Soc. Nat. Hist. **2**, p. 208 (Mangsi Id., Borneo); Gould 1852, United States Exploring Expedition **12**, p. 110, fig. 125a-b.

*Truncatella vitiana* Gould 1847 [1848] Proc. Boston Soc. Nat. Hist. **2**, p. 208 (Fiji Islands); Gould 1852, United States Exploring Expedition **12**, p. 109, fig. 126a-b.

*Truncatella pacifica* Pease 1867, American Journal of Conchology **3**, p. 230, pl. 15, fig. 27 (Insula Oualan (Oualau) [=Ovalau, Fiji Islands] ).

*Truncatella yorkensis* Cox 1868, Monograph of Australian Land Shells, Sydney, p. 93, pl. 15, fig. 11 (Cape York [Queensland] Australia).

*Truncatella cristata* Crosse 1868, Journal de Conchyliologie **16**, p. 177 (locality unknown); Crosse 1871, Journal de Conchyliologie **19**, p. 66, pl. 3, fig. 11 (Tonga Islands).

*Truncatella ferruginea* Cox 1868, Monograph of Australian Land Shells, Sydney, p. 94 (Cape York [Queensland] Australia).

*Truncatella concinna* Pease 1871, Proc. Zool. Society, London, p. 468 (Apaiang [Kingsmill Ids.] ).

*Truncatella semperi* Kobelt 1884, Nachrichtenblatt der Deutschen Malakozoologischen Gesellschaft **16**, p. 52 (Pangongon [?Bohol] Philippine Islands).

*Truncatella fasciata* Tapparone-Canefri 1886, Annali del Museo Civico Storia Naturale, Genova **24**, p. 193, pl. 2, fig. 24 (Wokan Island [Wokam] Aru Islands).

*Description.* Shell small, varying from 6 to 10 mm. in length, generally costate, rather dull and solid. Whorls  $4\frac{1}{2}$  and moder-

ately convex. Color ranging from dull gray to a dull reddish-brown. Spire lengthened and truncated. Suture moderately impressed. Aperture ovate, holostomatous, the inner margin attached to the parietal wall. Outer lip simple, occasionally flaring and somewhat thickened. Basal ridge usually well developed. Shell imperforate or only minutely rimate. Sculpture consisting of numerous axial costae. There are about 30 costae on the body whorl. Partially smooth forms are apparently quite rare. Operculum paucispiral, corneous and generally with a thin calcareous plate on the outer surface. In young specimens the first one to one and a half whorls are smooth, the remaining whorls becoming gradually more strongly costate.

length	width	
6.7	2.7 mm.	Lectotype
9.8	3.5	Batjan Id., Molucca Islands
7.5	3.3	Boga Id., Fiji Islands

*Types.* Lectotype, Museum of Comparative Zoölogy no. 177264 from the Island of Bourbon [Réunion], Indian Ocean, from Villa in the C. B. Adams collection.

We have examined type material of the following species: *concinna* Pease; *ferruginea* Cox; *guerinii* Villa; *pacifica* Pease; *valida* Pfeiffer; *vitiana* Gould; and *yorkensis* Cox.

*Remarks.* This is an extremely widespread species in the Indo-Pacific area. Like most other species of *Truncatella*, it is subject to considerable variation in size, shape and sculpture. This factor has brought about the long synonymy given above. In a large series of this species we have been unable to separate, either as species, subspecies or even valid races, the many named forms that exist.

It is most unfortunate that the better known name of *valida* Pfeiffer must be replaced by *guerinii* A. and J. B. Villa. The lectotype of *guerinii* is smaller than many specimens of the species that we have seen, but even this size occurs in our series from other localities in the Indo-Pacific.

*Range.* Most of Polynesia, Micronesia, Melanesia, Northern Australia, the East Indies, Philippines, southern Japan and west to Portuguese East Africa.

*Records.* SOCIETY ISLANDS: Tahiti (MCZ). MARIANA ISLANDS: Guam (MCZ). PALAU ISLANDS: Koror Id. (D. Thaanum). FIJI ISLANDS: Mbenga Id. (D. Thaanum); Boga Id. (MCZ). NEW CALEDONIA: Art Island; Noumea (both MCZ). SOLOMON ISLANDS: Harapa, Shortland Id. (AMNH); Guadalcanar Id. (MCZ). AUSTRALIA: Somerset, Cape York; Fitzroy Id., Queensland (both MCZ). MOLUCCA ISLANDS: Batjan (D. Fairchild). PHILIPPINE ISLANDS: Calapan, Mindoro; Catanduanes Id.; Malitgog, Leyte; Balabac Id.; Bahía de Ulugan, Palawan (all MCZ). JAPAN: Okinawa, LooChoo Ids. (MCZ). INDIA: Pondicherry (MCZ). INDIAN OCEAN ISLANDS: Nicobar Ids.; Réunion Id.; Mauritius (all MCZ). KENYA COLONY: Mombasa (MCZ).

### Subgenus **Tomlinitella**, new name

*Tomlinella* Clench and Turner 1948, *Johnsonia* 2, p. 159; *non Tomlinella* Viader 1938, Bull. Mauritius Inst. 1, p. 6.

Subgenotype, *Truncatella scalaris* Michaud, original designation.

This subgenus is characterized by possessing only a few, but exceedingly strong, axial costae. So far as known, the costae are always strongly developed with little tendency toward reduction at the periphery of the whorl. These costae seldom if ever group to form a basal ridge. Lip generally duplex, the outer generally being an enlargement of the last costa, the inner being a slightly forward development of the body whorl. Operculum paucispiral and corneous without any accessory calcified plate so far as known.

*Tomlinitella* is known to occur only along the tropical and subtropical coasts of both sides of the Atlantic. Only two species and one subspecies are known so far in this subgenus.

### **Truncatella (Tomlinitella) scalaris** Michaud

*Rissoa scalaris* Michaud 1830, Descr. Genre Rissoa, p. 18 [we have not seen this paper] (locality unknown); Michaud 1832, Descriptions de Plusieurs Nouvelles Espèces de Coquilles du Genre Rissoa (Freminville) 2nd. ed., p. 21, fig. 31-32.

### **Truncatella scalaris piratica** Clench and Turner

*Truncatella scalaris piratica* Clench and Turner 1948, *Johnsonia* 2, no. 25, p. 161, pl. 72, fig. 1-4 (St. George's Causeway, Bermuda).

## Plate 23

- Fig. 1. *Taheitia arcasiana* Crosse. Telenaua, near Varawa Bay, south coast Viti Levu, Fiji Islands (about 5×).
- Fig. 2. *Taheitia arcasiana abbotti* Clench and Turner. Holotype, Lomoloma Hill, Lautoka, Viti Levu, Fiji Islands (about 5×).
- Fig. 3. *Taheitia arcasiana cookei* Clench and Turner. Holotype, Vuni Vatu, central Viti Levu, Fiji Islands (about 5×).
- Fig. 4. *Taheitia soluta* Clench and Turner. Holotype, Bavatu, Vanua Mbalavu, Fiji Islands (about 5×).
- Fig. 5. *Taheitia porrecta* Gould. Tahiti, Society Islands (about 7½×).
- Fig. 6. *Taheitia tongana* Clench and Turner. Holotype, Vaigana, Eua Island, Tonga Islands (about 7½×).
- Fig. 7. *Geomelania (Scalatella) greyana* C. B. Adams. Lectotype, Yallah's Hill, Jamaica (about 7½×).
- Fig. 8. *Geomelania (Merrilliana) elegans* C. B. Adams. Lectotype, Jamaica (about 7½×).
- Fig. 9. *Blandiella reclusa* Guppy. Lectotype, Oropuche Mountains, Trinidad (about 7½×).
- Fig. 10. *Geomelania (Geomelania) media* C. B. Adams. Lectotype, Jamaica (about 5×) = *G. jamaicensis* Pfeiffer.
- Fig. 11. *Geomelania (Chittia) sinuosa* Chitty. Lectotype, Ashly Hall, Trelawny, Jamaica (about 11×).
- Fig. 12. *Truncatella guerinii* Villa. Lectotype, Island of Bourbon (about 5×).
- Fig. 13. *Truncatella valida* Pfeiffer. Cotype, Philippine Islands (about 5×) = *T. guerinii* Villa.
- Fig. 14. *Geomelania (Merrilliana) haitensis* Weinland. South of Coteaux, Dept. du Sud, Haiti, Hispaniola (about 11×).

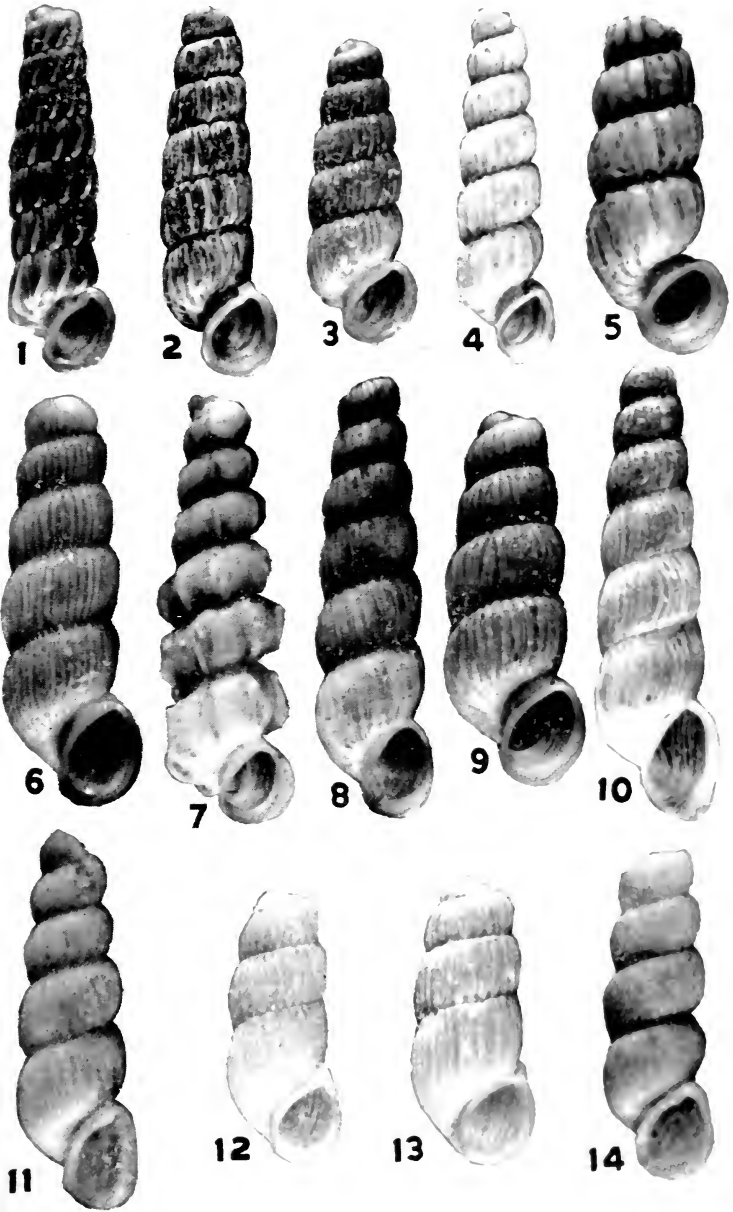


Plate 23

*Photographs by F. P. Orchard*

**Truncatella (Tomlinitella) rostrata** Gould

*Truncatella rostrata* Gould 1847 [1848], Proc. Boston Soc. Nat. Hist. **2**, p. 209 (Rio de Janeiro [Brazil] ); United States Exploring Expedition **12**, p. 111, pl. 8, fig. 128a-b. [This locality is certainly in error, as this species comes from the west coast of Africa. See Clench and Turner 1948, pp. 162-164, pl. 73].

*Truncatella princeps* Dohrn 1866, Malakozoologische Blätter **13**, p. 134, (Ilha do Principe [Princes Island, Gulf of Guinea, Africa] ); Pfeiffer 1867, Novitates Conchologicae **3**, p. 317, pl. 76, fig. 10-11.

\* \* \* \*

Comparatively little published material has appeared upon the genus *Geomelania*. Very fortunately, Sykes (1925) has figured most of the species contained in the Chitty collection: species described by both E. Chitty and C. B. Adams, and a few species loaned from the Adams collection, then at Amherst College.

We have attempted to outline the genus and give such synonymies as appear evident from the material at hand which includes most of the type specimens of the species described by C. B. Adams. However, far more material must be obtained for any real taxonomic understanding of this very complex genus and the distribution of the various specific elements.

**Genus *Geomelania* Pfeiffer**

*Geomelania* Pfeiffer 1845, Proc. Zool. Soc., London, p. 45.

Genotype, *Geomelania jamaicensis* Pfeiffer, monotypic.

Shells elongate, usually truncated in the adult stage, usually sculptured. The axial sculpture, when present, in the form of costae; spiral sculpture seldom present and then consisting only of very fine threads between the costae. The last whorl partially free or adnate. Outer margin of the lip straight or sinuous and sometimes with a small basal extension or with a partially closed sinus near its upper margin. Operculum may be with or without a thin calcified plate on the outer face of a paucispiral chitinized base. In *Geomelania* s.s., the operculum is thin, paucispiral and consists entirely of chitin.

Vendryes (1899, p. 605) reports that *Geomelania greyana* C. B. Adams, *beardsleana* C. B. Adams, and *pygmaea* C. B. Adams possess an external, calcified and rugose plate on the operculum. We have not seen the opercula of these three species.

So far as now known, the genus *Geomelania* occurs in eastern Cuba, southwestern Hispaniola, Jamaica and the Cayman Islands.

The Jamaican species in this genus have been complicated unduly by C. B. Adams. His collection is now in our possession and, with few exceptions, most of his species were based upon very few individuals. He carried to excess the naming of slight variations, and as few of these forms have ever been figured, his names have remained more or less unknown for nearly one hundred years.

*Geomelania*, particularly the subgenus *Geomelania*, exhibits considerable variation in the lip structure, especially in the formation of the tongue-like process on the outer lip. The differences exhibited by many of the specimens named by Adams are due merely to an age factor. In other words, the older the specimen, the greater the degree to which the tongue-like process has been developed. In addition, the curvature of the sigmoid outline (in profile) of the lip has been intensified. These characters were used by Adams to separate individuals into categories under the heading of different species.

### Subgenus *Geomelania* Pfeiffer

*Geomelania* Pfeiffer 1845, Proc. Zool. Soc., London, p. 45.

Subgenotype, *Geomelania jamaicensis* Pfeiffer, monotypic.

Shells elongate, truncated in the adult stage. Generally with numerous strongly developed axial costae. Aperture attached, flaring and possessing a small tongue-like process on the outer lip near its base. Operculum thin, paucispiral and chitinous.

**Geomelania (Geomelania) jamaicensis Pfeiffer**

Plate 23, fig. 10

*Geomelania jamaicensis* Pfeiffer 1845, Proc. Zool. Soc. London **13**, p. 45, (Savanna la Mar, Jamaica); Pfeiffer 1846, Conchy.-Cab. (1) **19**, p. 214, pl. 30, fig. 19-20; Sykes 1905, Proc. Malacological Soc. London **6**, p. 225, fig. 2.

*Geomelania expansa* C. B. Adams 1849, Contributions to Conchology no. 2, p. 18 (Jamaica); Sykes 1925, Proc. Malacological Soc. London **26**, p. 180, pl. 8, fig. 17.

*Geomelania fortis* C. B. Adams 1850, Contributions to Conchology no. 6, p. 94 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 12.

*Geomelania magna* C. B. Adams 1850, Contributions to Conchology no. 6, p. 94 (Jamaica); Sykes 1925, above, p. 179, text figure 2.

*Geomelania gracilis* C. B. Adams 1850, Contributions to Conchology no. 6, p. 95 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 8.

*Geomelania gracilis* var. *parva* C. B. Adams 1850, Contributions to Conchology no. 6, p. 95 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 9; *non parva* Chitty.

*Geomelania procera* C. B. Adams 1850, Contributions to Conchology no. 6, p. 95 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 14.

*Geomelania media* C. B. Adams 1850, Contributions to Conchology no. 6, p. 96 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 11.

*Geomelania alata* 'C. B. Adams' Paetel 1889, Catalog der Conchylien-Sammlung **2**, p. 431 (Jamaica); [nude name].

**Geomelania (Geomelania) typica C. B. Adams**

*Geomelania minor* Pfeiffer 1850, Conchy.-Cab. (1) **19**, p. 214, pl. 30, fig. 21-22 (Jamaica); *non minor* C. B. Adams 1849.

*Geomelania typica* C. B. Adams 1850, Contributions to Conchology no. 6, p. 95 (Jamaica); Sykes 1925, Proc. Malacological Soc. London **26**, p. 180, pl. 8, fig. 18.

*Geomelania typica pygmaea* C. B. Adams 1850, Contributions to Conchology no. 6, p. 96 (Jamaica); *non pygmaea* C. B. Adams 1845.

*Geomelania vicina* C. B. Adams 1850, Contributions to Conchology no. 6, p. 96 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 15.

*Geomelania conica* C. B. Adams 1850, Contributions to Conchology no. 6, p. 97 (Jamaica); Sykes 1925, above, p. 179, text figure 3.

**Geomelania (Geomelania) minor C. B. Adams**

Plate 22, fig. 4

*Geomelania minor* C. B. Adams 1849, Contributions to Conchology no. 2, p. 18 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 13; *non minor* Pfeiffer 1850.

*Geomelania minor denscostata* H. B. Baker 1935, Nautilus **48**, p. 83, pl. 3, fig. 5 (W. of Marshall Pen and E. of Mandeville-Somerset River (Jamaica)).



The species listed below apparently belong in *Geomelania* s.s. No specimens remain in the C. B. Adams collection under these names. The unique type of *G. hilliana* is in the Chitty collection.

***Geomelania* (*Geomelania*) *hilliana* C. B. Adams**

*Geomelania hilliana* C. B. Adams 1851, Contributions to Conchology no. 9, p. 159 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 10.

***Geomelania* (*Geomelania*) *pyramidata* C. B. Adams**

*Geomelania pyramidata* C. B. Adams 1851, Contributions to Conchology no. 9, p. 159 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 16.

***Geomelania* (*Geomelania*) *affinis* C. B. Adams**

*Geomelania affinis* C. B. Adams 1850, Contributions to Conchology no. 6, p. 96 (Jamaica).

*Geomelania jamaicensis* 'Pfeiffer' C. B. Adams 1849, Contributions to Conchology no. 2, p. 18 (Jamaica).

*Geomelania jamaicensis* 'Pfeiffer' Petit 1851, Journal de Conchyliologie **2**, p. 81, pl. 2, fig. 4 (Jamaica).

*Geomelania cunningi* Dean 1933, Journal of Conchology **19**, p. 331, fig. 5-6 [new name for *Geomelania jamaicensis* 'Pfeiffer' C. B. Adams; *non Geomelania jamaicensis* Pfeiffer].

***Geomelania* (*Geomelania*) *peilei* Dean**

*Geomelania peilei* Dean 1933, Journal of Conchology **19**, p. 333, fig. 7-9 (Montpelier, St. James, Jamaica).

***Geomelania* (*Geomelania*) *inornata* Chitty**

*Geomelania inornata* Chitty 1853, Contributions to Conchology, Kingston, Jamaica, no. 1 [13] p. 5 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 19.

***Geomelania* (? subgenus) *pauperata* C. B. Adams**

*Geomelania pauperata* C. B. Adams 1850, Contributions to Conchology no. 6, p. 97 (Jamaica).

This species is not in the Adams collection and apparently not in the Chitty collection in the British Museum.

## Plate 24. Opercula of the Truncatellidae

Fig. 1. *Taheitia arcasiana abbotti* Clench and Turner

Fig. 2. *Truncatella pulchella* Pfeiffer

Fig. 3. *Geomelania (Merrilliana) elegans* C. B. Adams (dotted area indicates muscle scar).

Fig. 4. *Blandiella reclusa* Guppy

Fig. 5. *Taheitia soluta* Clench and Turner (profile view).

Fig. 6. *Taheitia soluta* Clench and Turner

There is a calcareous plate on the operculum in many species of the Truncatellidae. In *Taheitia*, the calcareous plate is greatly developed with an elaborate sculpture and in thickness may be almost as high as the operculum is long (fig. 5-6). *Blandiella reclusa* (fig. 4) also has a thickened calcareous plate but it does not equal the development of this plate in certain species of *Taheitia*. The development of the calcareous plate varies in *Truncatella* and is usually thin when present. It has been reported in certain species of *Geomelania*.

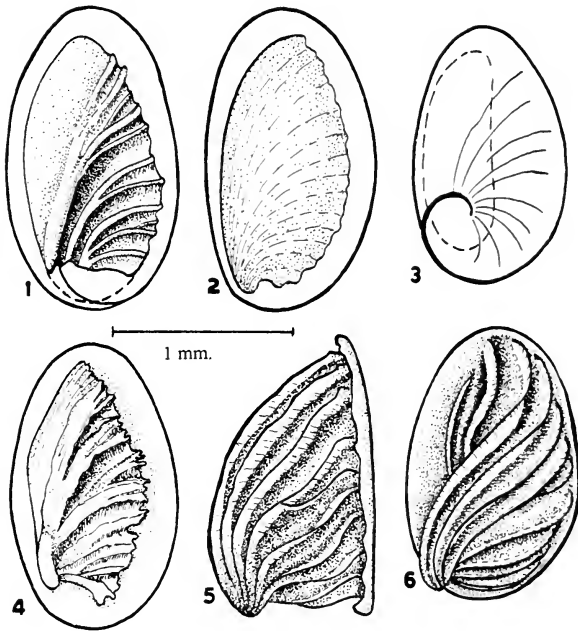


Plate 24  
*Drawn by Ruth D. Turner*

Subgenus **Chittia** *H. and A. Adams*

*Chittia* 'Livesay' H. and A. Adams 1858, The Genera of Recent Mollusca **2**, p. 647.

*Chittya* 'Livesay' Pfeiffer 1865, Mono. Pneumonopomorum Viventium **3**, p. 2 [emendation for *Chittia* H. and A. Adams].

Subgenotype, *Geomelania sinuosa* Chitty, monotypic.

Shells elongate, truncated and sculptured with numerous fine axial costae. Last whorl slightly free near the aperture, holostomatous and with a reflected lip. Near the upper margin of the lip there is a well defined sinus which is somewhat constricted at the margin of the lip. Operculum unknown.

*Geomelania sinuosa* Chitty is the only known species in this subgenus.

**Geomelania (Chittia) sinuosa** *Chitty*

Plate 23, fig. 11

*Geomelania sinuosa* Chitty 1853, Contributions to Conchology no. 1, [no. 13], p. 5 (Ashley Hall, Trelawny, Jamaica); H. and A. Adams, 1858, The Genera of Recent Mollusca **3**, pl. 138, fig. 14.

Subgenus **Scalatella** *von Martens*

*Scalatella* von Martens 1860, Die Heliceen, Leipzig, p. 41.

Subgenotype, *Cylindrella greyana* C. B. Adams, monotypic.

Shells elongate, truncated, sculpture consisting of few but exceedingly high blade-like costae which may be rounded or pointed at the whorl periphery. Last whorl attached or very slightly free at the aperture which is holostomatous. Operculum unknown to us.

Vendryes reports that *G. greyana* C. B. Adams possesses a calcified plate on the operculum.

*Geomelania greyana* C. B. Adams is the only known member of this subgenus.

**Geomelania (Scalatella) greyana** C. B. Adams

Plate 23, fig. 7

*Cylindrella greyana* C. B. Adams 1850, Contributions to Conchology no. 5, p. 82 (Jamaica).

We here select Yallah's Hill, 20 miles E. of Kingston, Jamaica to be the type locality. This is based upon the material (lectotype, MCZ 177215) from E. Chitty who gave the original specimens to C. B. Adams.

Subgenus **Merrilliana**,\* new subgenusSubgenotype, *Truncatella elegans* C. B. Adams.

Shells elongate, truncated in the adult stage, sculpture consisting of numerous fine axial costae. Spiral sculpture, when present, consisting of numerous fine threads between the costae. Aperture holostomatous, ovate, upright to slightly reflected. The last whorl attached or slightly free at the aperture. Operculum thin, paucispiral and chitinous in *C. elegans* C. B. Adams. Vendryes reports (1899, p. 605) that *G. beardseana* C. B. Adams and *pygmaea* C. B. Adams possess a calcified plate on the operculum, but this we have been unable to confirm.

Various species in this subgenus occur in Jamaica, Hispaniola, Cuba and the Cayman Islands. These are as follows:

## JAMAICA

- |                                  |                                       |
|----------------------------------|---------------------------------------|
| <i>G. beardseana</i> C. B. Adams | <i>G. parvulina</i> Clench and Turner |
| <i>G. costulosa</i> C. B. Adams  | <i>G. pygmaea</i> C. B. Adams         |
| <i>G. elegans</i> C. B. Adams    | <i>G. striosa</i> C. B. Adams         |
| <i>G. exilis</i> C. B. Adams     | <i>G. striosa pumila</i> H. B. Baker  |
|                                  | <i>G. jarvisi</i> Sykes               |

## HISPANIOLA

- G. haitensis*
- Weinland

## CUBA

- G. elongata* Pfeiffer  
*G. lirata* Poey

## CAYMAN ISLANDS

- G. alemon*
- Pilsbry

\* Named for Dr. Merrill E. Champion, Research Assistant in the Department of Mollusks, Museum of Comparative Zoölogy.

## SPECIES OF JAMAICA

**Geomelania (Merrilliana) pygmaea** *C. B. Adams*

*Cylindrella* (?) *pygmaea* C. B. Adams 1845, Proc. Boston Society Natural History **2**, p. 14 (Jamaica); *non Geomelania pygmaea* C. B. Adams 1850.

**Geomelania (Merrilliana) parvulina**, new name

*Geomelania parva* Chitty 1853, Contributions to Conchology, Kingston, Jamaica no. 1 [no. 13] p. 6 (Peace River, Manchester, Jamaica); Sykes 1925 Proc. Malacological Soc. London **26**, p. 180, pl. 8, fig. 4; *non parva* C. B. Adams 1850.

**Geomelania (Merrilliana) beardseana** *C. B. Adams*

*Cylindrella beardseana* C. B. Adams 1849, Contributions to Conchology no. 2, p. 19 (Jamaica).

**Geomelania (Merrilliana) elegans** *C. B. Adams*

Plate 22, fig. 5; Plate 23, fig. 8; Plate 24, fig. 3

*Geomelania elegans* C. B. Adams 1849, Contributions to Conchology no. 2, p. 18 (Jamaica); Sykes 1925, above, p. 179, text fig. 1.

**Geomelania (Merrilliana) striosa** *C. B. Adams*

*Geomelania striosa* C. B. Adams 1850, Contributions to Conchology no. 6, p. 96 (Jamaica); Sykes 1925, above, p. 180, pl. 8, fig. 7.

**Geomelania (Merrilliana) striosa pumila** *H. B. Baker*

*Geomelania (Scalatella) striosa pumila* H. B. Baker 1935, Nautilus **48**, p. 83, pl. 3, fig. 6 (eastern end of John Crow Mts., near Portland-St. Thomas boundary, Jamaica).

**Geomelania (Merrilliana) exilis** *C. B. Adams*

*Geomelania exilis* C. B. Adams 1850, Contributions to Conchology no. 6, p. 97 (Jamaica); Sykes 1925, above, p. 179, pl. 8, fig. 6.

**Geomelania (Merrilliana) costulosa** *C. B. Adams*

*Geomelania costulosa* C. B. Adams 1850, Contributions to Conchology no. 6, p. 96 (Jamaica); Sykes 1925, above, p. 179, pl. 8, fig. 5.

**Geomelania (Merrilliana) jarvisi** *Sykes*

*Geomelania jarvisi* E. R. Sykes 1905, Proc. Malacological Soc. London **6**, p. 226, fig. 1 (near Albert Town, Trelawny, Jamaica).

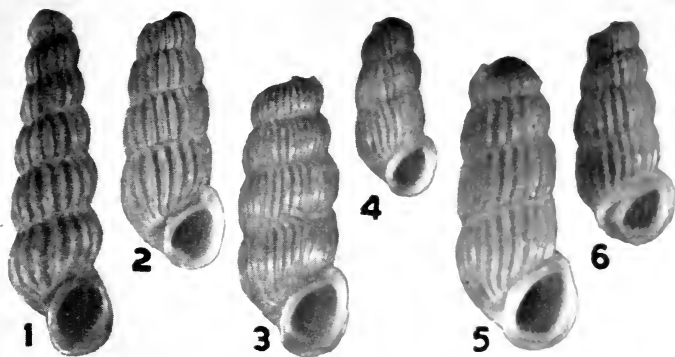


Plate 25

*Photographs by F. P. Orchard*

- Fig. 1. *Taheitia turricula* Mousson. Tuvutha Island, Lau Group, Fiji Islands.
- Fig. 2. *Truncatella rustica* Mousson. Lectotype, Uvea (Wallis Island).
- Fig. 3. *Truncatella avenacca* Garrett. Vanua Mbalavu, Fiji Islands.
- Fig. 4. *Truncatella granum* Garrett. Lectotype, Taviuni Island, Fiji Islands.
- Fig. 5. *Truncatella kiusiuensis* Pilsbry. Paratype, Tane-ga-shima, Hirado, Hizen, Japan.
- Fig. 6. *Truncatella thaanumi* Clench and Turner. Holotype, Ulali Island, Truk group, Caroline Islands.

(All about 5×.)

## SPECIES OF HISPANIOLA

**Geomelania (Merrilliana) haitensis** *Weinland*

Plate 23, fig. 14

*Truncatella (Blandiella) haitensis* Weinland 1876, Malakozoologische Blätter **23**, p. 172 (Mts. near Jérémie, Haiti); Pfeiffer 1876, *ibid.*, p. 233, pl. 2, fig. 12-14.

So far as we can trace, this species has never been recorded since the original publication by Weinland given above. The United States National Museum has several lots, all collected by C. R. Orcutt. We list the following localities based on this material. It would appear that this species occurs only in the "Tiburon" or southwestern peninsula of Haiti.

Mountains near Jérémie (paratypes MCZ no. 90391); Couteau; Dalmarie; Damassins; Les Cayes; Ravine west of Metesignix; St. Louis; south of Trou Sardines.

## SPECIES OF CUBA

**Geomelania (Merrilliana) lirata** *Poey*

*Truncatella lirata* Poey 1858, Memorias sobre la Historia Natural de la Isla de Cuba **2**, p. 25, 89 (Gibara, Holguín, Cuba).

*Truncatella wrighti* Pfeiffer 1862, Malakozoologische Blätter **9**, p. 127 (Yateras, Guantánamo, Cuba).

**Geomelania (Merrilliana) elongata** *Pfeiffer*

*Truncatella elongata* 'Poey' Pfeiffer 1856, Monographia Auriculaceorum Viventium **1**, p. 193; Poey 1858, Memorias sobre la Historia Natural de la Isla de Cuba **2**, p. 25, 89 (Oriente, Cuba [Gibara, Holguín, Cuba]).

*Truncatella filicosta* 'Gundlach' Poey 1858, Memorias sobre la Historia Natural de la Isla de Cuba, Habana **2**, p. 90 (Caimanera, Guantánamo, Cuba).

## SPECIES OF THE CAYMAN ISLANDS

**Geomelania (Merrilliana) alemon** *Pilsbry*

*Geomelania alemon* Pilsbry 1942, Nautilus **56**, p. 3, pl. 1, fig. 9 (Boilers, near Georgetown, Grand Cayman, Cayman Islands).



Genus *Blandiella* Guppy

*Blandiella* Guppy 1871, American Journal of Conchology **6**, p. 309.

Genotype, *Blandiella reclusa* Guppy, monotypic.

Shell elongate, truncated in the adult stage. Sculpture consisting of numerous fine axial costae. Aperture ovate, slightly reflected, holostomatous. Last whorl free near the aperture leaving a well defined parietal gap. Operculum paucispiral with a calcified plate on the outer surface which is ridged, the ridges curved and emanating from a common center over the nucleus.

The genus *Blandiella* is known to occur only on the island of Trinidad. In relationship of its shell characters, it appears nearest to the subgenus *Merrilliana* in the genus *Geomelania* but it differs in lacking spiral lirae, a character more or less developed in nearly all species of *Merrilliana*. The radula indicates a closer relationship to *Truncatella* (Plate 22, fig. 1 and 2) than it does to *Geomelania* (Plate 22, fig. 4 and 5).

*Blandiella reclusa* Guppy is the only known species in this genus.

***Blandiella reclusa* Guppy**

Plate 22, fig. 1; Plate 23, fig. 9; Plate 24, fig. 4

*Blandiella reclusa* Guppy 1871, American Journal of Conchology **6**, p. 309, pl. 17, fig. 7-8 (Oropuche Mts., Trinidad).

\* \* \* \*

The following is an outline of the genus *Taheitia* with a list of all the known species.

Genus *Taheitia* H. and A. Adams

*Taheitia* H. and A. Adams 1863, Ann. Mag. Nat. Hist. (3) **11**, p. 19 (Genotype, *Truncatella porrecta* Gould, monotypic).

*Tahitia* Adams and Angas 1865, Proc. Zool. Soc., London, pl. 2, fig. 2 [error for *Taheitia* H. and A. Adams, on plate caption only].

*Taheitea* Pease 1867, American Journal of Conchology **3**, p. 229 [error for *Taheitia* H. and A. Adams].

*Tahetia* Tapparone Canefri 1886, Ann. Museo Civico Storia Nat. Genova **24**, p. 198 [error for *Taheitia* H. and A. Adams].

Genotype, *Truncatella porrecta* Gould, monotypic.

Shells small, rarely exceeding 10 mm. in length in the adult truncated form. Sculpture consisting of axial costae which are seldom rounded but are most frequently blade-like. So far as known the axial costae always persist over the mid portion of the whorls. No spiral sculpture present. Lip moderately to greatly reflected. Operculum paucispiral with a heavy calcified and rugose plate on the outer surface.

The genus *Taheitia* is closely related to *Truncatella*; certain of its species, such as *porrecta* Gould and *scalariformis* Reeve are very similar to species of Pacific *Truncatella*. They differ in being more delicate in structure, having the costae finer and blade-like and in possessing a very well developed calcareous plate on the outer surface of the operculum. They are strictly terrestrial in habit, though it is interesting to note that the species that most closely approximate the species of *Truncatella* are to be found in the lowlands and nearest the sea. Other species of *Taheitia*, such as *arcasiana* Crosse, *turricula* Mousson, both from the Fiji Islands, and *alata* Quadras and v. Möllendorff from Guam, are quite different from typical *Truncatella*. In most cases, these latter species have been found in the interior of the larger and high islands of the western Pacific.

From the limited material we have had at hand for study, it would appear that the various species are somewhat colonial in habit and scattered in their distribution.

We list all the species that are known or are believed to be members of *Taheitia*. It is quite possible that certain species listed in our catalogue and originally described as *Truncatella* may eventually prove to be species in *Taheitia*.

### ***Taheitia scalariformis* Reeve**

*Truncatella scalariformis* Reeve 1842, Conchologia Systematica **2**, p. 94, pl. 182, fig. 6 (locality not given); Reeve, 1842 [1843], Proc. Zool. Soc. London **10**, p. 197 (Annaa Id. [Tuomoto Islands] ).

*Truncatella arctecostata* Mousson 1869, Journ. de Conchyliologie **17**, p. 68 (Iles Paumotou [Tuomoto Islands] ).

**Taheitia pallida** Pease

*Taheitea* [sic] *pallida* Pease 1867, American Journal Conchology **3**, p. 229 (Tahiti and Huaheine [Society Islands] ).

*Truncatella cylindrica* 'Pease' Cuming and H. Adams 1864 [1865], Proc. Zool. Soc. London, p. 676 [nude name].

*Truncatella cylindracea* 'Pease' Nevill 1878, Hand List of Mollusca in the Indian Museum **1**, p. 253 (Pacific Islands) [nude name].

**Taheitia porrecta** Gould

Plate 23, fig. 5

*Truncatella porrecta* Gould 1847 [1848], Proc. Boston Soc. Nat. Hist. **2**, p. 208 (Taheiti, Society Islands); Gould 1852, United States Exploring Expedition **12**, p. 110, pl. 8, fig. 127a-c.

**Taheitia arcasiana** Crosse

Plate 23, fig. 1

*Truncatella arcasiana* Crosse 1868, Journal de Conchyliologie **16**, p. 177 (Viti [Fiji Islands] ).

*Description.* Shell reaching about 11 mm. in length, truncated, coarsely sculptured, moderately strong and imperforate. Whorls seven, slightly convex to nearly straight-sided. Color gray to slightly pale reddish-brown. Aperture holostomatous, auriculate, white to yellow-ivory in color and with a strongly reflected lip. Aperture built forward, having a definite gap between the lip and the whorl above—the parietal gap. Columella not apparent. Spire extended and abruptly truncated. Sculpture consisting of strong axial costae with each second or third costa enlarged and blade-like, particularly below the periphery. These enlarged costae may extend over the margin of the suture and encroach somewhat on the whorl below. No spiral sculpture visible. There are 8 to 11 completed costae on the body whorl. Operculum unknown. Periostracum deciduous. We have not seen any young specimens of this species.

length	width	
10.8	3.2 mm.	Viti Levu, Fiji Islands
10.9	3	Near Varawa, Viti Levu, Fiji Islands
9.9	2.8	" " " " " "
9.3	2.8	" " " " " "

*Types.* The types of this species are very probably in the collection of the Journal de Conchyliologie. The original type locality was given only as Viti [Fiji Islands]. We here restrict the type locality to near Varawa Bay, south coast of Viti Levu, Fiji Islands.

*Remarks.* *Taheitia arcasiana* differs from both *cookei* and *abbotti* by having fewer completed costae on the body whorls and in addition, the blade-like structures at the base of the costae are far better developed in *T. arcasiana* than in either of the subspecies. *T. arcasiana* differs from *abbotti* by having the whorls more convex and having a proportionally wider shell. From *cookei* it also differs by being larger.

***Taheitia arcasiana cookei*, new subspecies**

Plate 33, fig. 3

*Truncatella alternans* Mousson 1869, [in] Museum Godeffroy, Hamburg, Catalogue no. 4, p. 76 (Vuni Vatu, central Viti Levu, Fiji Islands. E. Gräffe, collector) [nude name]; *non T. alternans* Mousson 1874.

*Description.* Shell about 7.5 to 9 mm. in length, truncated, coarsely sculptured, rather heavy and imperforate. Whorls six and moderately convex. Color a rather shiny gray. Aperture holostomatous, auriculate, whitish in color and having a strongly reflected lip. Aperture built forward, having a gap between the inner lip and the whorl above. Spire extended and abruptly truncated. Sculpture consists of numerous and fairly uniform axial costae. Every second costa and occasionally every third costa on the body whorl becoming slightly enlarged and blade-like at the base, the intervening costae not always extending from suture to suture. There are 11 to 15 completed costae on the body whorl. No spiral sculpture apparent (48x) though the intercostal areas are minutely granular. Young specimens having the first  $2\frac{1}{2}$  to 3 whorls smooth, the remaining whorls costate. The second to third whorls are nearly the same size but beyond these the whorls become increasingly larger.

length	width	
7.5	3 mm.	Holotype
8	2.7	Paratype
8.3	3	"
9.2	3	"

*Types.* Holotype, Museum of Comparative Zoölogy no. 181049, Vuni Vatu, central Viti Levu, Fiji Islands, E. Gräffe, collector, ex Museum Godeffroy. Paratypes, Museum of Comparative Zoölogy and the B. P. Bishop Museum, from  $2\frac{1}{2}$  miles at 2300' and  $3\frac{1}{2}$  miles at 2700' southwest of Nandarivatu, Viti Levu, Fiji Islands, Y. Kondo, collector, 1938.

*Remarks.* Mousson did not describe *T. alternans*. He introduced this name in the catalogue of the Museum Godeffroy and later considered his species to be the same as *arcasiana* Crosse. We possess a specimen labeled as a type of Mousson's *alternans*, received originally from the Museum Godeffroy. It is different subspecifically from *arcasiana* as described by Crosse. Apparently Mousson had two species, neither of which was *arcasiana*. The specimens originally sent out by the Museum Godeffroy under the name of *alternans* were quite different from *arcasiana*.

*T. arcasiana cookei* differs from both *arcasiana* and *abbotti* by being smaller, having more convex whorls and by having the blade-like processes of the costae less developed. Also the parietal gap is far less developed in this subspecies.

### **Taheitia arcasiana abbotti**, new subspecies

Plate 22, fig. 3; Plate 23, fig. 2; Plate 24, fig. 1

*Truncatella arcasiana* 'Crosse' Mousson 1870, Journal de Conchyliologie **18**, p. 196, pl. 7, fig. 13 (Vuni Vatu, central Viti Levu, Fiji Islands); *non arcasiana* Crosse 1868.

*Description.* Shell about 8 mm. in length, truncated, coarsely sculptured, structure moderately heavy and imperforate. Whorls  $5\frac{1}{2}$  to  $6\frac{1}{2}$  and slightly convex. Color a rather dull amber with the costae whitish. Aperture holostomatous, auriculate, yellow-ivory in color, and with a strong reflected lip. Aperture built forward, having a definite gap between the inner lip and the whorl above. Columella not apparent. Spire extended, abruptly truncated. Axial sculpture consisting of numerous, somewhat irregular costae. In general, alternate costae are much larger and reach from suture to suture. The smaller costae between start from the superior suture and usually disappear just before reaching the inferior suture. These

costae, however, are variable and occasionally there are two or even three smaller costae between the larger ones. There are 11 to 15 completed costae on the body whorl. There is no spiral sculpture discernible. Nuclear whorls smooth with the first whorl flattened on top. In young specimens the spire is slightly concave with the last whorl showing a strongly angled periphery, the costae below being reduced to faint threads. Periostracum dark amber and deciduous, the shell chalky-white underneath. Operculum possessing a striated calcareous plate on a horny base, the calcareous portion being outermost. The striae radiate from the nucleus which is on the parietal margin.

length	width	aperture	
9	2.5	2×1.7 mm.	Holotype
11	2.8	2.3×1.6	Near Lautoka, Viti Levu, Fiji Islands
7.8	2.9	1.6×1.2	Korovau, Viti Levu, Fiji Islands

*Types.* Holotype, Museum of Comparative Zoölogy 179578, first gully from west, North side of Lomoloma Hill, 9 miles S. of Lautoka, N. W. Viti Levu, Fiji Islands, collected by R. T. Abbott, Harvard-Archbold Expedition, December 1940. Paratypes from the same locality and from Korovau, Viti Levu, Fiji Islands, collected by O. Degener, Harvard-Archbold Expedition, April 1941, and Sigatoka, Viti Levu, H. S. Ladd, collector. This last locality is based on specimens in the B. P. Bishop Museum no. 88541.

*Remarks.* The reference above by Mousson is to this new form and not to *T. arcasiana* Crosse as he thought.

*T. arcasiana abbotti* differs from typical *arcasiana* in having the blade-like portion of the costae far less developed and having less convex whorls. From *T. arcasiana cookei* it differs in being larger, less convex and having a much wider parietal gap.

### **Taheitia turricula** *Mousson*

Plate 25, fig. 1

*Truncatella turricula* Mousson 1869, [in] Museum Godeffroy, Hamburg, Catalog 4, p. 76 (Mango Island [Lau Group, Fiji Islands] ) [nude name]; Mousson 1870, Journal de Conchyliologie **18**, p. 196.

This species has rather widely separated and strong costae. The aperture, though holostomatous, has a very narrow parietal gap.

We have seen specimens from Naiiau Island, Navutu Iloma Island and Mango Island in the Lau Group, Fiji Islands. All these lots are in the collection of the B. P. Bishop Museum.

### **Taheitia turricula laddi**, new subspecies

This subspecies is rather closely related to *T. turricula* Mousson. It differs, however, in its smaller size and much finer and more closely-set costae. There are 26 costae on the body whorl of *laddi* and only 16 on the body whorl of *turricula*, and the costae of *laddi* are more blade-like. Shell white, aperture holostomatous with an exceedingly narrow parietal gap.

length	width
7.5	2.5 mm. Holotype

*Types.* Holotype, B. P. Bishop Museum no. 167165 from the south end of Yangasa Levu, Lau Group, Fiji Islands. Paratype, Museum of Comparative Zoölogy no. 157850, from the north-east end of Navutu Iloma, Lau Group, Fiji Islands.

### **Taheitia funiculus** *Mousson*

*Truncatella funiculus* Mousson 1869, [in] Museum Godeffroy. Hamburg, Catalog no. 4, p. 76 (Intérieur de Viti Levu [Fiji Islands] ) [nude name]; Mousson 1870, Journal de Conchyliologie **18**, p. 197.

There is considerable question as to whether or not this species came from the interior of Viti Levu, the largest of the Fiji Islands. It probably came from one of the islands in the Lau Group.

This species is very close in its relationships to *T. turricula* Mousson and has about the same number of costae on the body whorl. It differs, however, in having the costae a little more blade-like, in its smaller size and its somewhat wider parietal gap.

**Taheitia soluta**, new species

Plate 23, fig. 4; Plate 24, fig. 5-6

*Description.* Shell reaching about 9 mm. in length, truncated and rather coarsely sculptured, rather thin and imperforate. Whorls six and only slightly convex. Color whitish to gray. Aperture holostomatous, auriculate to subovate, with a moderately reflected lip. Aperture built forward producing a pronounced parietal gap. Last whorl solute, free for about one third of a whorl. Sculpture consisting of numerous very thin blade-like axial costae, all more or less uniform in structure but varying slightly in spacing, particularly on the mid whorls. There are 15 costae on the body whorl. No spiral sculpture visible. Operculum paucispiral with a very strongly developed calcareous plate. The calcareous portion consists of blade-like costae all evolving from a common point which is built up as high as the aperture is wide. The high point is more or less over the nucleus.

length	width	
9	2.5 mm.	Holotype
9.1	2.6	Paratype
8.1	2.4	"

*Types.* Holotype, B. P. Bishop Museum no. 179895, Bavatu, Vanua Mbalavu, Lau Group, Fiji Islands. Paratypes, Museum of Comparative Zoölogy no. 157754 from the same locality.

*Remarks.* This species is probably distantly related to *turricula* Mousson from which it differs by having the costae blade-like and not rounded and having a larger parietal gap with a correspondingly greater portion of the last whorl free.

**Taheitia tongana**, new species

Plate 23, fig. 6

*Description.* Shell reaching about 8 to 9 mm. in length, truncated, finely sculptured, rather thin and imperforate. Whorls five and strongly convex. Color yellowish to gray. Aperture holostomatous, auriculate to subovate, with a strongly reflected lip. Aperture built forward, having a definite parietal gap. Spire extended and abruptly truncated. Sculpture consisting of very fine blade-like axial costae, all being uniform. There



are 37 to 42 costae on the body whorl. No spiral sculpture visible. There is a slight tendency toward forming a basal ridge. Operculum with a calcareous plate, having very strong curved, radial ridges.

length	width	
6.8	2.5 mm.	Holotype
7.1	2.5	Paratype
7	2.5	"

*Types.* Holotype, B. P. Bishop Museum no. 87703, from inland one half mile from Vaigana, Eua Island, Tonga Islands on cliffs at 760' elevation, H. S. Ladd and J. E. Hoffmeister collectors, May 1928. Paratypes from the same locality, Museum of Comparative Zoölogy no. 157757.

*Remarks.* This species appears to be distantly related to *Taheitia turricula* Mousson of the Fiji Islands. It differs mainly by having exceedingly fine and very numerous axial costae.

### **Taheitia clathrata** *A. Adams and G. F. Angas*

*Truncatella (Taheitia) clathrata* A. Adams and G. F. Angas 1865, Proc. Zool. Soc. London, p. 54, pl. 2, fig. 2 (Solomon Islands).

### **Taheitia schneideri** *Rensch*

*Truncatella schneideri* Rensch 1937, Archiv für Naturgeschichte N. F. **6**, pt. 4, p. 628, fig. 51-52 (Neu-Pommern Id., Bismarck Archipelago).

### **Taheitia bismarckiana** *Rensch*

*Truncatella avenacea bismarckiana* Rensch 1937, Archiv für Naturgeschichte N. F. **6**, p. 627 (Neu-Lauenburg, Bismarck Archipelago).

### **Taheitia ultima** *Rensch*

*Truncatella ultima* Rensch 1937, Archiv für Naturgeschichte N. F. **6**, pt. 4, p. 629, fig. 53 (Neu-Pommern Id., Bismarck Archipelago).

### **Taheitia gracilentia** *Smith*

*Truncatella gracilentia* Smith 1897, Proc. Malacological Soc. London **2**, p. 289, pl. 17, fig. 16-17 (Andai, New Guinea).

**Taheitia wallacei** *H. Adams*

*Truncatella (Taheitia) wallacei* H. Adams 1865, Proc. Zool. Soc. London, p. 416, pl. 21, fig. 13-14 (Waigiou, New Guinea).

**Taheitia tessellata** *Quadras and v. Möllendorff*

*Taheitia tessellata* 'Boettger' Quadras and v. Möllendorff 1897, Nachrichtenblatt Malakozoologischen Gesellschaft **29**, p. 32 (Bismarck Archipelago).

**Taheitia alata** *Quadras and v. Möllendorff*

*Truncatella (Taheitia) alata* Quadras and v. Möllendorff 1894, Nachrichtenblatt Malakozoologischen Gesellschaft **26**, p. 41 (Mariana Islands).

**Taheitia lamellicosta** *Quadras and v. Möllendorff*

*Truncatella (Taheitia) lamellicosta* Quadras and v. Möllendorff 1894, Nachrichtenblatt Malakozoologischen Gesellschaft **26**, p. 41 (Mariana Islands).

**Taheitia parvula** *Quadras and v. Möllendorff*

*Truncatella (Taheitia) parvula* Quadras and v. Möllendorff 1894, Nachrichtenblatt Malakozoologischen Gesellschaft **26**, p. 41 (Mariana Islands).

**Taheitia mariannarum** *Quadras and v. Möllendorff*

*Truncatellum mariannarum* Quadras and v. Möllendorff 1894, Nachrichtenblatt Malakozoologischen Gesellschaft **26**, p. 39 ( [Guam] Mariana Islands).

*Truncatella subauriculata* Quadras and v. Möllendorff 1894, Nachrichtenblatt Malakozoologischen Gesellschaft **26**, p. 40 ( [Guam] Mariana Islands).

We have examined cotypes of both of these forms and cannot distinguish between them.

**Taheitia albida** *v. Möllendorff*

*Truncatella (Taheitia) albida* v. Möllendorff 1893, Bericht der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt p. 137, pl. 5, fig. 11a-b (Saob, Leyte Id., Philippine Islands).

**Taheitia anctostoma** *Quadras and v. Möllendorff*

*Taheitia anctostoma* Quadras and v. Möllendorff 1897, Nachrichtenblatt Malakozoologischen Gesellschaft **29**, p. 31 (Puerto Princesa Id., Paragua [Palawan, Philippine Islands] ).

### Catalogue of the Truncatellidae

The following catalogue includes all names that we could locate which referred to species and genera in the Truncatellidae. Cross references are given to many synonyms in the genus *Truncatella*; they are omitted for species in *Geomelania* and *Taheitia* as these genera are outlined fully in the earlier portion of this report.

We have used the following abbreviations in order to save as much space as possible in the catalogue.

Archiv f. Natur. — Archiv für Naturgeschichte

C to C — Contributions to Conchology

This publication consisted of twelve numbers under the editorship of C. B. Adams. It contained original articles by Adams, Bland and Chitty, as well as the republication of certain papers by Adams that had appeared elsewhere. It was published in New York between October 1849 and November 1852. After the death of C. B. Adams, Edward Chitty published under the same title in Kingston, Jamaica (1853) a continuation which he called No. 1. This we have indicated in our catalogue as no. 1 [13] to avoid confusion. No additional numbers were ever published.

Jahr. Malak. Ges. — Jahrbücher Malakozoologischen Gesellschaft

J de C — Journal de Conchyliologie

Malak. Blatt. — Malakozoologische Blätter

MCZ — Museum of Comparative Zoölogy

Nach. Malak. Ges. — Nachrichtenblatt Malakozoologischen Gesellschaft

PZS — Proceedings of the Zoological Society of London

USNM — United States National Museum

Zeit. f. Malak. — Zeitschrift für Malakozoologie

T. — stands for **Truncatella**: all other genera are written out in full

- abbotti** Clench and Turner **Taheitia arcasiana**: 1948 (9 miles south of Lautoka, N. W. Viti Levu, Fiji Islands). This paper, p. 187.
- Acme** Hartmann: 1821, System der Erd-und Suesswasser Gastropoden Europa's [in] Sturm's Deutschlands Fauna Abth. 6, Heft 5, pp. 31, 37; is a synonym of *Acmea* Hartmann 1821; Pilsbry 1926, p. 32.
- Acmea** Hartmann: 1821, System der Erd-und Suesswasser Gastropoden Europa's [in] Sturm's Deutschlands Fauna Abth. 6, Heft 5, pp. 48-49, pl. 1, fig. 4.

Published previous to *Neue Alpina*. Is in the family *Acmeidae* and not *Truncatellidae*; Pilsbry 1926, p. 32; Thiele 1929, p. 136.

- Acmea** Hartmann: 1821, *Neue Alpina* **1**, pp. 204-212.

This name was used for a *Truncatella* but was published later than Hartmann's earlier use of the same name, a name not referring to any species that can be called a *Truncatella* (see above); see also Clench and Turner 1948, *Johnsonia* **2**, p. 151-152 for full discussion of this problem.

- acutecostata** Mousson **T.**: 1869, *J de C* **17**, pl. 5, fig. 4 (Iles Paumotou [Tuamotu]); error on plate caption for *arctecostata* Mousson.
- acutinodosa** ? Paetel **Geomelania**: 1889, *Catalog der Conchylien-Sammlung* **2**, p. 431 (Jamaica); nude name.
- adamsi** Pfeiffer **T.**: 1846 *Zeit. f. Malak.* **3**, p. 119 and p. 189; new name for *T. scalariformis* C. B. Adams, non Reeve.
- affinis** C. B. Adams **Geomelania**: 1850, *C to C no. 6*, p. 96 (Jamaica). Lectotype MCZ 177212.

Under the listing of this species in this report (p. 175) *G. affinis* should have followed *G. minor* C. B. Adams.

- alata** 'C. B. Adams' Paetel **Geomelania**: 1889, *Catalog der Conchylien-Sammlung* **2**, p. 431 (Jamaica). Nude name; is *Geomelania jamaicensis* Pfeiffer; Clench and Turner, this paper, p. 174. Lectotype MCZ 175607.
- alata** Quadras and v. Möllendorff **T. (Taheitia)**: 1894, *Nach. Malak. Ges.* **26**, p. 41 (Mariana Islands). Cotypes MCZ 21470.
- alba** Coen **T. subcylindrica** var.: 1933, *R. Comitato Talassografico Italiano*, Venice, *Memoria* 192, p. 30, 159 (Adriatic).
- Albertisia** Issel, *Ann. del Museo Civico di Storia Nat. di Genova* **15**, p. 275; genotype, *A. punica* Issel, monotypic. Is a synonym of *Truncatella*, Thiele 1929, p. 151.
- albida** v. Möllendorff **T. (Taheitia)**: 1893, *Bericht der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt* p. 137, pl. 5, fig. 11a-b (Saob, Leyte, Philippine Islands).

- alemon** Pilsbry **Geomelania**: 1942, *Nautilus* **56**, p. 3, pl. 1, fig. 9 (Boilers, near Georgetown, Grand Cayman, Cayman Islands).
- alternans** Mousson T.: 1869, [in] *Museum Godeffroy, Hamburg, Catalog 4*, p. 76 (Vuni Vatu, Central Viti Levu, Fiji Islands); nude name; Mousson 1874, *Museum Godeffroy, Hamburg, Catalog 5*, p. 104. This paper, p. 186.
- amnis** 'C. B. Adams' Vendryes **Geomelania**: 1899, *Journal Institute of Jamaica* **2**, pt. 6, p. 605 (Jamaica); nude name.

This is probably a typographical error for *affinis* Adams as this latter name does not appear in Vendryes' list.

- anctostoma** Quadras and v. Möllendorff **Taheitia**: 1897, *Nach. Malak. Ges.* **29**, p. 31 (Puerto Princesa Id., Paragua [Palawan, Philippine Islands] ).
- antideluviana** Deshayes T.: 1881, *Description des Animaux sans Vertèbres découverts dans le bassin de Paris, pour servir ce supplément à la Description des Coquilles fossiles, etc.* **2**, p. 421, pl. 18, fig. 24-27 (Calcaiae grossière, Hondan and Grignon, Paris Basin, France, fossil).
- arcasiana** Crosse T.: 1868, *J de C* **16**, p. 177 (Viti [Fiji] Islands); *non arcasiana* 'Crosse' Mousson 1870, *J de C* **18**, p. 196, pl. 7, fig. 15. This paper, p. 185.
- arctecostata** Mousson T.: 1869, *J de C* **17**, p. 68, pl. 5, fig. 4. (Ile Paumotu [Tuamotu] ). Is *scalariformis* Reeve; Mousson 1874, p. 104.
- atomus** Philippi T.: 1841, *Archiv f. Natur.* (7) **1**, p. 54, pl. 5, fig. 4. Is in the genus *Homalogyra*; Jeffreys 1867, p. 69.
- atomus** 'Shuttleworth' Pilsbry T.: 1920, *Manual of Conchology* (2) **26**, p. 63. Error for *Truncatellina atomus* Shuttleworth.
- aurantia** Gould T.: 1847 [1848], *Proc. Boston Soc. Nat. Hist.* **2**, p. 208; Gould 1852, *United States Exploring Expedition* **12**, p. 110, fig. 125a-b (Mangsi Id., Borneo). Is *guerinii* Villa; Clench and Turner, this paper, p. 167.
- aurea** Prime T.: 1853, *List of Shells and Corals collected at Bermuda by Temple Prince [sic] L.L.B. of New York.* [In] *The Bermuda Pocket Almanac for 1852*, p. 55; nude name.
- avenacea** Garrett T.: 1887, *PZS*, p. 301 (Vanua Levu [Fiji Islands] ). This paper, p. 167.
- bahamensis** Clench and Turner **T. bilabiata**: 1948, *Johnsonia* **2**, p. 155, pl. 67, fig. 1-5 (Northwest Point, Little Inagua Id., Bahama Islands). Holotype MCZ 158794.
- bairdiana** C. B. Adams T.: 1852, *Ann. Lyceum Nat. Hist. New York* **5**, pp. 437, 543 [p. 213 in separate] (Panama). Lectotype MCZ 177110.
- barbadensis** Pfeiffer T.: 1856 [1857], *PZS* **24**, p. 337 (Island of Barbados, West Indies). Is *bilabiata* Pfeiffer; Clench and Turner 1948, *Johnsonia*, p. 153. Heautotype MCZ 136008.
- beardsleana** C. B. Adams **Cylindrella**: 1849, *C to C no. 2*, p. 19 (Jamaica). Is a *Geomelania*. Lectotype MCZ 177224.
- bezanconi** Cossmann T.: 1892, *J de C* **40**, p. 358, pl. 9, fig. 6. (d'Etampes, France). Oligocene; probably not a *Truncatella*.
- bilabiata** Pfeiffer T.: 1840 *Archiv f. Natur.* (6) **1**, p. 253 (Cuba).

- bismarckiana** Rensch **T. avenacea**: 1937, Archiv f. Natur. N.F. 6, pt. 4, p. 627 (Neu Lauenburg, New Mecklenberg Id., Bismark Archipelago). Is a *Taheitia*.
- Blandiella** Guppy: 1871, American Journal of Conchology **6**, p. 309; genotype, *Blandiella reclusa* Guppy, monotypic. This paper, p. 183.
- brazieri** Cox **T.**: 1868, Monograph of Australian Land Shells, Sydney, p. 93, pl. 15, fig. 12a-b (Miller's Point, Sydney, New South Wales, Australia).
- californica** Pfeiffer **T.**: 1857, PZS p. 111 (San Diego, California).
- campanella** 'Philippi' Paetel **T.**: 1889, Catalog der Conchylien-Sammlung **2**, p. 432; nude name.
- capensis** 'Krauss' Küster **T.**: 1855, Conchylien-Cabinet (1) **1**, pt. 23, p. 13. Nude name, in the synonymy of *T. ventricosa* 'Sowerby' Reeve.
- capillacea** 'Gundlach' Pfeiffer **T.**: 1859, Malak. Blatt. **6**, p. 77 (Caimanera, Cuba). Cotypes MCZ 178982.
- caribaeensis** 'Reeve' Pilsbry **T. pulchella** form: 1948, Land Mollusca of North America, Philadelphia **2**, pt. 2, p. 1071, fig. 572a (Key Largo, Florida).

This large and strongly ribbed form is unquestionably *T. succinea* C. B. Adams. It is extremely unfortunate that the neotypes selected (ANSP 59131, from Grand Bay, Guadeloupe Island) were not figured but refer to figures based on specimens from Key Largo, Florida.

- caribaeensis** 'Sowerby' Reeve **T.**: 1842, Conchologia Systematica **2**, p. 94, pl. 182, fig. 2 (no locality given). Is *pulchella* Pfeiffer; Clench and Turner 1948, *Johnsonia*, p. 156.
- caribaeus** 'Sowerby' Petit **T.**: 1856, J de C **5**, p. 152 (Guadeloupe) [error for *caribaeensis* 'Sowerby' Reeve].
- carribeorum** 'Sowerby' Gould **T.**: 1852, United States Exploring Expedition **12**, p. 110 [error for *T. caribaeensis* 'Sowerby' Reeve].
- ceilanica** 'Pfeiffer' v. Martens **T.**: 1880, [in] K. Möbius, Beitrage z. Meeresfauna der Insel Mauritius und der Seychellen, Berlin p. 207 [error for *ceylanica* Pfeiffer].
- cerca** - - - **T.**: 1902 [1903], PZS Index for the years 1881-1890, p. 470 [error for *cerea* Gassies].
- cerea** Gassies **T.**: 1878, J de C **26**, p. 339 (Ilot Koutoumo, Ile de Pins, New Caledonia). Is *T. ceylanica* Pfeiffer; Garrett 1887, p. 300.
- ceylanica** Pfeiffer **T.**: 1856 [1857], PZS **24**, p. 336 (Ceylon).

- Chittia** 'Livesay' H. and A. Adams: 1858, The Genera of Recent Mollusca **2**, p. 647; genotype, *Geomelania sinuosa* Chitty, monotypic. This paper, p. 178.
- Chittya** 'Livesay' Pfeiffer: 1865, Monographia Pneumonopomorum Viventium **3**, p. 2; emendation for *Chittia* 'Livesay' H. and A. Adams.
- Choristoma** J. de Christophori and Jan: 1832, Cat. Mus. (Mantissa Test.) p. 8: *non* Hartmann 1840. We have not seen this publication. Is *Truncatella* Risso; Jeffreys 1867, p. 84.

- clathrata** A. Adams and G. F. Angas **T. (Taheitia)**: 1865, PZS p. 54, pl. 2, fig. 2 (Solomon Islands).
- clathrus** Lowe **T.**: 1832, Zoological Journal **5**, p. 303 (locality unknown); Reeve 1842, Conchologia Systematica **2**, pl. 182, fig. 3. Is *T. scalaris* Michaud, Clench and Turner, 1948, *Johnsonia*, p. 160; Pilsbry 1948, Land Shells of North America, Philadelphia **2**, pt. 2, p. 1069.

Unfortunately Pilsbry has given the date of *clathrus* Lowe as 1830. According to Sherborn this part of the Zoological Journal appeared in July 1832, two years after Michaud had introduced the name *scalaris* for this species.

- concinna** Pease **T.**: 1871, PZS p. 468 (Apaiang, Kingsmill Ids.). Is *T. guerinii* Villa; Clench and Turner. This paper, p. 167. Cotypes MCZ 178650.
- concinnum** 'Scacchi' Philippi **Cyclostoma**: 1844, Enumeratio Molluscorum Sicilia **2**, p. 133 (Sicily). Is *T. truncatula* Draparnaud; Jeffreys 1867, p. 87.
- conica** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 97 (Jamaica). Lectotype MCZ 177205.
- conspicua** 'Bronn' Pfeiffer **T.**: 1856, Monographia Auriculaceorum Viventium **1**, p. 184 (Fiji and Baclayon Id., Philippines). Is *T. guerinii* Villa.

This name was admitted by Pfeiffer based upon a name that appeared in a sales catalogue by Bronn.

- cookei** Clench and Turner **Taheitia arcasiana**: 1948, (Vuni Vatu, central Viti Levu, Fiji Islands). Holotype MCZ 181049. This paper, p. 186.
- consulata** 'Risso' d'Orbigny **T.**: 1842, Histoire Physique, Politique et Naturelle de L'Ile de Cuba, Paris **2**, p. 5 [error for *costulata* Risso].
- costata** 'Benoist' Cossmann **T.**: 1894 [1895] Association Française pour l'avancement des Sciences 23rd Session pt. 2, p. 446, pl. 3, fig. 10-11 (fossil, Mérignac, near Bordeaux, France).

This appears to us to be a synonym of *T. truncatula* Draparnaud.

- costata** Pfeiffer **T.**: 1839, Archiv f. Natur. von Wiegmann, 5th year **1**, p. 356 (Cuba).
- costellaris** (?) 'Risso' C. B. Adams **T.**: 1850, C to C p. 52 (Fiji Islands); nude name, probably error for *T. costulata* Risso.
- costellifera** Pease **T.**: 1871, PZS p. 468 (Vavau Id. [Tonga Ids.]). Is *T. rustica* Mousson; Garrett 1887, p. 300.
- costulata** Risso **T.**: 1826, Histoire Naturelle L'Europe Méridionale **4**, p. 125, pl. 4, fig. 57 (Central Europe). Is *T. truncatula* Draparnaud; Pfeiffer 1856, p. 189.
- costulosa** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 96 (Jamaica).
- crassicostata** 'Sowerby' H. and A. Adams **T.**: 1858, Genera of Recent Mollusca, London **2**, p. 311. Nude name.

- cristata** Crosse T.: 1868, J de C **16**, p. 177 (locality unknown); Crosse 1871, J de C **19**, p. 66, pl. 3, fig. 11 (Tonga Islands). Is *T. guerinii* Villa; Clench and Turner. This paper, p. 167.
- cumingi** Dean **Geomelania**: 1933, Journal of Conchology **19**, p. 331, fig. 5-6. New name for *Geomelania jamaicensis* 'Pfeiffer' C. B. Adams, *non Geomelania jamaicensis* Pfeiffer. Holotype MCZ 172231.
- cumingiana** 'Adams' Gould T.: 1852, United States Exploring Expedition **12**, p. 112; [error for *T. cumingii* C. B. Adams].
- cumingii** C. B. Adams T.: 1845, Proc. Boston Soc. Nat. Hist. **2**, p. 12 (Jamaica). Lectotype MCZ 177155.
- cylindracea** 'Pease' Nevill T.: 1878, Hand List of Mollusca in the Indian Museum **1**, p. 253 (Pacific Islands); nude name. Cotypes MCZ 161490.

Pease sent out duplicates under the manuscript name of *cylindracea* Pease, a name which Nevill listed. There are specimens in the collection of the Museum of Comparative Zoölogy from Pease in his own handwriting under this name.

- cylindrata** Briart and Cornet T.: 1889, Mémoires de l'Acad. Royale de Sciences, des Lettres et des Beaux Arts de Belgique **47**, p. 20, pl. 19, fig. 12a-c (fossil, Mons, France).
- cylindrica** 'Pease' Cuming and H. Adams T.: 1864 [1865], PZS p. 676; nude name. Is *Taheitia pallida* Pease. Cotypes MCZ 181051. This paper, p. 185.

Cuming and Adam were in error in assigning this species to "*Taheitia*" *scalaris* Michaud. It is not in any way related to this Western Atlantic species. It was later named *Truncatella pallida* by Pease, and is now in the genus *Taheitia* and not *Truncatella*.

- debilis** Mousson T.: 1873, Malak. Blatt. **21**, p. 156; Mousson 1874, Jahrbücher Malak. Ges. **1**, p. 99, pl. 5, fig. 3 (Rabat, West Morocco). Is *T. bilabiata* Pfeiffer; Clench and Turner 1948, *Johnsonia*, p. 153.
- densecostata** H. B. Baker **Geomelania minor** subsp.: 1935, Nautilus **48**, p. 83, pl. 3, fig. 5 (W. of Marshall Pen and E. of Mandeville-Somerset River, Jamaica). Holotype ANSP 163726; Paratypes MCZ 100892. Is a synonym of *G. minor* C. B. Adams; Clench and Turner this paper, p. 174.
- desnoyersi** Payraudeau **Paludina**: 1826, Catalogue des Annelides et des Mollusques de l'Île de Corse, p. 116, pl. 5, fig. 21-22 (Gulf of Santa-Manza, Porto-Vecchio, de Saint-Florent, de Calvi et des étamps d'Orbino). Is *T. truncatula* Draparnaud; Pfeiffer 1856, p. 188.
- diaphana** Gassies T.: 1869, J de C **17**, p. 78 (Isle d'Art, New Caledonia).
- distensa** Cossmann T.: 1888, Annales de la Société Royale Malacologique de Belgique **23**, p. 199, pl. 8, fig. 1-2 (Chenay, France—fossil, Eocene).
- dubiosa** C. B. Adams T. ? : 1852, Ann. Lyceum Nat. Hist. New York **5**, p. 437 [p. 213 separate] (Panama). Is in the genus *Aroapyrgus* H. B. Baker.



**dubiosa** 'Fischer' Paetel **Geomelania**: 1889, *Catalog der Conchylien-Sammlung* **2**, p. 431 (Guadeloupe). Nude name.

We have been unable to trace this name other than its listing in Paetel. In Beau's list, 1857 [1858] p. 16 *Truncatella dubiosa* C. B. Adams is given as occurring in Guadeloupe, which see.

**elegans** C. B. Adams **Geomelania**: 1849, C to C no. 2, p. 18 (Jamaica). Lectotype MCZ 177222. This paper, p. 180.

**elongata** 'Poey' Pfeiffer **T.**: 1856, *Monographia Auriculaceorum Viventium* **1**, p. 193 (Oriente, Cuba); Poey 1858, *Memorias Sobre la Historia Natural de la Isla de Cuba* **2**, pp. 25, 89 (Jibara [Gibara], Holguín, Cuba).

**Erpetometra** Lowe: 1832, *Zoological Journal* **5**, p. 300; genotype, *Cyclostoma truncatulum* Draparnaud, monotypic. Is a synonym of *Truncatella* Risso.

**exilis** C. B. Adams **Geomelania**: 1950, C to C no. 6, p. 97 (Jamaica).

**exilis** Menke **T.**: 1830, *Synopsis Methodica Molluscorum*, Pymont, p. 44 (no locality given). Is *Paludina desnoyersi* Payraudeau.

**expansa** C. B. Adams **Geomelania**: 1849, C to C no. 2, p. 18 (Jamaica). Is *Geomelania jamaicensis* Pfeiffer; Clench and Turner. This paper, p. 174. Lectotype MCZ 177209.

**expansilabris** Quadras and v. Möllendorff **T.**: 1894, *Nach. Malak. Ges.* **26**, p. 40 (Mariana Islands).

**fasciata** Tapparone Canefri **T.**: 1886, *Annali del Museo Civico Storia Naturale*, Genova **24**, p. 193, pl. 2, fig. 24 (Wokan Island [Wokam] Aru Islands). Is *T. guerinii* Villa; Clench and Turner. This paper, p. 167.

**ferruginea** Cox **T.**: 1869, *Monograph of Australian Land Shells*, Sydney, p. 94 (Cape York [Queensland] Australia). Is *T. guerinii* Villa; Clench and Turner, this paper, p. 167.

**Fidelis** Risso: 1826, *Histoire Naturelle l'Europe Méridionale* **4**, p. 121; genotype, *F. theresa* Risso, monotypic.

**filicosta** 'Gundlach' Poey **T.**: 1858, *Memorias Sobre la Historia Natural de la Isla de Cuba* **2**, p. 90 (Caimanera, Guantánamo, Cuba). Cotypes MCZ 175605.

**filosa** J. de C. Sowerby **T.**: 1838, [in] T. L. Mitchell, *Three Expeditions into the Interior of Eastern Australia*, **2**, p. 190, footnote. (Mitre Lake, Australia); nude name.

**fortis** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 94 (Jamaica). Lectotype MCZ 177214.

**funiculus** Mousson **T.**: 1869, [in] *Museum Godeffroy*, Hamburg, *Catalog* **4**, p. 76 (Intérieur de Viti Levu); nude name; Mousson 1870, *J de C* **18**, p. 197. Is a *Taheitia*. This paper, p. 189.

**fusca** Philippi **T.**: 1841, *Archiv f. Natur.* (7) **1**, p. 53, pl. 5, fig. 5 (Palermo [Sicily]). Is a *Paludinella*; Pfeiffer 1856, p. 178.

**futunaensis** Mousson **T.**: 1869, [in] *Museum Godeffroy*, Hamburg, *Catalog* **4**, p. 76; nude name; Mousson 1871, *J de C* **19**, p. 30 (Futuna [also Fotu-

- na) Horne Island] ). Is *T. rustica* Mousson; Clench and Turner. This paper, p. 164.
- Geomelania**: Pfeiffer: 1845, PZS **13**, p. 45; genotype *Geomelania jamaicensis* Pfeiffer, monotypic. This paper, p. 172.
- glabra** Risso T.: 1826, Histoire Naturelle l'Europe Méridionale **4**, p. 434, pl. 4, fig. 53 [plate caption=*T. lacvigata* Risso]. Is *T. truncatula* Draparnaud; Pfeiffer 1856, p. 189.
- Glaucothoe** Leach: 1852, Synopsis of the Mollusca of Great Britain, London, p. 199; genotype, *Glaucothoë montaguana* Leach, monotypic. Is *Truncatella* Risso; Jeffreys 1867, p. 84.
- gouldii** 'Bronn' Pfeiffer T.: 1856, Monographia Auriculaceorum Viventium **1**, p. 185.
- This was a nude name given in a price list of Bronn and included by Pfeiffer as a synonym of *caribaeensis*.
- gouldii** 'C. B. Adams' Pfeiffer T.: 1846, Zeit. f. Malak. **3**, p. 183. Nude name as a synonym of *caribacensis* Reeve.
- gracilenta** 'Gould' Binney T.: 1858, Proc. Acad. Nat. Sci. Philadelphia **10**, [errata, no pagination]; nude name. Is *T. californica* Pfeiffer, Binney 1859, p. 29; Pilsbry 1948, Land Mollusca of North America, Philadelphia **2**, pt. 2, p. 1073.
- gracilenta** Smith T.: 1897, Proc. Malacological Soc. London **2**, p. 289, pl. 17, fig. 16-17 (Andai, New Guinea). Is a *Taheitia*.
- gracilis** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 95 (Jamaica). Lectotype MCZ 177223.
- granum** Garrett T.: 1872, American Journal Conchology **7**, p. 225 (Viti Islands, N. E. end of Taviuni Island). Lectotype MCZ 178652; Paratypes Bishop Museum 2476. This paper, p. 165.
- greyana** C. B. Adams **Cylindrella**: 1850, C to C no. 5, p. 82 (Jamaica). Is a *Geomelania*. Lectotype MCZ 177215.
- guadalupensis** Pilsbry T. **stimpsoni**: 1901, Nautilus **15**, p. 83 (Guadalupe Island [West Mexico] ).
- guerinii** A. and J. B. Villa T.: 1841, Conchyliarum Terrestrium et Fluviatilium, Mediolani [Milan, Italy] p. 59 (Bourbon [Réunion Id.]). Lectotypes MCZ 177264. This paper, p. 167.
- guerinii** 'Parreyss' Pfeiffer T.: 1856, Monographia Auriculaceorum Viventium **1**, p. 185. Nude name included in the synonymy of *caribaeensis*.
- haitensis** Weinland T. (**Blandiella**): 1876, Malak. Blatt. **23**, p. 172; Pfeiffer 1876, Malak. Blatt. **23**, p. 233, pl. 2, fig. 12-14 (Mts. near Jérémie, Haiti). Cotype MCZ 90391. This paper, p. 182.
- hammerschmidti** 'Charpentier' Küster T. **truncatula**: 1855, Conchylien-Cabinet (2) **1**, pt. 23, p. 11, pl. 2, fig. 16-18 (Venedig [Venice] ).

Probably a synonym of *T. subcylindrica* Linné.

- hammersmithii** 'Charpentier' Coen T.: 1933, R. Comitato Talassografico Italiano, Venice, Memoria 192, pp. 30, 159 [error for *hammerschmidti* 'Charpentier' Kuster].

- hermitei** Barden T.: 1879, Actes de la Soc. Linnéenne de Bordeaux **33**, Comptes-Rendus p. 17 (Genneteil [France] fossil).
- Herpetometra** 'Lowe' Gray: 1856, PZS p. 22 [error for *Erpetometra* Lowe.]
- hilliana** C. B. Adams **Geomelania**: 1851, C to C no. 9, p. 159 (Jamaica). Unique type specimen in the Chitty collection, British Museum.
- hiusuensis** 'Pilsbry' Sykes T.: 1901, Zoological Record—Mollusca—**38**, p. 91; [error for *kiusiensis* Pilsbry].
- hyalina** 'Desmar' Pfeiffer **Rissoa**: 1856, Monographia Auriculaceorum Viventium **1**, p. 190. Is *T. truncatula* Draparnaud.
- improvisa** Monterosato T. **truncatula** var.: 1919, Bollettino della Societa Zoologica Italiana (3) **3**, p. 13 (Tripoli, Mediterranean).
- inornata** Chitty **Geomelania**: 1853, C to C no. 1 [13], p. 5 (Jamaica).
- insularis** Clench and Turner T. **thaanumi**: 1948 (near Houma, Tongatabu, Tonga Islands). Holotype, B. P. Bishop Museum 87796. This paper, p. 166.
- integra** Coen T. **subcylindrica**: 1933, R. Comitato Talassografico Italiano, Venice, Memoria 192, pp. 30, 159 (Adriatic).
- jamaicensis** Pfeiffer **Geomelania**: 1845, PZS **13**, p. 45; Pfeiffer 1846, Conchylien-Cabinet (2) **1**, pt. 19, p. 214, pl. 30, fig. 19-20 (Jamaica, "Savanah la mar").
- jamaicensis** 'Pfeiffer' C. B. Adams **Geomelania**: 1849, C to C no. 2, p. 18 (Jamaica); *non jamaicensis* Pfeiffer; is *Geomelania cumingi* Dean 1933, p. 331.
- jamaicensis** 'Pfeiffer' Petit **Geomelania**: 1851, J de C **2**, p. 81, pl. 2, fig. 4 (Jamaica); *non jamaicensis* Pfeiffer; is *Geomelania affinis* C. B. Adams; Sykes 1905, p. 226.
- japonica** Pilsbry and Hirase T.: 1905, Proc. Acad. Nat. Science, Philadelphia **57**, p. 707 (Futami Island, Japan). Is *T. marginata* Küster. This paper, p. 163. Types, ANSP 89942.
- jarvisi** E. R. Sykes **Geomelania**: 1905, Proc. Malac. Soc. London **6**, p. 226, fig. 1 (near Albert Town, Trelawny, Jamaica).
- juliae** deFolin T.: 1872, Les Fonds de la Mer **2**, liv. 4, p. 49, pl. 2, fig. 4 (Bidassoa, Hendaye, Dept. Basses Pyrenees, France). Is *Odostomia indistincta* Montagu; Jeffreys 1884, p. 354.
- kiusiensis** Pilsbry T.: 1902, Proc. Acad. Nat. Science, Philadelphia **53**, p. 615 (Tane-ga-shima, Hirado, Hizen, Japan). Paratypes MCZ 134427. This paper, p. 165.
- labiosa** Soverbie T.: 1862, J de C **10**, p. 242, pl. 9, fig. 9 (Island of Art [New Caledonia]). Is *T. teres* Pfeiffer. This paper, p. 164. Cotypes MCZ 178633.
- laddi** Clench and Turner **Taheitia turricula**: 1948 (Yangasa Levu, Lau Group, Fiji Islands). Holotype, B. P. Bishop Museum 167165. Paratype MCZ 157850. This paper, p. 189.
- laevigata** Risso T.: 1826, Histoire Naturelle l'Europe Méridionale **4**, p. 125, pl. 4, fig. 53 (Central Europe). Is *T. truncatula* Draparnaud; Pfeiffer 1856, p. 189.

- lamellicosta** Quadras and v. Möllendorff **T.** (**Taheitia**): 1894, Nach. Malak. Ges. **26**, p. 41 (Mariana Islands).  
**lineata** Held **T.**: 1848, Wassermoll. Bayerns Jahresh. Landwirth Gewerbe Schule Muenchen p. 22.

We have not seen this paper. It is *Acicula lineata* Draparnaud according to Pfeiffer 1852, p. 5.

- lirata** Poey **T.**: 1858, Memorias Sobre la Historia Natural de la Isla de Cuba **2**, pp. 25, 89 (Jibara [Gibara] near Holguín, Cuba). Cotypes MCZ 181277; 158267.  
**littorea** 'della Chiaje' Clark **T.**: 1855, British Marine Testaceous Mollusca p. 383. Error for *littorina* della Chiaje.  
**littorina** della Chiaje **Helix**: 1828, Mem. sulla Storia e Notomia Degli Animali senza Vertebre del Regno di Napoli **3**, p. 225, pl. 49, fig. 36-38 (Naples [Italy]). Is a *Paludinella*.  
**loevigata** 'Risso' Coen **T.**: 1933; R. Comitato Talassografico Italiano, Venice, Memoria 192, p. 159; [error for *laevigata* Risso].  
**lowei** Shuttleworth **T.**: 1852, Mittheilungen der Naturforschenden Gesellschaft in Bern. no. 241-242, p. 146 (Teneriffae Id.).

This species was based on Lowe's *Truncatella truncatula* var. B 1832, Zoological Journal **5**, p. 302, pl. 13, fig. 13-18. We consider this species to be *truncatula* Draparnaud.

- lubrica** Held **T.**: 1848, Wassermoll Bayerns. Jahresh. Landwirth Gewerbe Schule Muenchen p. 22.

We have not seen this paper. Is *Acicula* [*Acme*] *polita* Hartmann, according to Pfeiffer 1852, p. 5.

- magna** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 94 (Jamaica). Lectotype MCZ 177200.  
**marginata** Küster **T.**: 1855, Conchylien-Cabinet (2) **1**, pt. 23, p. 12, pl. 2, fig. 24-26 (Labuan, Borneo). This paper, p. 163.  
**mariannarum** Quadras and v. Möllendorff **T.**: 1894, Nach. Malak. Ges. **26**, p. 39 (Mariana Ids.). Cotypes USNM 302935; MCZ 183768.  
**media** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 96 (Jamaica). Lectotype MCZ 177213.  
**Merrilliana**: Clench and Turner: 1948, subgenotype. *Geomelania elegans* C.B. Adams, original designation. This paper, p. 179.  
**micra** Tension-Woods **T.**: 1878, Trans. and Proc. Royal Soc. of Victoria **14**, p. 62 (Brighton, Victoria, Australia).  
**microlena** 'Bourguignat' de Monterosato **T.**: 1878, J de C **26**, p. 321 (Algerie [Algeria]).

This is regarded by de Monterosato as only a small form of *T. laevigata* Risso.

- minor** C. B. Adams **Geomelania**: 1849, C to C no. 2, p. 18 (Jamaica). Lectotype MCZ 177207; *non minor* Pfeiffer.
- minor** Pfeiffer **Geomelania**: 1850, Conchylien-Cabinet (2) **1**, pt. 19, p. 214, pl. 30, fig. 21-22 (Jamaica); *non minor* C. B. Adams.
- minor** Briart and Cornet **T.**: 1889, Memorias de l'Acad. Royale des Sciences des Lettres et de Beaux Arts de Belgique **47**, p. 21, pl. 19, fig. 13a-c (Mons, France, fossil).
- minor** Nevill **T. valida** var.: 1878, Hand List of the Mollusca in the Indian Museum Part 1, p. 254; nude name.
- minor** 'Issel' Neville **T. guerinii** var.: 1878, Hand List of the Mollusca in the Indian Museum Part 1, p. 253; nude name.
- minuscule** deFolin **T.**: 1875, Les Fonds de la Mer **2**, p. 145, pl. 3, fig. 3.

We have not seen this paper; probably not a *Truncatella*.

- minuta** Requien **T.**: 1848, Catalogue des Coquilles de L'Ile de Corse p. 57 (Ajaccio, Corsica).
- minutissima** 'Parreyss' Paetel **T.**: 1889, Catalog der Conchylien-Sammlung **2**, p. 433; nude name.
- modesta** C. B. Adams **T.**: 1850, C to C no. 8, p. 132; 1851, Ann. Lyc. Nat. Hist. New York **5**, p. 48 (Jamaica). Holotype MCZ 177159.
- montaguana** Leach **Glaucothoe**: 1852, Synopsis of the Mollusca of Great Britain, London, p. 199 (Coasts of Devon and Cornwall).

Is a substitute name for *subtruncatus* Montagu.

- montagui** Lowe **T.**: 1835, Zoological Journal **5**, p. 303 (Seas of Britain). Is *subcylindrica* Linné.
- moussoni** O. Semper **Tahitia** [sic]: 1874, [in] Museum Godeffroy, Hamburg, Catalog 5, p. 102 (Maupiti Island); nude name.
- nitida** 'Gassies' Garrett **T.**: 1887, PZS p. 300; nude name. Is *ceylanica* Pfeiffer. Cotypes MCZ 174074.
- nitidissima** McGillivray **Eulima**: 1843, A History of Molluscos Animals of Aberdeen, Kincardine and Banff, London, p. 142 (Bay of Cruden, Aberdeen, Scotland); *non Turbo nitidissima* Montagu 1803. Is *T. truncatula* Draparnaud; Jeffreys 1867, p. 87.
- nitidus** J. Adams **Turbo**: 1797, Trans. Linnean Soc. London **3**, p. 65 (Pembrokeshire, England).

We consider this to be *T. subcylindrica* Linné.

- obesa** Menke **T.**: 1830, Synopsis Methodica Molluscorum, Pymont, p. 43 (no locality given); nude name.

According to Menke it is the same as *Rissoa truncata* Hartmann which is *Truncatella truncatula* Draparnaud.

**obesa** Menke T.: 1830, Synopsis Methodica Molluscorum, Pymont, p. 137 (Havannam [Habana] Cuba); *non* Menke 1830, p. 43.

This species is completely unknown to us. It is probably not a *Truncatella* but some Rissoid.

**obscura** Morelet T.: 1882, J de C **29**, p. 239, pl. 10, fig. 12 (Ilot de Dzaoudzi [Pamanzi Id., Mayotta, Comoro Island] ).

**opaca** Monterosato T.: 1878, Enumerazione e Sinonimia delle conchiglie mediterranee, Palermo, p. 27. We have not seen this paper. Cotypes MCZ 158233.

**pacifica** Pease T.: 1867, American Journal of Conchology **3**, p. 230, pl. 15, fig. 27 (Insula Oualan [Ovalau, Fiji Ids.] ). Is *T. guerinii* Villa. Cotypes MCZ 59799.

**pallida** Pease **Taheitea**: 1867, American Journal of Conchology **3**, p. 229 (Tahiti and Huaheine). Cotypes MCZ 178657; 178660.

**parcicostata** Nevill T. **valida** var.: 1878, Hand List of the Mollusca in the Indian Museum Part 1, p. 254; nude name.

**parisiensis** Deshayes T.: 1861, Description des Animaux sans Vertèbres découverts dans le bassin de Paris pour servir de supplément à la Description des Coquilles fossiles etc. **2**, p. 422, pl. 18, fig. 28-30 (Calcaire grossier, Parnes, Paris Basin, France, fossil).

**parva** C. B. Adams **Geomelania gracilis** var.: 1850, C to C no. 6, p. 95 (Jamaica); *non parva* Chitty.

**parva** Chitty **Geomelania**: 1853, C to C, Kingston, Jamaica no. 1 [13], p. 6 (Peace River, Manchester, Jamaica); *non parva* C. B. Adams 1850. Lectotype MCZ 177211.

**parvula** Quadras and v. Möllendorff T. (**Taheitia**): 1894, Nach. Malak. Ges. **26**, p. 41 (Mariana Islands).

**parvulina** Clench and Turner **Geomelania (Merrilliana)**: 1948. New name for *G. parva* Chitty 1853; *non parva* C. B. Adams 1850. This paper, p. 180.

**pauperata** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 97 (Jamaica).

**peilei** Dean **Geomelania**: 1933, Journal of Conchology **19**, p. 333, fig. 7-9 (Montpelier, St. James, Jamaica). Holotype in the National Museum of Wales, paratype MCZ no. 160811.

The earlier portion of this paper was printed (p. 175) before we had received a paratype specimen of this species from Dr. C. Matheson of the National Museum of Wales. In our opinion, *G. peilei* Dean is a synonym of *G. jamaicensis* Pfeiffer. It is only a very little smaller than the lectotype specimen of *G. fortis* C. B. Adams another synonym of *G. jamaicensis* Pfeiffer. The axial costae of both *peilei* and *fortis* are exactly the same and do not differ as stated by Dean.

- pellucida** Dohrn T.: 1860, Malak. Blatt. **6**, p. 203 (Arabia). Paratypes MCZ 104560.
- pfeifferi** v. Martens T.: 1861, Malak. Blatt. **7**, p. 43 (Japan). Holotype Rijksmuseum, Leiden, Holland; Paratype MCZ 160359.
- piratica** Clench and Turner T. **scalaris** subsp.: 1948, *Johnsonia* **2**, p. 161, pl. 72, fig. 1-4 (St. George's Causeway, Bermuda). Holotype MCZ 178985.
- porrecta** Gould T.: 1847 [1848], Proc. Boston Soc. Nat. Hist. **2**, p. 208; Gould 1852, United States Exploring Expedition **12**, p. 110, pl. 8, fig. 127a-c (Tahiti, Society Islands). Lectotype MCZ 178662; Paratypes MCZ 178663 and the USNM.
- princeps** Dohrn T.: 1866, Malak. Blatt. **13**, p. 134 (Ilha do Principe [Princes Island, Gulf of Guinea, Africa]); Pfeiffer 1867, Novitates Conchologicae **3**, p. 317, pl. 76, fig. 10-11. Lectotype MCZ 175593. Is *T. rostrata* Gould; Clench and Turner 1948, *Johnsonia*, p. 163.
- procera** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 95 (Jamaica). Lectotype MCZ 177201.
- pulchella** Pfeiffer T.: 1839, Archiv f. Nat. von Weigmann (5th year) **1**, p. 356 (Cuba); Küster 1855, Conchylien-Cabinet (2) **1**, pt. 23, p. 10, pl. 2, fig. 11-15; for figure of the radula, see this paper, pl. 22, fig. 2. Lectotype, Museo Poey 181; Paratype MCZ 158170.
- pumila** H. B. Baker **Geomelania (Scalatella) striosa** subsp.: 1935, Nautilus **48**, p. 83, pl. 3, fig. 6 (Eastern end of John Crow Mts., near Portland-St. Thomas boundary, Jamaica). Holotype ANSP 163727.
- punctata** Monterosato T.: 1878, Enumerazione e Sinonimia delle conchiglie mediterranee, Palermo, p. 27 (Algerie [Algeria]).

We have not seen this paper.

- punica** Issel **Albertisia**: 1880, Ann. del Museo Civico di Storia Nat. di Genova **15**, p. 275 (Megerdah near Utica [Utique] Tunis).

Is in the genus *Truncatella*.

- pygmaea** C. B. Adams **Cylindrella** (?): 1845, Proc. Boston Soc. Nat. Hist. **2**, p. 14 (Jamaica); *non Geomelania pygmaea* C. B. Adams 1850. Is a *Geomelania*. Lectotype MCZ 156155.
- pygmaea** C. B. Adams **Geomelania typica**: 1850, C to C no. 6, p. 96 (Jamaica); *non pygmaea* C. B. Adams 1845.
- pyramidata** C. B. Adams **Geomelania**: 1851, C to C no. 9, p. 159 (Jamaica).
- quadrasi** v. Möllendorff T.: 1893, Bericht der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt, p. 137, pl. 5, fig. 10a-b (Magallanes, Sibuyan, Philippines).
- quoyi** Pfeiffer T.: 1846, Zeit. f. Malak. **3**, p. 187 (Vanikoro Id.).

This is an absolute synonym of *Cyclostoma striata* Quoy and Gaimard. Pfeiffer substituted a new name but gave no reason for this change.

- reclusa** Guppy **Blandiella**: 1871, American Journal of Conchology **6**, p. 309, pl. 17, fig. 7-8 (Oropuche Mts., Trinidad). Lectotype MCZ 175606. This paper, p. 183.
- rostrata** Gould **T.**: 1847 [1848], Proc. Boston Soc. Nat. Hist. **2**, p. 209 (Rio Janeiro [Brazil] ); Gould, 1852, United States Exploring Expedition **12**, p. 111, pl. 8, fig. 128a-b; Clench and Turner 1948, *Johnsonia*, p. 162. Lectotype New York State Museum G2541a.
- rubra** 'Gassies' Paetel **T.**: 1889, Catalog der Conchylien-Sammlung **2**, p. 433 (Noumea [New Caledonia] ); nude name.
- rustica** Mousson **T.**: 1865, J de C **13**, p. 186, pl. 14, fig. 8 (Nucuiona, Uvea [Wallis Id.] ). Lectotype MCZ 178651. This paper, p. 164.
- samoensis** 'Reeve' Paetel **T.**: 1889, Catalog der Conchylien-Sammlung **2**, p. 433.

No such species exists. Paetel referred to the Journal de Conchyliologie 1865, **13**, p. 186. On this page there is a description of *Melania samoensis* Reeve.

- scalariformis** C. B. Adams **T.**: 1845, Proc. Boston Soc. Nat. Hist. **2**, p. 12 (Jamaica). Is *T. scalaris* Michaud; Clench and Turner 1948, *Johnsonia*, p. 160; *non scalariformis* Reeve.
- scalariformis** Reeve **T.**: 1842, Conchologia Systematica **2**, p. 94, pl. 182, fig. 6 (locality not given); Reeve 1842 [1843], PZS **10**, p. 197 (Annaa [Toumoto Islands] ); *non scalariformis* C. B. Adams.
- scalarina** Cox **T.**: 1867, PZS p. 40 (Port Lincoln, Australia); Cox 1868, Monograph of Australian Land Shells, Sydney, Australia, p. 93, pl. 15, fig. 10a-b. Cotypes MCZ 159354.
- scalaris** Michaud **Rissoa**: 1830, Descr. Genre Rissoa, p. 18 [we have not seen this paper]; Michaud, 1832, Descriptions de Plusieurs Nouvelles especes de Coquilles du Genre Rissoa (Fréminville) 2nd edition, p. 21, fig. 31-32 (locality unknown). Neoholotype MCZ 165706 (Port Antonio, Jamaica).
- scalaroides** v. Martens **T.**: 1864, Monatsberichte der Königlichen Preufs. Akad. der Wissen. zu Berlin for 1864, p. 119 (Amboina).
- Scalatella** von Martens: 1860, Die Heliceen, Leipzig p. 41; genotype, *Cylindrella greyana* C. B. Adams, monotypic. This paper, p. 178.
- schneideri** Rensch **T.**: 1937, Archiv f. Natur. N.F. **6**, pt. 4, p. 628, fig. 51-52 (Neu Pommern Id., Bismarck Archipelago). Is a *Taheitia*.
- semicostata** Montrouzier **T.**: 1862, J de C **10**, p. 243, pl. 9, fig. 10 (Island of Art and New Caledonia). Is *T. marginata* Pfeiffer. This paper, p. 163. Cotypes MCZ 178620; 178632.
- semicostulata** Jickeli **T.**: 1874, Nova Acta der Ksl. Leop.-Carol. Deutschen Akademie der Naturforscher **37**, p. 189, pl. 7, fig. 8 (Dahlak [Daalac, Eritrea] Red Sea). Is *pellucida* Dohrn. This paper, p. 164.
- semperi** Kobelt **T.**: 1884, Nach. d. Deutschen Malak. Ges. **16**, p. 52 (Pangongon, Bohol?, Philippine Islands). Is *T. guerinii* Villa. This paper, p. 167.
- sinuosa** Chitty **Geomelania**: 1853, C to C, Kingston, Jamaica no. 1 [13], p. 5 (Ashley Hall, Trelawny, Jamaica). Lectotype MCZ 165718.



- solida** Menke T.: 1830, Synopsis Methodica Molluscorum, Pyrmont, pp. 43, 137 (locality unknown).
- soluta** Clench and Turner **Taheitia**: 1948 (Bavatu, Vanua Mbalavu Id., Lau Group, Fiji Islands). Holotype B. P. Bishop Museum 179895; Paratypes MCZ 157754. This paper, p. 190.
- spectabilis** Held T.: 1848, Wassermoll Bayerns, Jahresh. Landwirth Gewerbe Schule Muenchen, p. 22. We have not seen this paper. Is *Acicula spectabilis* Rossmasseler; Pfeiffer 1852, p. 6.
- stimpsonii** Stearns T.: 1872, Proc. California Acad. Science **4**, p. 249, pl. 1, fig. 5 (False Bay near San Diego, California).
- striata** Quoy and Gaimard **Cyclostoma**: 1832, Voyage l'Astrolabe Zoologie **2**, p. 186, pl. 12, fig. 27-30 (Vanikoro Id. [Santa Cruz Ids.] ).

This is possibly a species of *Truncatella*, but it is impossible to determine from the figure just what species it could be. According to the authors, the original specimens were lost after the figures had been drawn.

- striata** 'J. de C. Sowerby' Reeve T.: 1842, Conchologia Systematica **2**, p. 94, pl. 82, fig. 4 (no locality given). Is probably in the genus *Coxiella*.
- striatula** Menke T.: 1843, Molluscorum Novae Hollandiae, p. 9 (west coast Australia).

Is not in the genus *Truncatella*, but is a *Coxiella*, in the family Bulimidae.

- strigilata** 'Parreyss' Philippi **Paludina**: 1844, Enumeratio Molluscorum Siciliae **2**, p. 133. Is *T. truncatula* Draparnaud; Jeffreys 1867, p. 87.
- striosa** C.B. Adams **Geomelania**: 1850, C to C no. 6, p. 96 (Jamaica). Holotype, British Museum.
- subauriculata** Quadras and v. Möllendorff T.: 1894, Nach. Malak. Ges. **26**, p. 40 (Mariana Islands). Cotypes USNM 302936; 201189; MCZ 21472. Is a *Taheitia*. This paper, p. 192.
- subcylindrica** Linné **Helix**; 1767, Systema Naturae 12 ed. **1**, p. 1248 (northern Europe). This is often quoted in error as **subcylindrica** Gray.
- sublaevigata** 'Potiez and Michaud' Paetel T.: Catalog der Conchylien-Sammlung **2**, p. 433; nude name. Is *T. truncatula* Draparnaud, according to Paetel.
- subsulcata** Gassies T.: 1878, J de C **26**, p. 338 (Lifu Id., Loyalty Islands).
- subtruncatus** Montagu **Turbo**: 1803, Testacea Britannica, p. 300, pl. 10, fig. 1 (Southampton, England). Is *T. subcylindrica* Linné.
- succinea** C.B. Adams T.: 1845, Proc. Boston Soc. Nat. Hist. **2**, p. 12, (Jamaica). Lectotype MCZ 177154.
- Taheitia** Pease: 1867, American Journal of Conchology **3**, p. 229; [error for *Taheitia* H. and A. Adams].

- Taheitia** H. and A. Adams: 1863, *Annals and Magazine of Natural History* (3) **11**, p. 19; genotype, *Truncatella porrecta* Gould, monotypic. This paper, p. 183.
- Taheitia** Tapparone Canefri: 1886, *Ann. Museo Civico Storia Nat. Genova* **24**, p. 198; [error for *Taheitia* H. and A. Adams].
- Tahitia** H. Adams and G. F. Angas: 1865, *PZS*, pl. 2, fig. 2; [error for *Taheitia* H. and A. Adams, on plate caption only].
- tasmanica**: Tenison Woods **T.**: 1875 [1876], *Proc. Royal Soc. Tasmania*, p. 143 (Bass Straits, Tasmania). Is *T. scalarina* Cox; E. L. May, 1921, p. 57.
- tatarica** Schrenck **T.**: 1861, *Bull. de l'Academie Imperiale des Sciences de Saint-Petersburg* **4**, p. 409 (Bay of Castries, Manchuria [de Kastri, Gulf of Tatory, Siberia]); Schrenck 1867, *Mollusken des Amur-Landes und des Norjapanischen Meeres* **2**, pt. 3, p. 310, pl. 14, fig. 10-13.

We consider this to be *Cecina manchurica* A. Adams.

- terebralis** Menke **T.**: 1830, *Synopsis Methodica Molluscorum*, Pyrmont, p. 44 (no locality given).
- teres** Pfeiffer **T.**: 1856 [1857], *PZS* **24**, p. 336, (Isle of Mauritius and Trinity Bay, Australia).
- tesselata** 'Boettger' Quadras and v. Möllendorff **Taheitia**: 1897, *Nach. Malak. Ges.* **29**, p. 32 (Bismarck Archipelago). Cotypes MCZ 179585.
- thaanumi** Clench and Turner **T.**: 1948 (Ulali Id., Truk Group, Caroline Islands). Holotype MCZ 159379. This paper, p. 165.
- theresa** Risso **Fidelis**: 1826, *Histoire Naturelle l'Europe Méridionale* **4**, p. 121, pl. 5, fig. 59 (Central Europe). Is *T. truncatula* Draparnaud; Jeffreys 1867, p. 87.
- Tomlinella** Clench and Turner: 1948, *Johnsonia* **2**, p. 159; subgenotype, *Truncatella scalaris* Michaud; *non Tomlinella* Viader 1938.
- Tomlinitella** Clench and Turner: 1948, subgenotype, *Truncatella scalaris* Michaud. New name for *Tomlinella* Clench and Turner, *non Tomlinella* Viader 1938. This paper, p. 169.
- tongana** Clench and Turner **Taheitia**: 1948 (one-half mile inland from Vaigana, Eua Island, Tonga Islands). Holotype B. P. Bishop Museum 87703; Paratypes MCZ 157757. This paper, p. 190.
- truncata** Hartmann **Acmea**: 1857, *Neue Alpina* **1**, p. 212. Is a synonym of *T. truncatula* Draparnaud; Pfeiffer 1857, p. 137.
- truncata** 'Draparnaud' Herrmannsen **Cyclostoma**: 1849, *Indicis Generum Malacozoorum* **2**, p. 626; [error for *Cyclostoma truncatula* Draparnaud].
- Truncatella** Risso: 1826, *Histoire Naturelle l'Europe Méridionale* **4**, p. 124; genotype, *Truncatella laevigata* Risso, subsequent designation, Gude 1921; equals *Helix subcylindrica* Linné.
- Truncatella** Lowe: 1832, *Zoological Journal* **5**, p. 300; genotype, *Cyclostoma truncatulum* Draparnaud, monotypic.

Is a synonym and homonym of *Truncatella* Risso.

- truncatulina** 'Lowe' Sowerby T.: 1842, A Conchological Manual, London, p. 280; [error for *T. truncatula* Draparnaud].
- Truncatula** Leach: 1847, Annals and Magazine of Natural History (1) **20**, p. 271; genotype, *Truncatula truncata* Montagu = *Turbo truncatus* Montagu = *Helix subcylindrica* Linné; subsequent designation, Clench and Turner, 1948, *Johnsonia*, p. 152.
- Truncatula** 'Risso' Caziot: 1910, Etude Moll. Princip. Monaco, p. 450; [error for *Truncatella* Risso]; Neave 1940, Nomenclator Zoologicus **4**, p. 583; *non* Leach 1847, *non* Hagenow 1851.
- truncatum** Draparnaud **Cyclostoma**: 1805, Histoire Naturelle des Mollusques Terrestres et Fluviales de la France, p. 40, pl. 1, fig. 28-31 (coast of Mediterranean).
- truncatus** Montagu **Turbo**: 1803, Testacea Britannica, p. 300, pl. 10, fig. 7 (Southampton and Plymouth, England). Is *T. subcylindrica* Linné.
- turricula** Mousson T.: 1869, [in] Museum Godeffroy, Hamburg, Catalog **4**, p. 76 (Mango Id., Lau Group, Fiji Islands); nude name; Mousson 1870, J de C **18**, p. 196. This paper, p. 188.
- turrita** 'Küster' Coen T.: 1933, R. Comitato Talassografico Italiano, Venice Memoria 192, p. 159 (Adriatic); nude name.
- turrita** 'Pfeiffer' Dall T.: 1885, Bull. United States Geological Survey, no. 24, p. 314; [error for "Testa" not *Truncatella*].
- typica** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 95 (Jamaica). Lectotype MCZ 177208.
- ultima** Rensch T.: 1937, Archiv f. Natur. N. F. **6**, pt. 4, p. 629, fig. 53 (Neu Pommern Id., Bismarck Archipelago). Is a *Taheitia*.
- valida** Pfeiffer T.: 1846, Zeit. f. Malak. **3**, p. 182 (Philippine Islands). Cotypes MCZ 178649. Is *T. guerinii* Villa. This paper, p. 167.
- variabilis** Pfeiffer T.: 1846, Zeit. f. Malak. **3**, p. 183; nude name included in the synonymy of *T. caribaensis* Reeve.
- ventricosa** 'Sowerby' Reeve T.: 1842, Conchologia Systematica **2**, p. 94, pl. 182, fig. 2 (locality not given). Is in the genus *Tomichia*; Thiele 1929, p. 150.
- vicina** C. B. Adams **Geomelania**: 1850, C to C no. 6, p. 96 (Jamaica). Lectotype MCZ 156153.
- vitiacea** 'Gould' Mousson T.: 1865, J de C **13**, p. 185; [error for *T. vitiana* Gould].
- vitiana** Gould T.: 1847 [1848], Proc. Boston Soc. Nat. Hist. **2**, p. 208 (Fiji Islands); Gould 1852, United States Exploring Expedition **12**, p. 109, pl. 8, fig. 126a-b. Is *T. guerinii* Villa. This paper, p. 167. Cotypes MCZ 178664.
- wallacei** H. Adams T. (**Taheitia**): 1865, PZS p. 416, pl. 21, fig. 13-14 (Waijiou, New Guinea).
- wrighti** Pfeiffer T.: 1862, Malak. Blatt. **9**, p. 127 (Yateras, Guantánamo, Cuba).
- yorkensis** Cox T.: 1868, Monograph of Australian Land Shells, Sydney, p. 93, pl. 15, fig. 11 (Cape York [Queensland] Australia). Is *T. guerinii* Villa. This paper, p. 167. Cotypes MCZ 159349.
- Zeanoe** Leach 1852, Synopsis of the Mollusca of Great Britain, London, p. 198; genotype, *Turbo nitida* Adams, monotypic. Is *Truncatella* Risso; Jeffreys 1867, p. 84.

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### Paetel's Catalogue

PAETEL FRIEDRICH, 1887-1891: *Catalog der Conchylien-Sammlung*, Berlin. This molluscan catalogue of Friedrich Paetel was issued in parts and it appeared between the years 1887 and 1891.

Volume I	Lief. 1-8	Pages 1-639+16	Issued 1887-1888
" II	" 9-14	" 1-505+12	" 1888-1890
" III	" 15-18	" 1-256+23	" 1890-1891

This is not only a list of the species contained in Paetel's collection, but includes also the names of all species that he gleaned from the literature. The number of nude names occurring in this list indicates that Paetel probably had access to museum collections throughout Germany. As a consequence, many manuscript names which he copied from museum labels were included. References are not always given nor are they always to the original citation. It is, however, the most complete list of specific names ever published and it is very important as a source of information, much of which could not be located without considerable effort.

Paetel's earlier catalogues, published in 1869, 1873 and 1883, were much smaller and, of course, completely superceded by his three volume work.

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# Occasional Papers On Mollusks

Published by

THE DEPARTMENT OF MOLLUSKS

Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

VOLUME 1

MARCH 30, 1949

NUMBER 14

## Jesse Wedgwood Mighels with a Bibliography and a Catalogue of His Species

By RICHARD I. JOHNSON

Although Jesse Wedgwood Mighels was active in conchology for little more than a decade before the middle of the last century, he described as new nearly one hundred species of mollusks, most of them from New England and the Hawaiian Islands. Through his efforts the Portland Society of Natural History acquired a collection of mollusks which for some years had few rivals in the United States.

Mighels was born in Parsonsfield, Maine on July 7, 1795. He was teaching school by the time he was eighteen. He soon began the study of medicine under the direction of a local physician, Dr. James Bradbury. After attending some "medical lectures" at Dartmouth College, he was awarded the degree of M.D. in 1823. Three years later, Mighels married Evalina A. Rust of Norway, Maine. They lived in Minot, Maine for nine years, then moved to Portland where Mighels won a reputation in surgery. Mighels began the study of conchology in 1827, and it is obvious from the annotated remnants of his library (now in the Portland Society of Natural History) that he spent long hours mastering this science. When the Portland Society of Natural History was formed, Mighels was elected corresponding secretary at the first election of officers in December 1843. He held this position until he moved to Cincinnati, Ohio in 1847.

Even before the Society was founded, Mighels was collecting shells. At first he valued shells only for their intrinsic beauty,

and in accordance with the custom of the time, he wanted only a pair of each species.

It was not long before a new light began to dawn upon him: for in reply to demands for shells made of persons living more or less remote from Portland he was told that shells of his own neighborhood would be acceptable in return. The most that he could do was to gather together a dozen or twenty different kinds of such mean appearance that they did not seem worth the trouble of collecting, much less worthy of acceptance by persons owning large collections of splendid shells.

The experiment was made, and the demand came for more. Then, for the first time, he began to understand that a thorough knowledge of the conchology of his own region was an essential step towards acquiring that of other countries, and it was always the surest and safest method of obtaining the necessary materials. With a boat and a dredge our [Portland] Harbour was fully explored and great was the surprise and pleasure manifested in drawing from their dwelling places numerous living shells of forms and colors wholly new.\*

In 1846 Mighels sold his shell collection to the Portland Society of Natural History for \$1000. It consisted of over three thousand species and upwards of ten thousand specimens, including all of the species known to inhabit the State of Maine, as well as many "rare and interesting varieties."

A year later Mighels moved to Cincinnati, Ohio where he became a professor of obstetrics and diseases of women and children in the Cincinnati College of Medicine and Surgery. It is mentioned in "Daniel Drake and his Followers" by Otto Juetner that in Cincinnati Mighels "wrote good papers on obstetrics." Since the Cincinnati Natural History Museum was housed in the old College of Medicine Building, it would seem natural that Mighels would have become active in the museum, making the acquaintance of his old correspondent J. G. Anthony; but strangely Mighels' name does not appear on a single record of the institution.

It was in Cincinnati that news reached Mighels that on January 8, 1854 a fire had totally destroyed the collections of the Portland Society of Natural History. Upon receipt of this sad news Mighels wrote lugubriously to the Society on January 10:

\* Norton, A. H., 1927: *Maine Naturalist* **7**, no. 2, pp. 67-68. From the Portland Tri-Weekly Advertiser, February 24, 1854.





*J. W. Michels.*

1795-1861

Plate 26. Copied from Norton, 1927, p. 65.

Photographed by F. P. Orchard.

Is it possible that my beautiful collection of shells is destroyed? Is it all ruined? Must I know that I can see that collection no more?

The work of nine years of delightful enthusiastic industry—is it all gone? ... Your beautiful collections of shells, and birds, and minerals and fossils—alas, are they all lost?

... When my eye caught that telegraphic announcement, I was almost affected to tears. It cannot *all* be replaced.

How is it possible to replace the deep water species of Maine and the Gulf of the St. Lawrence? The species from Europe, East and West Indies, Sandwich Islands, from the Nile, India, Africa, South America and Oregon? What a loss! Money and books and goods and buildings can be replaced but that collection, I fear never!

... I have but few specimens of anything. There are a few species of British fossils in my possession of much value. To these you are welcome, as soon as the spring opens.\*

Sometime before 1857, when Mighels was leaving a dimly lighted court room where he had been serving as a witness, he plunged down an open shaft or stairway and sustained injuries from which he never fully recovered.

In 1858 he returned to Norway, Maine, his wife's birthplace, where he remained until his death on September 16, 1861.

Mighel's first contribution to conchology was a list of the shells of Maine printed in 1841. Two hundred and seven species are enumerated, sixteen of which are nude names. Five of these were described the following year with C. B. Adams in the *Journal of the Boston Society of Natural History*. In this paper twenty-four species are clearly described and adequately illustrated with figures drawn by Mighels. It is interesting to note that in his "Catalogue of the Shells of Maine" (1843, *Boston Journal of Natural History* 4, p. 308), Mighels has dropped the name of C. B. Adams as co-author, stating, after due thanks to Prof. Adams that his name had been placed on the paper as co-author through an error of the editor.

In Mighels' paper describing fifty-one shells, most of them from the Hawaiian Islands, the descriptions are very brief and none of the species is figured, with the result that the identification of some of these species has been difficult or impossible. Where we have had authentic type material a lectotype has been selected and the lectotypes of those species that were

\* Norton, A. H. 1927: *Maine Naturalist* 7, no. 2, p. 69. From the *Portland Tri-Weekly Advertiser*, February 24, 1854.

not figured by Mighels are herein figured. In a few instances, where no types could be found, neoholotypes have been chosen on the basis of subsequent identification.

Unfortunately, Mighels' own set of types was destroyed in the Portland Society of Natural History holocaust of 1854. Mighels did, however, send types of many of his species to the Boston Society of Natural History, to Prof. C. B. Adams of Amherst College, and to J. G. Anthony. All of these types are now in the Museum of Comparative Zoölogy. Mighels sent types of a few of his species to Dr. J. C. Jay, whose collection is now in the American Museum of Natural History in New York. Unfortunately, in a rather extensive search for this material we were able to find only one of these type lots. There are types of some of the Hawaiian species in the Cuming Collection, now in the British Museum, and L. Pfeiffer described several species which had been sent to Cuming under manuscript names.

The late Dr. C. M. Cooke, Jr. generously offered the following notes regarding the localities of Mighels' Hawaiian species:

Undoubtedly Mighels obtained a large part of his Hawaiian material from the Reverend Edward Johnson, a keen shell collector, who for many years (from 1837) lived at Waioli near Hanalei on Kauai. Wesley Newcomb and one or two other authors\* also had material from Johnson.

There is a note on page 18 of the B. P. Bishop Museum copy of volume 2 of the Proceedings of the Boston Society of Natural History, in the hand of William Harper Pease which says: "The marine species were from Kauai without doubt." (Mighels attributes most of them as coming from Oahu).

\* \* \* \*

#### ACKNOWLEDGMENTS

The author is especially indebted to the late Dr. C. M. Cooke, Jr. of the B. P. Bishop Museum for generously contributing much information regarding many of Mighels species and for checking the identification of most of the types of the Hawaiian species. Thanks are extended to Mr. Ralph Dury, Director,

\* C. B. Adams received material from Johnson.

Cincinnati Museum of Natural History; to Miss Ethel L. Hutchins, Reference Department of the Public Library of Cincinnati, Ohio; and to Prof. W. B. Hendrickson of MacMurry College for information on the years Mighels spent in Cincinnati. Grateful thanks are extended to W. J. Clench, M. E. Champion and R. D. Turner for many invaluable suggestions and for material aid during the course of this entire study.

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#### *Bibliography of J. W. Mighels' works on recent Mollusks*

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mending the study of conchology, and soliciting exchanges, are followed by a list, without notes, containing about 154 species, exclusive of the barnacles, etc., arranged according to the Lamarckian system.”\*

1841, June, Catalogue of the Marine, Terrestrial and Fluviate Shells of Maine. Portland, Maine. [Privately printed by the author. It consists of a list of 213 shelled invertebrates.]

1842, January, Mighels, J. W. and C. B. Adams. Descriptions of twenty-four species of the Shells of New England. Boston Journal of Natural History **4**, pp. 37-54, pl. 4. [Also reprinted with the plate and repaged 1-20.]

1843, April, Catalogue of the Marine, Fluviate and Terrestrial Shells of the State of Maine and Adjacent Ocean. Boston Journal of Natural History **4**, pp. 308-345. [Also reprinted and repaged 1-39.]

1843, October, A Catalogue of the Marine, Fluviate and Terrestrial Shells of Maine and the Adjacent Ocean. Proceedings of the Boston Society of Natural History **1**, pp. 117-118. [Title only, followed by a brief review of the preceding paper.]

1843, April, Descriptions of Six Species of Shells Regarded as New. Boston Journal of Natural History **4**, pp. 345-350, pl. 16, fig. 1-6. [Also reprinted with the plate and repaged 1-6.]

1843, October, "Dr. Gould presented a paper on behalf of Dr. Mighels entitled 'Descriptions of Seven [actually six] Species of Shells regarded as new.'" Proceedings of the Boston Society of Natural History **1**, p. 129. [Short summary of the preceding paper.]

1843, October, "Dr. Gould read a paper entitled 'Descriptions of twenty-five [actually twenty-four] new species of Shells by J. W. Mighels and C. B. Adams' of which the following twenty-one are regarded as new." Proceedings of the Boston Society of Natural History **1**, pp. 48-50 [Short summary of January 1842 paper.]

\* Johnson, C. W., 1905, *Nautilus* **19**, p. 92.

1844, October,\* "Dr. Gould communicated on behalf of Dr. J. W. Mighels some specimens of shells with descriptions." Proceedings of the Boston Society of Natural History **1**, pp. 187-189.

1845, Descriptions of Shells from the Sandwich Islands and other localities. Proceedings of the Boston Society of Natural History **2**, pp. 18-25.

\* \* \* \*

*A List of the Recent Mollusks described by J. W. Mighels with their original references and type localities*

The initials BJNH refer to the Boston Journal of Natural History; PBSNH to the Proceedings of the Boston Society of Natural History; and MCZ to the Museum of Comparative Zoölogy.

J. W. Mighels is the sole author of all names except as otherwise indicated.

All locality data in brackets were previously unpublished. (See p. 217 for information on localities.)

**accincta** 'Mighels' Gould **Achatinella**: 1852, United States Exploring Expedition **12**, p. 89.

Gould claims that *A. accineta* is a typographical error and has changed the name to *A. accincta*. Under the International Rules of Zoölogical Nomenclature, Art. 19, this is not advised.

**accincta**, **Achatina**: 1845, PBSNH **2**, p. 20 (Oahu [Hawaiian Islands] ). Cotypes in British Museum, figured 1849, Conch. Icon. **5**, **Achatina**, pl. 19, fig. 101.

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\* There is some confusion among authors regarding the date of publication of the first volume of the Proceedings of the Boston Society of Natural History. The title page bears the date 1844. Pages 1-184 (which consist of the meetings of Jan. 6, 1841 to June 19, 1843) were printed and distributed in October 1843 (see 1844, Amer. Jour. Sci. **46**, p. 203 [reviewed]; and 1843, Proc. Acad. Nat. Sci. Philadelphia **1**, p. 303 [listed as having been received at the October 24, 1843 meeting] ). The beginning of the signature on p. 185 bears the date October 1844, and thereafter each signature was dated as it appeared.

- acuminata, Pleurotoma:** 1845, PBSNH 2, p. 23 (Oahu [Hawaiian Islands] ).  
Lectotype here selected MCZ 176467, pl. 27, fig. 18.
- admodesta, Pupa:** 1845, PBSNH 2, p. 19 (Oahu [Hawaiian Islands] ).  
Lectotype here selected MCZ 177005, pl. 27, fig. 17.
- aeruginosa, Osteodesma:** 1844, PBSNH 1, p. 187 (Gulf of St. Lawrence).
- anthracina, Paludina:** 1845, PBSNH 2, p. 22 (Tortola [Virgin Islands] ).  
Lectotype here selected MCZ 176985, pl. 27, fig. 12.
- antiqua** Mighels and Adams **Nucula:** 1842, BJNH 4, p. 53, pl. 4, fig. 4 (fossil,  
Westbrook, in the vicinity of Portland, Maine).
- ampla, Limnea:** [sic] 1843, BJNH 4, p. 347, pl. 16, fig. 1-1c (Second Eagle  
Lake, Maine, N. Lat. 47°).
- Apella** 'Mighels' Anthony: 1843, Proc. Acad. Nat. Sci. Philadelphia, p. 251.

"This manuscript name of Mighels was first introduced by Anthony as a synonym of *Schizostoma* Lea 1843 (*non* Bronn 1834; *non* Schlaeter 1838) in a letter which was published as above. As *Apella* 'Mighels' Anthony equals *Schizostoma* Lea it is the next available name for this genus as *Schizostoma* Lea is a homonym. This will replace *Gyrotoma* Schuttleworth 1845, as *Apella* has two years priority" (Turner, R. D., 1946, Occasional Papers On Mollusks 1, No. 8, p. 99).

- arenaria** Mighels and Adams **Cingula:** 1842, BJNH 4, p. 49, pl. 4, fig. 24  
(Casco Bay, Maine).
- armatus, Bulimus:** 1845, PBSNH 2, p. 19 (Hawaii [Hawaiian Islands] ).  
Lectotype here selected MCZ 177001, pl. 27, fig. 15.

Dr. Cooke believed that Mighels had a mixed lot of shells from two islands when he described this species and had selected a specimen from the island of Oahu for his description. However, the type material in the MCZ is all from the island of Hawaii and is identical with *Auriculella westerlundiana* Ancey 1889, also from the island of Hawaii.

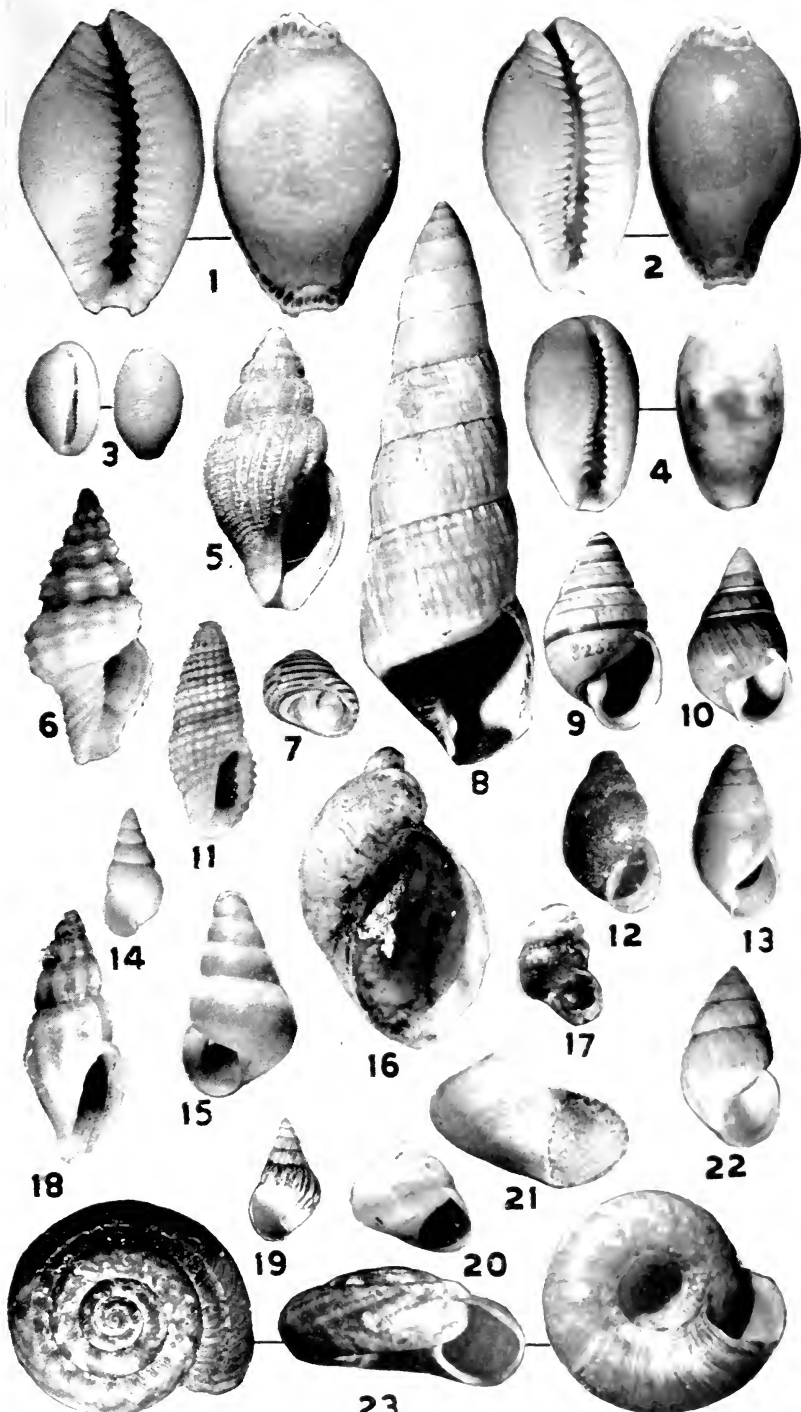
- baetica** 'Mighels' Pfeiffer **Achatinella:** 1848, Monographia Heliceorum Viventium 2, p. 235. [Nude name listed under the synonymy of *A. spirizona* Férussac.]
- caducca, Succinea:** 1845, PBSNH 2, p. 21 (Oahu [Hawaiian Islands] ).  
Lectotype here selected MCZ 39645, pl. 27, fig. 16.
- cancellatus** Mighels and Adams **Fusus:** 1842, BJNH 4, p. 52, pl. 4, fig. 18  
(Casco Bay, Maine).
- candida** Mighels and Adams **Cemoria:** 1841, Cat. Shells of Maine, No. 105  
[nude name].
- candida, Cingula:** 1841, Cat. Shells of Maine, No. 181 [nude name].

## Plate 27

- Fig. 1. *Cypraea semiplota* Mighels. Neoholotype (2.4x).  
Fig. 2. *Cypraea spadix* Mighels. Lectotype (2.5x).  
Fig. 3. *Cypraea insecta* Mighels. Lectotype (3x).  
Fig. 4. *Cypraea unifasciata* Mighels. Neoholotype (2.4x).  
Fig. 5. *Pleurotoma violacea* Mighels and Adams. Lectotype (4x).  
Fig. 6. *Pleurotoma rugosa* Mighels. Neoholotype (4.5x).  
Fig. 7. *Turbo rubricinctus* Mighels. Lectotype (6x).  
Fig. 8. *Achatina turricula* Mighels. Lectotype (natural size).  
Fig. 9. *Partula virgulata* Mighels. Lectotype (natural size).  
Fig. 10. *Achatinella mustelina* Mighels. Lectotype (natural size).  
Fig. 11. *Pleurotoma pumila* Mighels. Neoholotype (4.5x).  
Fig. 12. *Paludina anthracina* Mighels. Lectotype (4x).  
Fig. 13. *Bulimulus pumicatus* Mighels. Lectotype (3x).  
Fig. 14. *Achatinella citrina* Mighels. Lectotype (natural size).  
Fig. 15. *Bulimulus armatus* Mighels. Lectotype (4x).  
Fig. 16. *Succinea caduca* Mighels. Lectotype (4x).  
Fig. 17. *Pupa admodesta* Mighels. Lectotype (8x).  
Fig. 18. *Pleurotoma acuminata* Mighels. Lectotype (4x).  
Fig. 19. *Achatinella picta* Mighels. Lectotype (natural size).  
Fig. 20. *Helicina laciniosa* Mighels. Lectotype (4x).  
Fig. 21. *Helicina rotelloidea* Mighels. Lectotype (4x).  
Fig. 22. *Achatinella nubilosa* Mighels. Lectotype (natural size).  
Fig. 23. *Helix tiara* Mighels. Lectotype (2.5x).

Photographs by F. P. Orchard





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- carinata, Cingula:** 1841, Cat. Shells of Maine, No. 180 [nude name]; Mighels and Adams 1842, BJNH 4, p. 49, pl. 4, fig. 23 (Casco Bay, Maine).  
**cascoensis, Nucula:** 1841, Cat. Shells of Maine, No. 66 [nude name]; Mighels and Adams 1842, BJNH 4, p. 40, pl. 4, fig. 6 (Casco Bay, Maine).  
**cingula, Achatinella:** 1845, PBSNH 2, p. 21 (Oahu [Hawaiian Islands]).

Cotypes in the collections of Wesley Newcomb, Cornell University, Ithaca, New York. Types were also placed in the J. C. Jay collection, but these could not be located.

- circumsecta, Pleurotoma:** 1845, PBSNH 2, p. 24 (Oahu [Hawaiian Islands]).  
**citrina** 'Mighels' Pfeiffer **Achatinella:** 1845, Monographia Heliceorum Viventium 2, p. 234 (Molokai, Sandwich Islands [Hawaiian Islands]). Lectotype here selected MCZ 156493, pl. 27, fig. 14.  
**clausinus, Bulimus:** 1845, PBSNH 2, p. 20 (Hawaii [Hawaiian Islands]).

This species has never been recognized.

- coarctata, Delphinula:** 1843, BJNH 4, p. 349, pl. 16, fig. 6 (Casco Bay, Maine).  
**coronata, Pleurotoma:** 1845, PBSNH 2, p. 23 (Oahu [Hawaiian Islands]).  
**corrugata, Cypricardia:** 1844, PBSNH 1, p. 189 (Zanzibar).  
**costellata, Turritella:** 1841, Cat. Shells of Maine, No. 183 [nude name].  
**costulata, Pupa:** 1844, PBSNH, p. 187 (Portland, Maine).

A. A. Gould, who had undoubtedly seen Mighels' specimens, regards this species as identical with *Helix harpa* Say, 1844, PBSNH 1, p. 189.

- costulata** Mighels and Adams **Turritella:** 1842, BJNH 4, p. 50, pl. 4, fig. 20 (Casco Bay, Maine).  
**crassilabrum, Pleurotoma:** 1845, PBSNH 2, p. 23 (Oahu [Hawaiian Islands]).  
**curta, Schizostoma:** 1844, PBSNH 1, p. 189 (Warrior River, Alabama).

C. Goodrich has placed this species in the synonymy of *Gyrotoma incisum* Lea (1924, Univ. of Michigan, Mus. of Zoöl., Misc. Pub. 12, p. 23).

The locality "Warrior River" given above by Mighels is in error. The genus *Schizostoma* (= *Apella*) is limited in its distribution to the Coosa River in Alabama.

- cyclostomum, Solarium:** 1845, PBSNH 2, p. 22 (Oahu [Hawaiian Islands]).

As this name is a homonym of *Solarium cyclostomum* Menke 1830, Philippi 1853, Conchylien-Cabinet (2) 2, pt. 7, p. 36, has changed the name to *Solarium mighelsi*.

**cylindracea, Schizostoma:** 1844, PBSNH 1, p. 189 (Warrior River, Alabama).

C. Goodrich states that this species can not be recognized with any exactness from the description. (1924, Univ. of Michigan, Mus. of Zoöl., Misc. Pub. 12, p. 28.)

See second note under *curta* above.

**decollata** Mighels and Adams **Limnaea:** 1842, BJNH 4, p. 45, pl. 4, fig. 13, 13bis (Unity, Maine).

The specimen here selected as lectotype MCZ 176986 is figured in Baker, F. C., 1911, Chicago Acad. of Sciences, Special Publication No. 3, pl. 41, fig. 8.

**delphinodonta** Mighels and Adams **Nucula:** 1842, BJNH 4, p. 40, pl. 4, fig. 5 (Casco Bay, Maine). Lectotype here selected MCZ 176984.

**diluvialis, Nucula:** 1841, Cat. Shells of Maine, No. 62 [nude name].

**elucens, Tellina:** 1844, PBSNH 1, p. 188 (Casco Bay, Maine).

**emarginata, Purpura:** 1841, Cat. Shells of Maine, No. 201 [nude name].

**filicatus, Sigaretus:** 1845, PBSNH 2, p. 22 (Zanzibar).

**fragilis, Physa:** 1841, Cat. Shells of Maine, No. 144 [nude name]; Mighels and Adams, 1842, BJNH 4, p. 44, pl. 4, fig. 12 (Monmouth, Maine). Lectotype here selected MCZ 177004.

**glacialis, Arca:** 1843, BJNH 4, p. 322 (Gulf of St. Lawrence).

**gracilentum, Cerithium:** 1845, PBSNH 2, p. 22 (Oahu [Hawaiian Islands]).

**hystrix** 'Mighels' Pfeiffer **Helix:** 1846 Symbolae Ad Historiam Heliceorum 3, p. 67 ([East Maui] Sandwich Islands [Hawaiian Islands]).

This species was first described as *H. setigera* by A. A. Gould. Apparently Dr. Mighels suggested to Dr. Gould that as *setigera* was a homonym, *hystrix* be used. It was under this name that material was sent out and Pfeiffer was the first to publish its use. See Gould 1852, United States Exploring Expedition 12, p. 55.

**implexum, Solarium:** 1845, PBSNH 2, p. 22 (Oahu [Hawaiian Islands]).

**incincta, Bulla:** 1844, PBSNH 1, p. 188 (Casco Bay, Maine).

**inornata, Achatinella:** 1845, PBSNH 2, p. 21 (Oahu [Hawaiian Islands]).

The cotypes of this species placed in the J. C. Jay collection could not be located. In the Catalogue of the Shells in the

J. C. Jay collection, 4th edit., 1850, p. 215 it is listed as identical with *Achatinella turritella* Férussac.

**insculpta, Pleurotoma:** 1844, PBSNH 1, p. 189 (Key West, Florida).

**insecta, Cypraea:** 1845, PBSNH 2, p. 24 (Oahu [Hawaiian Islands]). Lectotype here selected MCZ 177006, pl. 27, fig. 3.

**insignis** 'Mighels' Reeve **Bulimus:** 1850, Conch. Icon. 5, **Achatinella**, species 3 [nude name listed as a synonym of *A. virgulata* Mighels].

**intercarinata, Helix:** 1845, PBSNH 2, p. 18 (Oahu [Hawaiian Islands]).

"Subsequent authors have considered this a synonym of *Endodonta (Thaumatodon) contorta* Férussac. (Cooke).

**intermedia, Nucula:** 1841, Cat. Shells of Maine, No. 66 [nude name].

**jugosa, Helix:** 1845, PBSNH 2, p. 19 (Waioli [Kauai, Hawaiian Islands]).

**laciniosa, Helicina:** 1845, PBSNH 2, p. 19 (Oahu [Hawaiian Islands]). Lectotype here selected MCZ 156497, pl. 27, fig. 20.

Dr. Cooke stated that *Orobophana berniceia* Pilsbry and Cooke becomes a synonym of *H. laciniosa* Mighels by the identification of the type. This is unfortunate because Miss Neal (1934, P. B. Bishop Museum Bull. 125, p. 39) recognized 22 varieties of *Pleuropoma laciniosa* Mighels on the basis of A. A. Gould's identification of this species, but Gould's material was from J. P. Couthouy, collected on the United States Exploring Expedition, and is not identical with the species described by Mighels. Therefore, *Pleuropoma laciniosa* (non Mighels) Neal becomes a new species with the specific name chosen from one of the varieties. "The type did not come from Oahu as stated by Mighels, but came from Kauai, presumably the north coast near to, if not, Hanalei (Waioli)." (Cooke).

**laciniosum, Cerithium:** 1845, PBSNH 2, p. 23 (Oahu [Hawaiian Islands]).

**lacunatum, Triton:** 1845, PBSNH 2, p. 24 (Oahu [Hawaiian Islands]).

**latior** Mighels and Adams **Cingula:** 1842, BJNH 4, p. 48, pl. 4, fig. 22 (Casco Bay, Maine).

**ligata** Mighels and Adams **Fasciolaria:** 1842, BJNH 4, p. 51, pl. 4, fig. 17 (Mingan, in the Gulf of St. Lawrence).

**maculosum, Cerithium:** 1845, PBSNH 2, p. 22 (Oahu [Hawaiian Islands]).

Cotypes in the British Museum, figured, Reeve 1865, Conchologia Iconica 15, **Cerithium**, pl. 14, fig. 97.

- mainiensis, Cyclas:** 1841, Cat. Shells of Maine, No. 42 [nude name].
- mendicarius** Mighels and Adams **Chiton:** 1842, BJNH 4, p. 42, pl. 4, fig. 8 (Casco Bay, Maine).
- micans, Pleurotoma:** 1845, PBSNH 2, p. 23 (Oahu [Hawaiian Islands]).
- minganensis, Mytilus:** 1844, PBSNH 1, p. 188 (Mingnan, Gulf of St. Lawrence).
- minus** Adams and Mighels **Cyclas:** 1841, Cat. Shells of Maine, No. 41 [nude name].
- minor** Mighels and Adams **Cyclas:** 1842, BJNH 4, p. 39, pl. 4, fig. 2 (Weybridge, Vermont; Portland, Maine). Lectotype here selected MCZ 19827.
- minutissima, Margarita:** 1843, BJNH 4, p. 349, pl. 16, fig. 5 (Casco Bay, Maine).
- mustelina, Achatinella:** 1845, PBSNH 2, p. 21 (Waianai [Oahu, Hawaiian Islands]). Lectotype here selected MCZ 156494, pl. 27, fig. 10.
- nitida** Mighels and Adams **Cyclas:** 1842, BJNH 4, p. 39, pl. 4, fig. 3 (Norway, Maine). Lectotype here selected MCZ 19783.
- nodulosa, Cypricardia:** 1844, PBSNH 1, p. 188 (Key West, Florida).

Mighels received this species from T. A. Conrad under the name *Carditamera floridana*. Apparently unknown to Mighels, Conrad had published this name in 1838 (Fossils of the Tertiary Formations of the United States, p. 12). Therefore, *C. nodulosa* Mighels is a synonym of *C. floridana* Conrad.

- nubilosa, Achatinella:** 1845, PBSNH 2, p. 20 (Oahu [Hawaiian Islands]). Lectotype here selected MCZ 165606, pl. 27, fig. 22.

Pilsbry (1912, Manual of Conchology (2) 21, p. 259) states that this species is actually from Molokai. There are two poorly preserved cotypes in the collection of the Portland Society of Natural History No. 220.

- obnubila, Pleurotoma:** 1845, PBSNH 2, p. 24 (Oahu [Hawaiian Islands]).
- obtusa, Thracia:** 1841, Cat. Shells of Maine, No. 27 [nude name].
- occidentalis** Mighels and Adams **Trochus:** 1842, BJNH 4, p. 47, pl. 4, fig. 16 (Casco Bay, Maine).
- occulta** Mighels and Adams **Bulla:** 1842, BJNH 4, p. 54, pl. 4, fig. 11 (fossil, Westbrook in the vicinity of Portland, Maine). Lectotype here selected MCZ 156452.
- patula, Succinea:** 1845, PBSNH 2, p. 21 (Oahu [Hawaiian Islands]).

As this is a homonym of *Succinea patula* 'Lamarck' de Blainville 1827, the first available name is *Succinea rotundata* Gould 1845, PBSNH 2, p. 182.

**pertenius, Bulla:** 1843, BJNH 4, p. 346, pl. 16, fig. 2 (Casco Bay, Maine).

**picta, Achatinella:** 1845, PBSNH 2, p. 21 (Oahu [Hawaiian Islands]). Lectotype here selected MCZ 176982, pl. 27, fig. 19.

This species is from Maui. (Cooke).

**plicata 'Mighels' Pfeiffer Achatinella:** 1848, Monographia Heliceorum Viuentium 2, p. 235 (Molokai [Hawaiian Islands]).

Cotypes in the British Museum, figured by Reeve 1850, Conchologia Iconica 6, **Achatinella**, pl. 6, fig. 44.

**porrecta, Paludina:** 1845, PBSNH 2, p. 22 (Oahu [Hawaiian Islands]).

**portlandica, Astarte:** 1843, BJNH 4, p. 345, pl. 16, fig. 2 (Casco Bay, Maine).

**princeps** Mighels and Adams **Cemoria:** 1842, BJNH 4, p. 42, pl. 4, fig. 9 (75-100 miles off mouth of Kennebec River, Maine, on fishing ground "Monhegan Falls," 40-75 fathoms).

**producta, Physa:** 1845, PBSNH 2, p. 21 (Oahu [Hawaiian Islands]).

**pumicatus, Bulimus:** 1845, PBSNH 2, p. 19 (Oahu [Hawaiian Islands]). Lectotype here selected MCZ 177002, pl. 27, fig. 13.

Undoubtedly from Kauai. (Cooke).

**pumila, Pleurotoma:** 1845, PBSNH 2, p. 23 (Oahu [Hawaiian Islands]).

Neoholotype here selected MCZ 176993, pl. 27, fig. 11.

**puncto-striata** Mighels and Adams **Bulla:** 1842, BJNH 4, p. 43, pl. 4, fig. 10 (Casco Bay, Maine). Neoholotype here selected MCZ 177003.

Only one specimen was taken by Mighels which was destroyed. The neoholotype is selected from idotypes in the C. B. Adams collection.

**4 carinata** Mighels and Adams **Trochus:** 1841, Cat. Shells of Maine, No. 172 [nude name].

**reticulata** Mighels and Adams **Turritella:** 1842, BJNH 4, p. 50, pl. 4, fig. 19 (Bay Chaleur, in the Gulf of St. Lawrence). Lectotype here selected MCZ 125508.

**rotelloidea, Helicina:** 1845, PBSNH 2, p. 19 (Oahu [Hawaiian Islands]). Lectotype here selected MCZ 156499, pl. 27, fig. 21.

Dr. Cooke said that *Pleuropoma hawaiiensis* Pilsbry and Cooke becomes a synonym of *Helicina rotelloidea* Mighels by the identification of the type. "The type did not come from Oahu as stated by Mighels, but came from Kauai." (Cooke).

**rubricintus, Turbo:** 1845, PBSNH 2, p. 22 (Oahu [Hawaiian Islands]).  
Lectotype here selected MCZ 177007, pl. 27, fig. 7.

**rugosa, Pleurotoma:** 1845, PBSNH 2, p. 22 (Oahu [Hawaiian Islands]).  
Neoholotype here selected MCZ 176992, pl. 27, fig. 6.

As this name is a homonym of *Pleurotoma rugosa* Lea 1833, (fossil) Iredale and Tomlin (1917, Journal of Conchology 15, No. 7, p. 216) have changed the name to *Lienardia mighelsi*.

**scissura 'Mighels' Anthony Apella:** 1843, Proc. Acad. Nat. Sci. Philadelphia, p. 251 [nude name].

**scutilus, Bulimus:** 1845, PBSNH 2, p. 20 (Oahu [Hawaiian Islands]).

**semicostata Mighels and Adams Cingula:** not of Montagu 1803 = *Cingula carinata* Mighels and Adams.

**semiplota, Cypraea:** 1845, PBSNH 2, p. 24 (Oahu [Hawaiian Islands]).  
Neoholotype here selected MCZ 176989, pl. 27, fig. 1.

**sinuosa, Pleurotoma:** 1845, PBSNH 2, p. 23 (Oahu [Hawaiian Islands]).

**spadix, Cypraea:** 1845, PBSNH 2, p. 25 (Oahu [Hawaiian Islands]).  
Lectotype here selected MCZ 176987, pl. 27, fig. 2.

**sphaerula, Cypraea:** 1845, PBSNH 2, p. 24 (Oahu [Hawaiian Islands]).

**subglobosa, Cancellaria:** 1841, Cat. Shells of Maine, No. 188 [nude name].

**submeris, Helix:** 1844, PBSNH 1, p. 187 (Key West, Florida).

W. G. Binney (1869, Smithsonian Misc. Coll. No. 194, p. 184) places this species in the synonymy of *Helix varians* Menke.

**subrutila, Helix:** 1845, PBSNH 2, p. 18 (Oahu [Hawaiian Islands]).

H. B. Baker (1940, Bull. B. P. Bishop Mus. No. 165, p. 163) has chosen a neotype to represent this species.

**sulcosa, Phasianella:** 1843, BJNH 4, p. 348, pl. 16, fig. 4 (Casco Bay, Maine).

**tenuicostata Mighels and Adams Pectin:** 1841, Cat. Shells of Maine, No. 89 [nude name].

**tenuicostatus Mighels and Adams Pectin:** 1842, BJNH 4, p. 41, pl. 4, fig. 7 (Casco Bay, Maine).

Mighels realized that this species was the young of *P. magellanicus* Gmelin (1843 BJNH 4, p. 327).

**tiara, Helix:** 1845, PBSNH 2, p. 19 (Kauai [Hawaiian Islands]).  
Lectotype here selected MCZ 176994, pl. 27, fig. 23.

**todilla, Pleurotoma:** 1845, PBSNH 2, p. 24 (Oahu [Hawaiian Islands]).

**truncata** Mighels and Adams **Thracia**: 1842, BJNH 4, p. 38, pl. 4, fig. 1 (Casco Bay, Maine). Lectotype here selected MCZ 165595.

Jeffreys (1872, Ann. Mag. Nat. Hist., p. 238) proposes the name *Thracia septentrionalis* for *Thracea truncata* Mighels and Adams, *non* Brown 1827.

**turricula**, **Achatina**: 1845, PBSNH 2, p. 20 (Oahu [Hawaiian Islands]). Lectotype here selected MCZ 156495, pl. 27, fig. 8.

Mighels' specimens undoubtedly came from the mountains back of Waioli, Kauai. (Cooke).

**umbilicata**, **Physa**: 1845, PBSNH 2, p. 21 (Oahu [Hawaiian Islands]).

**unifasciata**, **Cypraea**: 1845, PBSNH 2, p. 25 (Oahu [Hawaiian Islands]). Neoholotype here selected MCZ 176990, pl. 27, fig. 4.

**varicosa** Mighels and Adams **Margarita**: 1842, BJNH 4, p. 46, pl. 4, fig. 14 (Bay Chaleur, Gulf of St. Lawrence).

**venusta**, **Achatinella**: 1845, PBSNH 2, p. 21 (Oahu [Hawaiian Islands]).

"The Portland Society of Natural History possesses three specimens which had been given by Mighels to J. H. Thompson and by him turned over to the Society. Since the original type has been destroyed by fire, we propose to regard one of these shells (No. 218 Portland Soc. Nat. Hist. coll.) as the type" (Pilsbry, 1912, Manual of Conch. (2) 21, p. 347). Not found on Oahu but is from Molokai. (Pilsbry)

**vestita**, **Achatinella**: 1845, PBSNH 2, p. 20 (Waianai [Oahu] and Hawaii [Hawaiian Islands]).

"This species has never been recognized. It could not have come from both islands." (Cooke). The cotypes placed in the J. C. Jay collection could not be located. In the Catalogue of the J. C. Jay collection, 4th ed., 1850, p. 215, it is listed as identical with *Achatinella decora* Férussac.

**violacea** Adams and Mighels **Pleurotoma**: 1841, Cat. Shells of Maine, No. 186 [nude name]; Mighels and Adams, 1842, BJNH 4, p. 51, pl. 4, fig. 21 (Casco Bay, Maine). Lectotype here selected MCZ 165594, pl. 27, fig. 5.

**viridans**, **Achatinella**: 1845, PBSNH 2, p. 20 (Oahu [Hawaiian Islands]).

Cotypes in the British Museum. Figured by Reeve, 1850, Conchologica Iconica 6, **Achatinella**, pl. 4, fig. 25. Cotypes American Museum of Natural History No. 25532, J. C. Jay collection.



**virgulata, Partula:** 1845, PBSNH 2, p. 20 (Waianai [Oahu, Hawaiian Islands]). Lectotype here selected MCZ 177008, pl. 27, fig. 9.

Not found on Oahu, but is from Molokai. (Pilsbry 1912, Manual of Conchology (2) 22, p. 26.)

\* \* \* \*

### BOOK REVIEWS

Dall, W. H., P. Bartsch and H. A. Rehder 1938: A Manual of the Recent and Fossil Marine Pelecypod Mollusks of the Hawaiian Islands. B. P. Bishop Museum Bulletin 153, 233 pp., 58 plates and 28 text figures.

In this rather important paper on the recent and fossil marine bivalves of the Hawaiian Islands the authors recognize 187 species of which 135 are described as new. They have also introduced 23 new genera and subgenera, making the book indispensable to anyone working on Pacific bivalves. Most of the species treated are illustrated. There are many keys to the genera and species which are an aid in identification. Very long and detailed locality data are given for many of the species; comparative remarks, however, are exceedingly limited.  
—R. D. TURNER

Edmondson, H. H., 1933: Reef and Shore Fauna of Hawaii. B. P. Bishop Museum Special Publication 22, 295 pp., 153 figures.

To the ecologist and general collector of Eastern Pacific marine animals, and especially to those interested in mollusks and arthropods this book should prove quite helpful. The purpose of the book is to give a picture of Hawaiian sea shore life and the relative abundance of the various groups represented.

It covers the principal phyla from Protozoa to the lower Chordata with stress on the littoral forms. Edmondson has devoted ninety-one pages to the mollusks, giving descriptions of the families found in the Hawaiian Islands and photographs or drawings of many of the species. Eighty-two pages have been devoted to the arthropods with many figures, especially of the crabs.

In the introduction, Edmondson has briefly discussed collecting in the Islands, stressing some of the more accessible localities and mentioning the groups of animals to be found in each.—R. D. TURNER

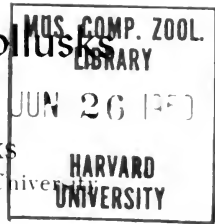
Hirase, S., 1934: A Collection of Japanese Shells with Illustrations in Natural Color. Tokyo, Japan, 217 pp., 129 plates.

In this colorful book Shintaro Hirase has produced a guide that is most helpful, not only to collectors of Japanese mollusks but to students of Indo-Pacific marine shells in general, for many of the 1360 species illustrated are found throughout much of that region. All of the 129 plates are in full color and though many of the shells were not reproduced natural size, the measurements of each are given in the plate captions. Illustrations of most of the larger shells are reduced from natural size. Unfortunately the very small ones are not enlarged and so they are of little help in identification. This group of small shells, however, includes only a very small portion of the total species shown.

The plate captions are given in both English and Japanese. The book is intended to serve solely as a pictorial guide to aid in identification, no descriptive remarks or data on the ranges of the species are given.—R. D. TURNER

# Occasional Papers On Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts



VOLUME 1

JUNE 26, 1950

NUMBER 15

## The Western Atlantic Marine Mollusks Described By C. B. Adams

By WILLIAM J. CLENCH AND RUTH D. TURNER

This present study includes the marine species described by C. B. Adams from the Western Atlantic. His original descriptions are given exactly as he published them along with any of his pertinent remarks concerning the various species described. No attempt is made to bring his species "up to date" other than the very few that have been considered in *Johnsonia* and the work on *Vitrinella* done by Pilsbry. However, we have appended after each species concerned the notes published by H. Krebs in 1866. Henry Krebs had paid a visit to Amherst prior to this time to see the Adams collection and his notes add material value to an understanding of a few of the species no longer existing in the Adams collection. To modernize the many species described by Adams would call for a complete revision of several genera and in certain cases, whole families, a task far beyond the scope of this report.

The purpose of this report is to put on record the material that Adams described but rarely figured. His collection, which was at Amherst College for nearly ninety years, was deposited in the Museum of Comparative Zoölogy in 1942.

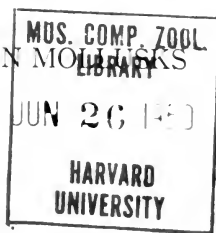
The collection had suffered but little during the long years at Amherst. This in itself is remarkable as throughout that long period those responsible for its care may have had little interest in it. There are many cases on record of valuable collections, bequeathed to various institutions, that have deteriorated or even entirely disappeared.

A few types, particularly very small specimens, have been lost. Their exact number will not be known until the last report of his many species has been worked up. This loss was due mainly to a peculiar defect in housing the collection. Small specimens were kept in long glass vials, generally with a rather loose plug of long fibered cotton. These vials were for the most part free in the drawers. Any movement of the drawers would cause the vials to roll back and forth. Cotton plugs of vials with opposing apertures would become entangled and in time the weaker plug was pulled out. Minute shells were thus readily lost in the dust and through cracks in the drawers.

A few genera, such as *Eulima* (= *Melanella*) and *Chemnitzia* (= *Turbonilla*) are completely lacking. These may have been loaned to others and never returned. No records remain to indicate their whereabouts nor are there the usual labels and empty vials which exist for the few lots of known "lost" material.

The proper evaluation of the work of C. B. Adams in the field of mollusks is most difficult. In the short space of 15 years he described about 800 species. His early work on New England mollusks was carefully done and the species described were, for the most part, well figured. At the time of his visits to Jamaica, comparatively little was known about the astonishing richness of the West Indian mollusks. Though much material had reached Europe, it had been collected mainly by persons interested in other fields and locality data were both limited and, in many cases, incorrect. This, of course, complicated his earlier studies of the Jamaican marine mollusks. In addition, the highly localized nature of the land snail fauna and, in general, the lack of extreme variation among most of the colonial elements of this fauna, probably influenced his point of view regarding the marine species that he described. At least, he separated many of his marine forms on very trivial characters, which even today would be held as falling within a normal variation curve.

Adams realized early that the task ahead was a tremendous one, a task that would take many years to finish. As a consequence, he issued his descriptions of new species briefly with few or no figures. This procedure he considered a preliminary one; at a later date a complete monograph of the land, fresh-



*C B Adams.*

1814-1853

Plate 28. Copied from the American Geologist, 1903, 32, Plate 1.

water and marine shells he had described was to be issued. His premature death in St. Thomas left only the preliminary work behind him. This type of work has been most unfortunate as it has added many difficulties to the study of this complex fauna. Even at this date, many of Adams' species remain completely unknown.

Realizing that a large monograph would be a very costly undertaking, Adams decided to sell duplicate material in order to obtain additional money for his publication; to facilitate this the new species were described. Such collections were sold to J. G. Anthony, Hugh Cuming, E. Johnson (of Waioli, Kauai, Hawaiian Islands), H. Krebs, E. C. Layard, M. Largilliert, S. Moricand, A. Mousson, R. MacAndrew, T. H. Newton, W. H. Pease, S. Petit de la Saussaye, Felipe Poey, J. H. Redfield, R. J. Shuttleworth, Robert Swift, Frederick Sturm, Benjamin Tappan and others.

We list these collectors simply as an aid in tracing the whereabouts of some of the Adams specimens. All would be heautotypes and probably most could be considered as paratypes. The collections of many of the people mentioned above have been donated or sold to various museums in many parts of the world. Very probably many more names could be added to this list. Most of the names given above were obtained from Amherst College. Adams had printed extra copies of his Catalogue of the Land Shells which inhabit Jamaica (Contributions to Conchology no. 9, pp. 179-186, 1851) and the index to his Catalogue of Shells Collected at Panama, 1852. These were sent to his correspondents who checked their wants and returned them to Adams for pricing.

Specific locality data were seldom given by Adams. This is difficult to understand in a man who appreciated the remarkable speciation and differentiation that occur locally in the Jamaican land snail fauna. Occasionally his labels carry more information as to locality than his published record, but these instances are infrequent. Edward Chitty, a student-colleague of Adams, realized this omission and in the few papers he published on the Jamaican land mollusks added such data for the species originally described by Adams.

Another unfortunate practice of C. B. Adams was the sending out of material under manuscript names. Many of these species were never described as these manuscript names were discarded for others or were later held to be synonyms of species already described. Certain of these names have appeared

in the published record and much time has been lost in searching the writings of Adams to establish their validity. A classic example is that of *Torinia canalifera* 'C. B. Adams' Dall (Clench 1948, *Nautilus* **61**, p. 104).

### Charles Baker Adams

*January 11, 1814—January 18, 1853*

To the student of West Indian and Panamic mollusks the name of C. B. Adams is most familiar. Adams was one of that remarkable group of malacologists interested in the West Indies during the middle of the last century. Among this fraternity were Thomas Bland, Henry Krebs, F. Poey, J. H. Redfield, Edward Chitty, Robert Swift, A. H. Riise and others—all men who have left their stamp on the literature of that region. However, C. B. Adams was probably one of the most important of this group and it has been said that it was his enthusiasm and personality that stimulated many of the others.

Charles Baker Adams was born in Dorchester, Massachusetts on January 11, 1814. His early life was spent in and around Boston where his interest in Natural History developed at an early age. He attended Phillips Academy at Andover, Massachusetts and in 1830 entered Yale University, New Haven, Connecticut. In his sophomore year, however, he transferred to Amherst College, Amherst, Massachusetts from which he was graduated with honors in 1834. He then entered the Theological Seminary at Andover, but soon abandoned this work to assist on the geological survey of the State of New York which was directed by Professor Hitchcock under whom he had studied at Amherst. When Professor Hitchcock gave up the survey due to ill health, Adams, unwilling to continue it alone, turned to lecturing on geology at Bradford Academy, Bradford, Massachusetts, and in October 1836 he accepted a position as tutor at Amherst College.

In September 1838 C. B. Adams became Professor of Chemistry and Natural History at Middlebury College, Middlebury, Vermont where he immediately began building up a college museum. This was at the time of the beginning of a nationwide interest in state geological surveys and in the spring of 1845, C. B. Adams was appointed head of the survey for Ver-

mont. For three years he worked on this survey while teaching at Middlebury College, publishing four annual reports on the work accomplished. In 1847 he accepted a position as professor of Zoology and Astronomy at Amherst College where he was the first strictly biological teacher to serve the college. As no further money was appropriated by the Vermont legislature for the geological survey and as Adams' interest had turned elsewhere, the fourth annual report was only a very small portion of the big work which had been originally planned.

Taking up his teaching duties at Amherst, Adams apparently dropped his interest in geology and turned his attention to the study of mollusks. He had been interested in this group for some time and had collected rather extensively in New England. He had exchanged with other collectors throughout the country and had published several papers on New England mollusks, some of these with Jesse W. Mighels\* of Portland, Maine.

In the winter of 1843-1844 Adams made his first trip to Jamaica, in the West Indies. He quickly realized the great possibilities for research and in 1845 published his first paper on Jamaican mollusks. Adams returned to Jamaica in 1848-1849 and in 1850-1851 he made a trip to Panama. Again in 1852 he returned to the West Indies, this time to visit Robert Swift at St. Thomas, in the Virgin Islands. Here he was stricken with yellow fever and died on January 18, 1853 at the age of thirty-nine. He was buried in the public cemetery at St. Thomas where a gravestone was erected to his memory by his American friends.

Descriptions of the many new species which were found in Jamaica as well as notes on other West Indian species and their distribution were published in various journals but principally in the 'Contributions to Conchology,' a series privately published by Adams. In these papers he brought out preliminary descriptions of the many new species so that he could exchange and sell material and in this way finance additional trips to collect material in preparation for a large, illustrated

\*For an account of Jesse Wedgewood Mighels see R. I. Johnson 1949, *Occasional Papers On Mollusks* 1, no. 14, pp. 213-232.



monograph of Jamaican mollusks which he was planning to write with Edward Chitty. Though Chitty published one additional number of *Contributions to Conchology* he never undertook the large monograph on the West Indian mollusks which had been planned by them jointly.

W. S. Tyler and E. Hitchcock in their histories of Amherst College gave rather vivid accounts of the personality and character of C. B. Adams. We quote portions from their books. The following is from the account of W. S. Tyler.

"He was an intense thinker. He was an intense worker. At the same time his thinking and working were subjected to the most rigid, undeviating, unbending system and method. He seldom smiled, and never laughed. From his external appearance, you would judge him incapable of wit or humor. Yet ever and anon a flash of dry wit broke from those marble lips which moved the hearers to laughter and the more irresistibly, because it produced not the slightest change in the countenance of the speaker.

"His speech and outward action were indicative of imperturbable calmness, nay of the coldness of pure intellect without a spark of passion or emotion. But beneath that cold exterior like the perpetual and unchanging snow and ice of Hecla, there was a soul of fire—a volcanic intensity of thought and feeling and action which nothing could chill and nothing withstand—which made him a man of irresistible power."

President E. Hitchcock wrote: "I never knew a man who would do as much in collecting, arranging and ticketing specimens as he. He gave his whole time to it, regardless of the laws of health, which with him was not the most vigorous. So economical was he of time, that in going from his cabinet to his meals he had learnt to move upon a trot, and I am afraid that too many midnight hours saw his lamp burning. He had two characteristics fully developed, which are indispensable to form the distinguished naturalist. The one was the power of giving a logical attention to minutiae and the other the power of grasping great principles and using them for the arrangement of details.

"I think I never saw a man all of whose operations were such perfect clock-work as those of Professor Adams. He was rigidly exact in the performance of his duties and could tolerate

no delinquency or irregularity in other. Hence he could not always get along agreeably when associated with others in a common enterprise. Toward the close of his life he became exceedingly tenacious of his own plans, and would rarely submit to modify them at all, however strongly advised. Knowing that I had always been his friend, he had in earlier days paid a good deal of deference to my advice; but not so towards the close of life."

Concerning his last visit to the West Indies President Hitchcock, who had advised against his going, added the following:

"He went and stopping at the hospitable residence of a friend in St. Thomas was advised to keep within doors till the yellow fever had subsided. But his love of science set at naught the suggestions of prudence, with the remark that there was no fever among the shell fish, and a little exposure brought on the fever of which he died."

Rather detailed accounts of the life of C. B. Adams have already been published by Thomas Bland, W. H. Dall, Henry M. Seely and others so we have reduced this to a brief sketch and refer those interested to these more complete accounts.

#### ACKNOWLEDGMENTS

Without financial aid from two friends, this present study would have been impossible, at least in its extended form. This aid enabled us to photograph individually most of the specimens on the following plates so as to bring out to the best advantage the characters of diagnostic value. Harald A. Rehder and R. Tucker Abbott, both of the United States National Museum, have given us their hearty cooperation in many ways, particularly in hunting up early exchange material of Adams, which is not now extant in the Adams collection. Such material has been loaned to us for study and use in this present paper. Lectotypes chosen from this material are, of course, deposited in the United States National Museum. Our thanks are due to H. A. Pilsbry for the loan of the original plate on the species of *Vitrinella*. These exceedingly small shells would have been most difficult to photograph. The present plate is based upon drawings. To Miss Rena Durkan of Morgan Hall, Amherst College Library, we are indebted

for her kindness in making available for our study, books, pamphlets, exchange lists and other data about Adams now under her care. We are also grateful to Harold B. Hitchcock, Department of Biology, Middlebury College, who kindly made the collection in his charge available for our study. To Frank White, Staff Photographer in the Biological Laboratories, we owe much for his careful and painstaking work. Minute shells when greatly magnified are difficult subjects to photograph.

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Papers privately published by Adams were limited in the number of copies and as a consequence are rarely obtainable today. Complete copies of his "Contributions to Conchology" are seldom offered by second-hand book dealers and even odd numbers of the twelve issued by Adams are infrequently offered for sale. For this reason, all of the original descriptions of Adams are published in full in this present report, making it possible for those not in a position to consult the originals to have at hand the complete story of each species described as well as figures of the type specimens never published by Adams.

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\* This is the original publication of the description of *Pupa tappaniana* 'Ward' C. B. Adams. It has always been credited to Adams in his paper in Thompson's *History of Vermont* which appeared a year later.

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*Original Descriptions of the Western Atlantic Marine Mollusks  
Described by C. B. Adams*

The many descriptions by Adams vary greatly in their completeness. When several specimens of a species were involved, he drew upon all of them for his diagnoses. His measurements, however, were based upon a single specimen. In general, he measured to one-hundredth of an inch. This is a little difficult

to understand as no attempt was made to give a range in size nor to set aside the specimen measured to be the holotype or "specimen selected" to represent the species. In our selection of lectotypes\* we have attempted to locate the single specimen that Adams measured. In many of his type lots, no such specimen now exists. It would appear that certain of these specimens at least were subsequently sent out on exchange.

Many of the types are imperfect shells. These represent the single specimens Adams described or the best specimen in a series of poor and beach rolled material.

The initials C. to C. refer to Contributions to Conchology. Numbers within brackets in the body of Adams' descriptions refer to the original pagination. The plate and figure references given on the same line as the species name refer to the plates in the present report.

Original figures of Adams are also given on our plates, usually twice the original size. In most cases these are the only available figures. Specimens of most of the species described by Mighels and Adams were not in the Adams Collection.

All species are arranged alphabetically in the body of this report regardless of the genera in which they were described. However, as far as possible, species are grouped on the plates according to the various genera in which Adams had placed them.

**abbreviata Adams, Marginella**

Plate 32, fig. 8

1850, C. to C. no. 4, p. 56.

Shell oblong, but much contracted anteriorly: white: smooth and shining: spire very short: apex rather obtuse: whorls about three and one-third: labrum incurved and contracting the aperture: varix produced a little way on the spire: columella with four plaits of which the upper one is small.

Mean divergence about  $90^\circ$ ; length of spire about .04 inch; total length .22 inch; breadth .11 inch.

This shell resembles *M. lactea* Kr., but is much shorter,

\* *Lectotype*—a cotype chosen subsequently to the original description, to take the place which in other cases a holotype occupies (C. Schuchert and S. S. Buckman 1905, Science (NS) 21, pp. 899-900).

and is broader at the top of the last whorl; in *M. lactea* the varix extends farther on the apex.

Jamaica.

**aberrans Adams, Purpura**

Plate 32, fig. 9

1850, C. to C. no. 4, p. 58-59.

Shell ovate or subfusiform: white: longitudinally plicately ribbed; with close-set, well elevated spiral ridges which are continuous over the longitudinal folds, and are closely and finely but strongly imbricated, and of which the alternate ones are often much smaller: apex acute: spire with the outlines almost rectilinear: whorls about seven, quite convex, with a rather deep suture: aperture obovate: lip rather sharp, serrated by the sculpture; labium with a moderate deposit: umbilicus slight. An old shell is subcanaliculate.

Mean divergence  $55^{\circ}$ ; length of spire .26 inch; total length .47 inch; breadth .27 inch. Of another specimen, mean divergence  $65^{\circ}$ ; length .46 inch; breadth .3 inch.

This species resembles *Murex costellaris* Lam., the *Purpura costellaris* of Reeve.

Jamaica.

[This species is in the genus *Tritonalia*.—Clench 1947, *Johnsonia* 2, p. 90.]

**aberrans Adams, Rissoa**

Plate 33, fig. 10

1850, C. to C. no. 7, p. 113.

Shell long ovate conic: white: strongly sculptured with three or four spiral ridges, which are decussated, with nodulous intersections, by transverse ridges, of which there are about sixteen on each whorl; anteriorly the transverse ridges are obsolete, and three or four additional spiral ridges are nodiferous: apex acute: spire with the right side nearly rectilinear and the left quite curvilinear, the axis being curved: whorls seven, nearly planulate, with a subcanaliculate suture; last whorl rather large: aperture rather small, deeply notched anteriorly; labrum rather thick and well excurved. This species connects the genus with those *Cerithia*, in which the canal is reduced to a notch.

Mean divergence about  $32^{\circ}$ ; length of spire .1 inch; total length .165 inch; breadth .08 inch.

Jamaica.

**affinis Adams, Eulima**

Type lost.

1850, C. to C. no. 7, pp. 110-111.

Shell similar to that of *E. conica*, but the form is more slender, the axis scarcely curved, the last whorl less oblique anteriorly, and the aperture is larger.

[111] Mean divergence about  $19^\circ$ ; length .09 inch; breadth .034 inch.

Jamaica.

**affinis C. B. Adams, Phasianella**

Plate 36, fig. 6

1850, C. to C. no. 4, p. 67.

Shell ovate: with waving or zigzag transverse flames of brown or red; and very numerous minute well defined dots of red or brown, with white shadows on their right side, somewhat in irregular waving or zigzag series, on a whitish ground: apex acute: spire with moderately convex outlines: whorls nearly five, moderately convex, a little flattened along the middle, with a moderately impressed suture: aperture elliptical: with a small umbilicus and groove issuing from it, which are sometimes concealed by the labial deposit. This species was at first mistaken for *P. pulla*.

Mean divergence about  $60^\circ$ ; length of spire .16 inch; total length .31 inch; breadth .19 inch.

Jamaica.

**affinis Adams, Psammobia**

Plate 45, fig. 7

1845, Proc. Boston Soc. Nat. Hist. 2, p. 10.

Praecedenti affinis [*Psammobia purpureomaculata*], sed t. fusca, atropurpureo biradiata, exilissime decussata. Long. .66 poll.;\* alt. .51 poll.; lat. .25 poll.

Jamaica.

[This is the common *Heterodonax bimaculata* Linné. It would appear that Adams at a later date reconsidered the forms that he had named as *Psammobia affinis*; *P. cerina*; *P. biradiata* and *P. purpureo-maculata* as synonyms of *P. bimaculata*. These were kept separately in his collection, but all under the name of *bimaculata*.—Clench and Turner.]

\* poll. (=pollex) Latin, the thumb. Used as a unit of measure in older descriptions. This reference means one inch, i.e., the first joint of the thumb is approximately one inch in length.

**affinis Adams, Rissoa**

Plate 34, fig. 5

1845, Proc. Boston Soc. Nat. Hist. 2, p. 6.

Praecedenti affinis [*Rissoa albida*]; spira graciliore; striis juxta suturam nullis; costulis ad suturam infra productis. Forsan var.

Jamaica.

**alba Adams, Mangelia biconica var.**

Plate 32, fig. 1

1850, C. to C. no. 4, p. 65.

Var. *alba*, entirely a pure white color.

[See under *biconica*.]

Jamaica.

**alba Adams, Marginella**

Plate 32, fig. 7

1850, C. to C. no. 4, p. 56.

Shell obovate, wide: pure opaque white: smooth and shining: spire concealed, with a shallow pit in its place: labrum well excurved in its upper part, produced to the summit, rather sharp edged, thick, smooth within: columella with four or five plaits, of which the upper one or two are inconspicuous.

Length .205 inch; breadth .13 inch.

Jamaica.

[*Marginella albida*\* C. B. Ad. and *M. nivea* C. B. Ad., belong to the same group as *M. apicina* Menke.—Krebs 1866, p. 396.]

**albella Adams, Pleurotoma**

Plate 29, fig. 2

1850, C. to C. no. 4, p. 63.

Shell long ovate-fusiform: opaque snow white in the intercostal spaces, otherwise of a chalcedonic white: with strong wide transverse ribs, about thirteen on each whorl, nearly in continuous lines from the summit to the last whorl, and becoming obsolete anteriorly; with one or two raised spiral lines at the base of each whorl and numerous well rounded revolving ridges on the anterior half of the last whorl: apex acute: spire with slightly convex outlines, long and regularly conic: whorls seven, slightly convex, with a moderately im-

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\* Unquestionably an error by Krebs for *alba* C. B. Adams.

pressed suture: aperture nearly in the form of a [see plate 39, fig. 1]; labrum denticulate within; sinus rather wide and shallow near the upper end of the labrum: canal very short.

Mean divergence about  $30^{\circ}$ ; length of spire .12 inch; total length .2 inch; breadth .07 inch.

Jamaica.

**albicosta Adams, Patella**

Plate 36, figs. 1, 2

1845, Proc. Boston Soc. Nat. Hist. 2, p. 8.

*P. t. crassa, atro-fusca, costulis 12 elevatis, totidem brevioribus, omnibus albis—instructa; margine pectinato, juniorum fusco—et albo-maculato, seniorum albo. Long. .84 poll.; lat. .7 poll.; alt. .41 poll.; dec. ant. : dec. post. : : 4 : 5.*

Jamaica.

**albicostata Adams, Mitra**

Plate 36, fig. 11

1850, C. to C. no. 4, p. 57.

Shell fusiform: dark brown or reddish brown, with whitish ribs, with a spiral band of a darker shade of the same, which is scarcely interrupted on the ribs, and a spiral white band which commences on the last whorl near the summit of the aperture: with obtuse longitudinal ribs, about 16 on each whorl, which are nearly obsolete in a broad shallow groove near the anterior extremity; with spiral striae in the intercostal spaces, and a few spiral raised nodulous lines anteriorly, of which the larger is continuous with the upper columellar plait: apex obtuse: spire with the outlines quite convex: whorls six, moderately convex, with a well impressed suture: aperture narrow: columella with four plaits, of which the two lower are small and approximate, and the two upper are large and distant. This species resembles *M. cavea* Reeve.

Mean divergence  $40^{\circ}$ . Length of spire .35 inch; total length .59 inch; breadth .31 inch.

Jamaica.

**albida 'C. B. Adams' Krebs, Marginella**

1866, Annals Lyceum Natural History New York 8, p. 396.

[See *Marginella alba* C. B. Adams.]

**albida Adams, Pleurotoma**

Plate 30, fig. 2

1845, Proc. Boston Soc. Nat. Hist. 2, p. 3.

*P. t. parva*, albida, linea flavo-fusca decurrente costulis interrupta; anf. 6, perconvexis, subangulatis, costulis crassis, et striis profundis decurrentibus minus saepe costulas superantibus—instructis; sinu haud profundo; canali subbrevis. Div. 30°; spirae long. .15 poll.; long. tot. .26 poll.; lat. .11 poll. Jamaica.

[*Pleurotoma albida* C. B. Ad., and *P. fusiformis* C. B. Ad., appear to be synonymes.—Krebs 1866, p. 397.]

**albida Adams, Rissoa**

Plate 34, fig. 2

1845, Proc. Boston Soc. Nat. Hist. 2, p. 6.

*R. t. magna*, diaphana, albida; apice acutissimo; anf. 10, a costulis pluribus exilissimis, ad cujusque inferam partem obsoletis, et striis exilissimis decurrentibus, eleganter, decussatis; striis juxta suturam profundioribus, anf. angustantibus; labio a labro supra sinu disjuncto. Div. 28°; spirae long. .2 poll.; long. tot. .31 poll.; lat. .11 poll.

Jamaica.

[Is a synonym of *Rissoina (Zebinella) decussata* Montague.—M. Desjardin 1949, *Jour. de Conch.* 89, p. 200.]

**albo-cincta Adams, Mitra**

Plate 36, fig. 10

1845, Proc. Boston Soc. Nat. Hist. 2, p. 2.

*M. t. minima*, fusiformi; anf. 6, fascia superiore fusca, inferiore alba majori ornatis, striis decurrentibus et costis latis spiralium anfractuum latitudine brevioribus—instructis; canali brevi. Div. 40°; spirae long. .11 poll.; long. tot. .2 poll.; lat. .1 poll. *M. savignyi* affinis.

Jamaica.

**albo-cincta Adams Pleurotoma**

Plate 29, fig. 5

1845, Proc. Boston Soc. Nat. Hist. 2, p. 3.

*P. t. parva*, rubro-fusca, anf. 6, supra carina albo-tuberculata, infra carina enodi—instructis, mediis striatis, striis creberrimis subtilissimis decurrentibus; anf. ultimo alteris carinis tuberculis, et fascia alba ornato; anf. etiam longitudinaliter costulatis, intersectionibus noduliferis; canali

brevi. Div.  $45^{\circ}$ ; spirae long. .16 poll.; long. tot. .28 poll.; lat. .13 poll.

Jamaica.

**albo-maculata** *Adams Pleurotoma*

Plate 29, fig. 6

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 3.

P. t. parva, rubro-fusca; anf. 7, infra longitudinaliter tuberculatis, supra tuberculis minoribus transversis et striis pluribus granosis decurrentibus—instructis; tuberculis et granulis albis; sinus ostio contracto; canali brevissimo. Div.  $35^{\circ}$ ; spirae long. .25 poll.; long. tot. .48 poll.; lat. .06 poll.

Jamaica.

**albo-vittata** *Adams Pleurotoma*

Plate 30, fig. 3

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 4.

P. t. parva, flavido-fusca, fascia alba latissima—cincta; sutura parum impressa; anf. 6, haud multum convexis, singulatim costis 8 vel 9 latis, et striis creberrimis decurrentibus inequalibus—ornatis; sutura haud multum impressa; sinu magno; canali brevissimo. Div.  $33^{\circ}$  ad  $23^{\circ}$ ; spirae long. .15 poll.; long. tot. .25 poll.; lat. .1 poll.

Jamaica.

**albovittatum** *Adams Cerithium*

Plate 38, fig. 6

1850, C. to C. no. 7, p. 122–123.

Shell conoid, turritid: light yellowish brown, with a spiral white band occupying the two lower spiral ridges: with three spiral ridges, of which the middle one is most [123] prominent, and on each whorl about sixteen very small transverse ridges, the intersections forming well developed nodules; anteriorly with another slightly nodulous spiral ridge: apex acute: spire with the outlines moderately curvilinear: whorls nine, a little convex, with an indistinct suture, last whorl terminating abruptly, concave anteriorly: aperture suborbicular: canal extremely short, wide, and straight.

Mean divergence about  $24^{\circ}$ ; length of spire .09 inch; total length .11 inch; breadth .035 inch.

Jamaica.

[See note under *C. gemmulosum* C. B. Adams.]



**algincola** Adams **Cerithium**

Plate 37, fig. 4

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 5.

*C. t.* irregulariter albo et fusco-maculata, caerulescente; varicibus albis vel fuscis, penultimo ab ultimo semi-anfractum distante, alteris  $\frac{2}{3}$  anf. distantibus; anf. 10, subangulatis, striis decurrentibus, pluribus exilioribus 5 majoribus granulosis, et plicis longitudinalibus—instructis; labio supra uniplicato; canali brevi. Div.  $35^\circ$  ad  $25^\circ$ ; spirae long. .52 poll.; long. tot. .73 poll.; lat. .33 poll.

Jamaica.

**ambiguum** Adams **Cerithium**

Plate 38, fig. 7

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 4-5.

*C. lafondii*, Kr., affine; t. costis plu- [5] ribus, 20 ad 25, minoribus—instructa, praecipue elatiore minusque robusta.

	Div.	spirae long.	long. tot.	lat.
<i>C. lafondii</i> :	$23^\circ$ ;	.57 poll;	.8 poll;	.8 poll.
“ <i>ambiguum</i> :	$17^\circ$ ;	.65 “	.8 “	.2 “

Jamaica.

[*Cerithium ambiguum* C. B. Ad., is syn. with *C. costata* Da Costa (Wood's Ind. Test. pl. 25, fig. 13), and *C. Petitii* Kien.—Krebs 1866, p. 394.]

[Is a synonym of *Cerithidea costata* daCosta.—J.C.Bequaert 1942, *Johnsonia* **1**, no. 5, p. 2.]

**americana** C. B. Adams **Lucina**

Plate 46, fig. 1-2

1852, C. to C. no. 12, p. 243.

*L. t. Lucinae divaricatae* simili; crassiore, majore; striis profundioribus ornata; lunula minima, elongata, sinuosa; marginibus exilissime crenulatis, haud serratis. Long. 19.8 millim.; alt. 19.6 millim.; lat. 12.7 millim.

We wish to call the attention of *geologists* and of others, who have believed in the great geological antiquity and the wide geographical distribution of the so-called *L. divaricata*, to the just remark of Philippi (Zeit. f. Mal. 1848, p. 151): “nomine *L. divaricatae* plures species confusae, omnes *divaricatim striatae*.” When the types shall have been properly distinguished, we believe they will be found to have the ordinary restriction both in time and in area. The Linnaean

name should be reserved for the Mediterranean species, since Linnaeus assigns his shell to a Mediterranean habitat.

*L. eburnea* Rv., from the west coast of tropical America, resembles this species more closely than does any other Atlantic species, but differs in having a more distinct and cordate lunule, and in having the striae more arcuated. The beaks of our shell are not oblique as in *L. ornata* Rv.

*Habitat.* Coney Is., New York; C. B. A! and Jamaica; C. B. A! St. Thomas; T. H. Newton! in Mus. Amh.[erst].

**angulata** *Adams Monodonta*

Plate 39, fig. 12

1845, Proc. Boston Soc. Nat. Hist. 2, p. 7.

*M. t. parva*, crassa, olivacea, rubescente, maculis parvis quadratis albidis ornata; spira conica; sutura minime impressa; anf. 7, concavis, singulatim plicis 6 decurrentibus—instructis; anf. ultimo acute carinato, infra plicis 8 cincto; apertura subquadrata; umbilico angusto, subprofundo. Div. 75°; spirae long. .16 poll.; long. tot. .325 poll.; lat. .32 poll. *M. modulo* affinis.

Jamaica.

[*Modulus perlatus* (Wood?), of the collections at St. Thomas, and of Mr. R. Swift, is *Trochus angulatus* C. B. Ad.—Krebs 1866, p. 396.]

[Is *Modulus carchedonius* Lamarck. See Abbott, R. T. 1944, *Johnsonia* 1, no. 14, p. 5.]

**anomala** *C. B. Adams Narica* (?)

Plate 39, fig. 14

1850, C. to C. no. 7, p. 109.

Shell ovate: white, with a tinge of brown: with, on the penult whorl four, and on the last whorl eight, stout obtuse very prominent spiral ridges, which are decussated imbricately by very prominent regular incremental laminae: apex acute: spire with the outlines rather convex: whorls four, quite convex, with a rather deep suture; last whorl large and ventricose: aperture ovate, somewhat effuse and subacute anteriorly: labrum pectinate, rather sharp, thickened within: columella with a small transverse plait opposite the umbilicus, expanded and flattened below.

Mean divergence about 67°; length of spire .08 inch; total length .2 inch; breadth .13 inch.

Jamaica.

**antiqua** *Mighels and Adams Nucula* Plate 45, fig. 10

1842, Boston Journal of Natural History 4, pp. 53-54, pl. 4, fig. 4.

N. testa parva, sub-trapeziformi, per-obliqua, transverse sulcata; dentibus posticis sexdecim, anticis sex; margine simplici.

*Shell* white, small, somewhat trapeziform, very in-equilateral, covered with deep transverse sulci; epidermis dark brown; teeth, sixteen posterior and six anterior to the beaks; beaks low, approximate; anterior margin abrupt, posterior regularly rounded, basal margin slightly curved, simple.

Length  $7/10$  inch; height  $11/40$  inch; breadth  $1/5$  inch.

*Cabinets* of Boston Soc. Nat. Hist., J. W. Mighels, and C. B. Adams.

REMARKS. This species resembles *N. proxima* Say, and *N. tenuis* Turton, but differs from both in the number and [54] arrangement of the teeth, in the deep transverse sulci, in its length compared with its height and width. It is scarce.

Fossil, Westbrook, in the vicinity of Portland, Maine.

**arcuata** *Adams Eulima*

Type lost

1850, C. to C. no. 7, p. 110.

Shell ovate-conic, turritid: subtransparent, white: smooth and shining, with a fine impressed spiral line above the suture: apex acute: spire with the axis curved to an extraordinary degree in the upper whorls, with the outlines moderately curvilinear in the plane perpendicular to that of the curvature: whorls ten, quite convex, with a lightly impressed suture; last whorl long and fusoid: aperture rather long ovate: labium with a well defined deposit.

Mean divergence about  $25^\circ$ ; length .165 inch; breadth .055 inch.

Jamaica.

[*Eulima arcuata* C. B. Ad. We believe this is to be nothing more than a monstrosity.—Krebs 1866, p. 395.]

**arenaria** *Mighels and Adams Cingula* Plate 39, fig. 6

1842, Boston Journal of Natural History 4, p. 49, pl. 4, fig. 24.

C. testa minima, sub-cylindræa, striatula, subplicata;

spira conica, elongata, anfractibus sex, convexis; sutura impressa; apertura sub-orbiculari, dimidium spirae aequante; operculo corneo.

Syn. *Turbo arenarius* Montagu.

*Shell* minute, white, sub-cylindrical, sub-plicate longitudinally, and minutely striate transversely; spire elongated, conical; whorls six, convex; suture impressed; aperture sub-orbicular, half the length of the spire; operculum horny.

Length .10 inch; breadth .05 inch; divergence  $30^{\circ}$ .

*Habitat.* Casco Bay, taken from the stomach of a haddock in the summer of 1841.

But few specimens, have been found, which are in the Cabinet of J. W. Mighels.

### **armillatus Adams Conus**

Plate 31, fig. 10

1850, C. to C. no. 4, p. 59.

Shell obovate-conic; attenuated anteriorly: white, with small orange brown square spots, which are more or less confluent transversely, anteriorly and within the aperture of a pale purple color, which is interrupted within by a white fascia below the middle of the shell: solid, with fine revolving striae on the spire, and on the last whorl with very regular spiral rather distant minute granulous elevated lines, which, from the angle above nearly to the anterior extremity, resemble fine strings of beads, but anteriorly are crowded, smaller, and are irregularly and feebly granulous: apex acute: spire with the outlines a little concave: whorls nearly seven, not coronated: aperture rather open.

Mean divergence  $90^{\circ}$ ; length of spire .2 inch; total length .59 inch; breadth .32 inch.

Jamaica.

[Is *Conus regius* Gmelin.—W. J. Clench 1942, *Johnsonia* 1, no. 6, p. 3.]

### **augustae Adams Pleurotoma**

Plate 30, fig. 1

1850, C. to C. no. 4, p. 61.

Shell long ovate-fusiform: bright red, whitish on the folds and anteriorly, with a wide or sometimes a linear spiral band of brown, which is interrupted by the ribs: with nine broad longitudinal ribs on each whorl: apex obtuse: spire with the

outlines nearly rectilinear: whorls six and one-half, a little convex, with a lightly impressed suture: aperture obovate: sinus shallow: canal very short, wide, and strong.

Mean divergence  $30^{\circ}$ ; length of spire .48 inch; total length .74 inch; breadth .27 inch.

Jamaica.

[*Pleurotoma Augustae* C. B. Ad., is *P. coccinata* Rv.—Krebs 1866, p. 397.]

### **babylonia** Adams *Chemnitzia*

Type lost

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 6.

C. t. parva, lactea; anf. (apice deflecto excepto) 4, carinis duabus perelevatis decurrentibus, intervallis concavis—ornata; anf. ultimo quadricarinato; labro a carinis pectinato. Div. 20; spirae long. .05 poll.; long. tot. .08 poll.; lat. .03 poll.

Jamaica.

### **barrattiana** Adams *Corbula*

Plate 47, figs. 7-8

1852, C. to C. no. 12, pp. 237-238.

C. t. ovato-triangulari, subtenui, [238] inequivalvi, vix inequilaterali, postice acuminata, margine ventrali excurvata: albida: rugis irregularibus parvis concentricis, in lunulam haud productis, ad valvam magnam haud multum majoribus; junioribus exilissime radiatim striatis: apicibus parvis, haud involutis: umbonibus postice acute angulatis: dentibus parvis. Long. 8' ' ' .9; alt. 5' ' ' .2; lat. 4' ' ' .3.

Shell ovate-triangular, somewhat thin, inequivalve, slightly inequilateral, posteriorly acuminate, with the ventral margin well rounded: whitish: with small concentric irregular ridges, which are a little larger on the large valve, not produced into the lunule; with minute radiating striae in young shells: beaks small, not involute: umbones with an acute angle posteriorly: teeth moderately developed.

Length .35 inch; breadth .26 inch; height .17 inch.

*Station*.—In mud, in 4 or 5 fathoms water; C.B.A.!

*Habitat*.—Kingston harbor, Jamaica; C.B.A.! About 200 specimens were collected, many of which are immature.

### **bicolor** Adams *Cerithium*

Plate 37, fig. 15

1845, Proc. Boston Soc. Nat. Hist. **2**, pp. 5-6.

*C. t. parva*, solidiuscula, albida, fascia rubrofusca—cincta; anf. 15 (?), planulatis, lineis 5 elevatis decurrentibus, supra (2 exceptis) obsolete, et lineis elevatis longitudinalibus pluribus, intersectionibus nodiferis—instructis; anf. [6] ultimo plica fusca cincto; columella uniplicata, plica decurrente; canali brevi. Div.  $15^{\circ}$ ; aperturæ long. .08 poll.; long. tot. .08 poll. ? [sic]; lat. .13 poll.

Jamaica.

[*Cerithium bicolor* C. B. Ad., is the *C. punctatum* L., of the collections at St. Thomas, W. I., and of Mr. Robert Swift of Philadelphia.—Krebs 1866, p. 394.]

### **bicolor** *Adams Perna*

Plate 48, figs. 6-7

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 9.

*P. t. convexa*, intus argentea, extra pallii impressionem aterrima, splendente; impressione musculari bilobata, parte altera majori suborbiculari, altera cuspidata; ligamentis 7, robustis. Long. .7 poll.; alt. 1 poll.; lat. .33 poll.

Jamaica.

### **biconica** *Adams Mangelia*

Plate 32, fig. 2

1850, C. to C. no. 4, p. 65.

Shell biconic: whitish, with a narrow spiral band of brown at the summit of the whorls, which is darker between ribs, and a similar wider band a little anterior to the periphery of the last whorl; (or some specimens may be described as pale brown, with a spiral band of white on the periphery of the whorls, and as white anteriorly): with strong transverse rounded ribs, about nine on each whorl, and excessively fine spiral rather distant raised lines, which are obsolete on the summits of the ribs: apex acute: spire with the outlines nearly rectilinear: whorls six, subangular, with a moderately impressed suture: aperture narrow: labrum often much thickened by the last rib: sinus near the upper extremity of the labrum, rather large in old shells: canal short.

Mean divergence  $45^{\circ}$ ; length of spire .08 inch; total length .18 inch; breadth .09 inch.

This species resembles *P. symmetrica* Rv. and *Mangelia Dysoni* Rv.

Jamaica.

**bilineata** 'C. B. Adams' *Reeve Mactra*

1854, May, *Conchologia Iconica* **8**, *Mactra*, pl. 15, fig. 72.

Jamaica. This was also described by Deshayes 1854 [Feb. 1855] *Proceedings Zoological Society of London* **22**, p. 67.

[A manuscript name of C. B. Adams, never described by him. Cotypes MCZ 154329.]

**biradiata** *Adams Psammobia*

Plate 45, figs. 5-6

1845, *Proc. Boston Soc. Nat. Hist.* **2**, p. 10.

Praecedenti affinis [*Psammobia affinis*], sed t. anterius longiore, candidissima, radiis 2 sanguineis latis, brevibus, ornata. Long. .49 poll.; alt. .38 poll.; lat. .18 poll.

Jamaica.

[See note under *Psammobia affinis* C. B. Adams.]

**blandiana** *Adams Corbula*

Plate 47, figs. 3-4

1852, C. to C. no. 12, pp. 234-235.

C. t. crassa, subrhombica, vix inequivalvi, perinequilateralis; margine antice rotundata, aliunde rectilinearis, postice infra acuminata: alba: costis magnis, subacutis, concentricis, postice minoribus; lineis radiantibus tuberculatis, microscopicis; tuberculis deciduis; valvis ambobus similiter insculptis; apicibus prominulis, vix involutis: umbonibus planulatis, postice valde angulatis: dentibus parvis. Long. 11' '' .2; alt. 6' '' .6; lat. 4' '' .5.

Shell thick, subrhombic, slightly inequivalve, very inequilateral; anteriorly well rounded, with the other margins nearly or quite rectilinear; posteriorly and inferiorly acuminate: white: with large blunt edged concentric ribs, which are more slender in the posterior area; with microscopic radiating lines of deciduous tubercles, which are visible only under a good magnifier; with both valves sculptured alike: beaks prominent, slightly involute: umbones flattened, with a stout posterior angle: teeth rather small. Under a good magnifier a crystalline structure is very conspicuous.

Length .44 inch; height .26 inch; breadth .18 inch.

*Station*.—Muddy bottom, at the depth of 3 or 4 fathoms; C. B. A.!

*Habitat*.—Port Royal, in Jamaica; C. B. A.! 5 specimens were collected.

**brevis** *Adams Mangelia*

Plate 31, fig. 14

1850, C. to C. no. 4, p. 66.

Shell short, fusiform, orange or wax yellow, white along the upper part of the whorls and anteriorly: with very strong transverse ribs, about nine on each whorl, smooth on the summits, with unequal microscopic spiral elevated lines: apex subacute: spire with very convex outlines: whorls about six, moderately convex or subangular, with a lightly impressed suture: aperture quite narrow: labrum much thickened by the last rib: sinus rather large: canal very short.

Mean divergence about  $45^{\circ}$ ; length of spire .065 inch; total length .135 inch; breadth .07 inch.

Jamaica.

**brevis** *Adams Phasianella*

Types lost

1850, C. to C. no. 4, p. 67.

Shell subglobose: with a whitish ground and large spots of red on the upper part of the whorls; pale red on the anterior and middle of the last whorl; with well-defined spots of dark red sprinkled over the whole surface: with microscopic spiral striae on the upper whorls, otherwise smooth: apex rather obtuse: spire with very convex outlines: whorls about four, very convex, with a rather deep suture: aperture large, ovate-orbicular: umbilicus wanting.

Mean divergence about  $80^{\circ}$ ; length of spire .04 inch; total length .1 inch; breadth .085 inch.

Jamaica.

**canaliculata** *Adams Odostomia*

Plate 40, fig. 3

1850, C. to C. no. 7, p. 109.

Shell conic, turrated: white: smooth: apex acute: spire with rectilinear outlines: whorls six, planulate, with the suture in a small spiral channel; last whorl short and abruptly terminating: aperture broadly ovate: columellar plait nearly transverse.

Mean divergence about  $20^{\circ}$ ; length .12 inch; breadth .045 inch.

Jamaica.



[*Odostomia canaliculata* C. B. Ad., and *O. solida* C. B. Ad., are very like each other.—Krebs 1866, p. 397.]

**canalifera** 'C. B. Adams' Dall **Torinia**

Dall, W. H. 1889, Bulletin United States National Museum no. 37, p. 148.

[This was apparently a manuscript name of C. B. Adams and was never officially described. It was first listed by Dall in the reference above. See also Clench 1947 [1948] *Nautilus* **61**, p. 104.]

**cancellatus** *Mighels and Adams* **Fusus** Plate 39, fig. 10

1842, Boston Journal of Natural History **4**, pp. 52-53, pl. 4, fig. 18.

F. testa subulata, longitudinaliter plicata, transverse striata: anfractibus septem, convexis: sutura valde impressa; spira acuminata; apice acuta: apertura sub-ovata; labro crenato.

*Shell* rather slender, turreted, with about twenty longitudinal ribs, running a little obliquely to the left, crossed by numerous transverse, revolving, raised lines, giving the shell a cancellated appearance; whorls seven, convex; suture well impressed; spire gracefully tapering; apex acute; columella slightly arched at the upper part; aperture rather narrow, subovate; canal short, straight, rather wider at the base; labrum thin, delicately crenated by the transverse striae. [53] Length  $13/20$  inch; breadth  $1/4$  inch; divergence  $22^\circ$ .

*Cabinets* of Dr. Gould and J. W. Mighels.

*Habitat.* Casco Bay; taken from the stomachs of haddock in the summer of 1840. It must be regarded as very rare.

REMARKS. This species is very nearly allied to *Murex purpureus* Mont., (Turton Conch. Dict. 95) but is distinct in having a less number of volutions by three or four, by the direction of the ribs, which are "obliquely to the right," in *M. purpureus*; Montagu's shell is also described as "rugged," "very rough," &c., terms which will not apply to our shell; it is also said to be "purple," which color is regarded by the author as characteristic; our shell is variously colored, some specimens being tinged with purple, others are white.

**candidissima** *Adams* **Pleurotoma**

Plate 30, fig. 5

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 4.

P. t. parva, candidissima; sutura profunda; anf. 5, supra

subangulatis, singulatim costis 8 vel 9 robustis subcompressis, et striis decurrentibus haud crebris parallelis—instructis; canali brevissimo. Div.  $35^{\circ}$ ; spirae long. .1 poll.; long. .19 poll.; lat. .085 poll.

Jamaica.

[*Mangelia candidissima* C. B. Ad., is a white variety of *Pleurotoma badia* Reeve, of the collections at St. Thomas and of Mr. R. Swift, of Philadelphia.—Krebs 1866, p. 396.]

**candidissimum** *Adams* **Buccinum**

Type lost

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 2.

B. t. parvula, alba, solida; anf.  $6\frac{1}{2}$ , supra striis decurrentibus, costis (anf. cujusque 7 vel 8) ad suturam supra haud productis, latis, laevibus—ornatis; labro crassissimo; labio calloso. Div.  $50^{\circ}$ ; spirae long. .275 poll.; long. tot. .45 poll.; lat. .23 poll.

Jamaica.

**carinata** *Mighels and Adams* **Cingula**

Plate 39, fig. 18

1842, Boston Journal of Natural History **4**, p. 49.

[See under *Cingula semicostata* Mighels and Adams.]

**cascoënsis** *Mighels and Adams* **Nucula**

Plate 45, fig. 13

1842, Boston Journal of Natural History **4**, pp. 40–41, pl. 4. fig. 6.

N. testa ovato-lanceolata, sub-inequilaterali, compressa; postice attenuata; areola valde compressa; natibus parvis; dentibus anticis decem, posticis duodecim, parvis.

*Shell* ovate-lanceolate, rather thin, finely striate, slightly [41] inequilateral; anterior half regularly semi-oval; posterior half tapering nearly to a point, with an areola well defined, sharply compressed, with a slight wave below the areola; epidermis greenish straw-color; beaks small, nearly central within pearly-white; teeth small, ten anterior, and ten or twelve posterior, including some very minute ones near the beaks.

Length, .6 inch; height, .35 inch; width, .09 inch.

*Cabinets* of G. B. Sowerby, Esq., J. W. Mighels, and C. B. Adams.

*Habitat.* Casco Bay. A single specimen was found in the stomach of a haddock in the spring of 1840. Subsequently

we have found a single specimen of the above dimensions, and four or five very small ones.

REMARKS. This species is allied to *N. limatula*, Say, and *N. myalis*, Couth., but is easily distinguished from both by the number of teeth, the beaks being nearer the posterior extremity, and being much more compressed than either. It more nearly resembles the latter, but is uniformly lighter colored.

**cerina Adams Psammobia**

Plate 45, figs. 3-4

1845. Proc. Boston Soc. Nat. Hist. **2**, p. 10.

*P. t. parva*, *cerina*, *tenui*, *anterius procera et circulari*, *posterius angulata* (angulo haud multum truncato), *concentrice exilissime striata*; *dentibus parvis, prominentibus*. Long. .39 poll.; alt. .31 poll.; lat. .17 poll.

Jamaica.

[See note under *Psammobia affinis* C. B. Adams.]

**cerina Adams Thetis**

Plate 44, figs. 7-8

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 9.

*T. t. parva*, *lineis elevatis concentricis distantibus et striis radiantibus ornata*, *cerina*; *lunula vulvaque transversim rubro lineatis*; *umbonibus minimis, acutis, pallide virentibus*; *marginē supra angulato, alibi rotundato*; *pallii impressione subsinuata*. Long. .4 poll.; alt. .39 poll.; lat. .21 poll.

Jamaica.

See *Gouldia*.

**chittyana Adams Corbula**

Plate 48, figs. 4-5

1852, C. to C. no. 12, p. 238.

*C. t. Barrattianae* simili; sed multum crassiore, latiore, inequivalviore; praecipue differt quoad crescendi rationem duplicem, sicut *C. Dietziana*. Long. 8' ' ' .6; alt. 5' ' ' .8; lat. 5' ' ' .2.

This species resembles *C. Barrattiana*, but differs in being very thick and solid, very wide, and in having two periods of growth, like *C. Dietziana*: it is also more inequivalve.

Length .34 inch; height .23 inch; breadth .22 inch.

*Station*.—In 4 or 5 fathoms water, in a muddy bottom; C. B. A.!

*Habitat*.—Kingston harbor, Jamaica; C. B. A.! We obtained only 4 specimens of this rare shell.

**concinna** *Adams* **Cingula** (?)

Plate 39, fig. 4

1850, C. to C. no. 5, p. 70.

Shell broadly ovate-conic: subtransparent, wax brown, darker at the sutural ridge: smooth and shining; at the summit of the whorls with a narrow ridge scarcely elevated, but separated by an impressed line: apex rather obtuse: spire with the outlines moderately convex: whorls five, quite convex, with a well impressed suture; last whorl large: aperture acute above, in the rest regularly ovate: lip a little reflected on the left side: umbilical region slightly indented.

Mean divergence  $53^{\circ}$ ; length of spire .03 inch; total length .075 inch; breadth .055 inch.

Jamaica.

**concinna** *Adams* **Phasianella**

Plate 36, fig. 4

1850, C. to C. no. 5, p. 69.

Shell broad ovate, or ovate conic: with numerous well defined dots of opaque reddish brown on a subtransparent ground of very pale red or brown, the dots being less numerous and less uniformly sprinkled on the upper part of the whorls: surface well polished: apex rather obtuse: spire with quite convex outlines: whorls four, quite convex, with a well impressed suture: aperture ovate-orbicular, with its plane very oblique to the axis of the shell: labrum much curved: with an umbilical groove parallel to the labrum.

Mean divergence about  $60^{\circ}$ ; length of spire .07 inch; total length .14 inch; breadth .1 inch.

Jamaica.

**concinnum** *Adams* **Buccinum**

Plate 32, fig. 16

1845, Proc. Boston Soc. Nat. Hist. 2, p. 2.

B. t. parva, nitida, flavo-fusca, fuscomaculata, maculis plerumque seriatis; anf. 7, costis parvis, et striis decurrentibus; labro solido et albo-varicato, intus 6-denticulato; apertura lacunata. Div.  $40^{\circ}$ ; spirae long. .12 poll.; long tot. .225 poll.; lat. .11 poll.

Jamaica.

[This name was changed to *Columbella decipiens* by Adams in his *Contributions to Conchology* no. 4, p. 55, 1850, as a new name in place of *Buccinum concinnum* Dillwyn 1817.]

**concolor** *Adams Phasianella*

Plate 36, fig. 3

1850, C. to C. no. 4, p. 68.

Shell rather long ovate-conic: of a uniform glossy brown, rarely with a sutural band of a deeper shade of the same: surface highly polished: apex rather obtuse: spire with the outlines nearly rectilinear: whorls five, rather convex, with a well impressed suture; last whorl subangular: aperture ovate: labium with a thick deposit: with an umbilical indentation.

Mean divergence about  $35^{\circ}$ ; length of spire .05 inch; total length .1 inch; breadth .06 inch.

Jamaica.

**conica** *Adams Cingula* (?)

Plate 39, fig. 5

1850, C. to C. no. 5, pp. 70-71.

Shell elongated, conic: whitish, with large irregular spots of wax color, and a wax-colored summit: solid, with three or four slightly elevated obtuse spiral ridges, and about the periphery of the last whorl two or three more, all of which are slightly striated across; on the lower whorls with nearly obsolete broad ridges; anteriorly smooth: apex acute: spire with rectilinear outlines: whorls six and one-half, flat, with a lightly impressed suture; last whorl with a moderately acute periphery: aperture between quadrate and orbicular, nearly parallel with the axis of the spire: lip reflected on the left side and on the adjacent part of the anterior side: umbilical region moderately indented.

Mean divergence about  $32^{\circ}$ ; length of spire .065 inch; total length .105 inch; breadth .06 inch.

These last three species we have referred, with some doubt, to *Cingula* of Fleming, restricting this genus to the section in which the labrum is not thickened and the aperture is Turbinoid, and excluding *Rissoa* in which the aperture is Melanoid and the labrum thickened. *C. concinna* however is with difficulty referred to the same generic type with *C. solida* and *C. conica*, being eminently distinguished

by its smoothness and translucency, (in this respect resembling, as also [71] in color, *Pupa ovata*, *P. milium*, &c.) and its broadly ovate form elegantly rounded below and acute above, with the same beautiful outline repeated in the aperture, as in some Phasianellae. The last two species have a striking coincidence in the general plan of sculpture, reflection of the left side of the lip, &c., and evidently belong to a restricted natural group, which perhaps should be separated from *Cingula*. We have been unable to obtain more than one specimen of each of these species.

Jamaica.

**conica** *Adams Eulima*

Plate 36, fig. 7

1850, C. to C. no. 7, p. 110.

Shell conic turritid: white: smooth and shining: apex acute: spire with the axis moderately curved throughout with the outlines rectilinear in the plane perpendicular to that of the curvature: whorls about eleven, planulate, with an indistinct suture: last whorl subangular, quite oblique anteriorly: aperture small, ovate.

Mean divergence about  $22^{\circ}$ ; length .1 inch; breadth .042 inch.

Jamaica.

**costatus** *Adams Chiton*

Plate 42, fig. 8

1845, Proc. Boston Soc. Nat. Hist. 2, p. 8.

C. t. albido atroque maculata; areis lateralibus elevatis, costulis 3 vel 4 papillosis instructis, posterius subspinosus; areis dorsi mediis laevibus, transversim striatis; inter areas declivitas est, profunde striata; margine squamoso, alternatim flavido-albo atroque. Long. 1.35 poll.; lat. .75 poll.

Jamaica.

**costulata** *Adams Columbella*

Plate 41, fig. 3

1850, C. to C. no. 4, p. 58.

Shell moderately elongated, ovate: whitish, with an ill-defined spiral band of very pale yellowish brown on the middle of the whorls, with the same color anteriorly; with a series of large deep brown spots at the summit of the whorls and also before the middle of the last whorl: with

obtuse longitudinal ribs, about twelve on each whorl, and unequal spiral striae: apex subacute: spire with moderately convex outlines: whorls about five and one-half, a little convex, with a well impressed suture: aperture small: labrum with a broad highly polished varix, denticulate within, sinuate above.

Mean divergence  $40^{\circ}$ ; length of spire .12 inch; total length .19 inch; breadth .09 inch.

This species was described in Mss. five years since, but being informed that it was identical with *C. pygmaea* Sowb. just published, I suppressed the description and distributed the shell as *C. pygmaea*. It proves to be quite distinct.

Jamaica.

[*Columbella costulata* C. B. Ad., described from a single specimen from Jamaica, we consider syn. with *C. obesa* C. B. Ad.—Krebs 1866, p. 395.]

**costulata** *Mighels and Adams Turritella* Plate 40, fig. 16

1842, Boston Journal of Natural History 4, p. 50, pl. 4, fig. 20.

T. testa albida; transverse subtilissime striata; anfractibus decem; superioribus sub-plicatis; duobus ultimis sub-laevibus, ultimo sub-carinato; apertura sub-ovata, anterius producta.

*Shell* whitish, translucent; whorls nine or ten, nearly flat, or very slightly convex; suture well impressed; last two whorls nearly smooth; the others longitudinally plicate, with microscopic transverse striae; last whorl sub-carinate; aperture rather less than one-fourth the length of the shell, sub-ovate, produced anteriorly.

Length .7 inch; breadth .23 inch; divergence,  $22^{\circ}$ .

*Habitat.* Casco Bay; taken from the stomach of a haddock in the summer of 1841.

REMARKS. Although only a single specimen has been obtained, its characteristics are so obvious that we have not hesitated to describe it. It has no analogue on our coast, to our knowledge; it, however, resembles a very much enlarged *T. interrupta* Totten. It is in the cabinet of J. W. Mighels.

**crassicosta** *Adams Rissoa*

Plate 34, fig. 6

1845, Proc. Boston Soc. Nat. Hist. 2, p. 6.

R. t. magna, crassa, lactea; anf. 7, costulis 11 vel 12, latis, obliquis, supra suturam profundam trajectis et striis pluribus exilissimis decurrentibus costulas superantibus—instructis; labro perincrassato, infra haud sinuato. Div.  $35^\circ$ ; spirae long. .21 poll.; long. tot. .3 poll.; lat. .11 poll.

Jamaica.

[*Rissoa crassicosta* C. B. Ad., one poor specimen from Jamaica very like a *Scalaria crenata* L., is certainly not a *Rissoa*, but being placed next to the *Scalariae* a mistake may have arisen.—Krebs 1866, p. 397.]

[Is *Opalia (Dentiscala) hotessieriana* d'Orb.—Clench and Turner 1950, *Johnsonia*, no. 15 [In press] ].

**crassicostata Adams Mangelia**

Plate 31, fig. 12

1850, C. to C. no. 4, p. 66.

Shell subfusiform: dark reddish brown, paler about the apex: with very strong and very prominent transverse ribs, smooth on the summits, about ten on each whorl, with the transverse sections of the intercostal spaces almost regularly concave; with a few distant elevated spiral lines, of which one is on the middle of each whorl, and one is on the lower half, and the rest are anterior: apex acute: spire with quite convex outlines: whorls about seven, rather convex, with a well impressed suture: aperture narrow: labrum much thickened by the last rib: sinus rather large and deep: canal very short.

Mean divergence  $42^\circ$ ; length of spire .13 inch; total length .22 inch; breadth .1 inch.

This species resembles *Mangelia badia* Rv., but that shell is represented with a smaller spire and more slender ribs. It may possibly be a variety of *M. fusca* Ad.

Jamaica.

**cumingii Adams Truncatella**

Plate 40, fig. 10

1845, Proc. Boston Soc. Nat. Hist. 2, p. 12.

T. t. parva succinea, rubente, scalariformi, decollata; anf. 4 perditis; anf. reliquis 4, singulatim costis 9 robustis acutis-ornatis; operculo subcorneo. Div.  $22^\circ$  ad  $18^\circ$ ; spirae long, post decoll. .12 poll., antea. .18 poll.; long. tot. .17 poll.; lat. .08 poll.

Jamaica.



[Is a synonym of *Truncatella scalaris* Michaux.--Clench and Turner 1948, *Johnsonia* **2**, p. 160.]

**cypraeoides** *Adams Erato* (?)

Plate 33, fig. 11

1845. Proc. Boston Soc. Nat. Hist. **2**, pp. 1-2.

M. t. *solida*, *alba*; anf. infra suturam fusco-canaliculatis; spira plana, parva; apertura lineari, pro [2] funde emarginata; labro extra crasso, intus exile crenulato; labio per totum transversim exile plicato. Long. .325 poll.; lat. .2 poll.

Jamaica.

**dealbatum** *Adams Cerithium*

Plate 38, fig. 3

1850, C. to C. no. 7, p. 117.

Shell like that of *C. decoratum*, but snow white; the outlines of the spire are exactly rectilinear; the granules are less developed; and the canal is nearly straight.

Jamaica.

**decorata** *Adams Pleurotoma*

Plate 29, fig. 4

1850, C. to C. no. 4, pp. 62-63.

Shell ovate-fusiform: covered, on a whitish ground, with a net work of bright brown irregular spots and lines, which on the upper whorls are less numerous, somewhat regular and darker: with, on the upper whorls, strong transverse ridges which become smaller and at length disappear on the penult whorl; [63] with very close-set rather coarse spiral striae, which are elegantly decussated on the lower whorls by excessively minute lines of growth: apex acute: spire with moderately convex outlines: whorls seven or eight, rather convex, with a well impressed suture: aperture large: labrum well excurved and produced in its lower half: sinus rather deep at the upper extremity of the labrum: canal short and very wide.

Mean divergence  $32^{\circ}$ ; length of spire .27 inch; total length .55 inch; breadth .2 inch.

This species much resembles *P. lymneiformis* Rv., for which it has been mistaken. It also closely resembles in form, but not in sculpture, *P. patula* Rv.

Jamaica.

**decoratum** *Adams Cerithium*

Plate 38, fig. 2

1850, C. to C. no. 7, p. 117.

Shell conic, turritid, sinistrorsal: white, dark reddish brown anteriorly, with many large rather square irregular spots of the same: with, on the upper whorls, two, and on the middle and lower whorls, three nearly equal spiral ridges, which are nearly concealed by numerous large nodules that are produced by the excessive development of the intersections of twenty-five to twenty-eight small transverse ridges on each whorl; anteriorly with two additional smaller or less strongly nodulous spiral ridges: apex very acute: spire with the outlines nearly rectilinear: whorls sixteen, planulate, with the place of the suture distinguished by a deeper groove; last whorl terminating very abruptly, so as to be concave between the periphery and the canal: aperture ovate-orbicular, modified a little by the penult whorl: canal strongly bent to the right, closed except near the extremity. This shell resembles *C. ornatum* *Desh.*, but that species has only ten or twelve whorls, its outlines are quite curvilinear and the last whorl terminates less abruptly.

Mean divergence about  $20^{\circ}$ ; length .29 inch; breadth .085 inch.

Jamaica.

**decipiens** *Adams Columbella*

Plate 32, fig. 16

1850, C. to C. no. 4, p. 55.

[New name for *Buccinum concinnum* C. B. Adams *non* Dillwyn 1817.]

**decussatula** *Adams Tellina*

Plate 44, figs. 1-2

1845, Proc. Boston Soc. Nat. Hist. 2, p. 10.

T. t. rosacea, supra albida, iridescente, exilissime decussata; dente sinistra posteriore obsoleta. Long. 1 poll.; alt. .65 poll.; lat. .29 poll.

Jamaica.

**delphinodonta** *Mighels and Adams Nucula*

Plate 45, figs. 8-9

1842, Boston Journal of Natural History 4, p. 40, pl. 4, fig. 5.

N. testa parva, solida, trigona, transverse sub-sulcata; an-

gulis umbonalibus duobus; natibus prominentibus, sub-terminalibus; dentibus anticis tribus, posticis septem, elevatis, conicis, acutis.

*Shell* small, solid, very wide, oblique, triangular, transversely ribbed and striate irregularly; anterior margin nearly straight above, curved below, inferior margin well rounded, posterior moderately curved, making a right angle with the anterior; surface divided into three regions by the umbonial angles which diverge from the beaks; these are prominent, nearly terminal, often eroded; epidermis green; seven posterior and three anterior teeth, which are very long, slender and pointed.

Average length, .13 inch; height, .11 inch; width, .09 inch.

*Cabinets* of Bost. Soc. Nat. Hist., J. W. Mighels, and C. B. Adams.

*Habitat.* Casco Bay. Several hundred specimens were taken from the stomach of a single haddock, in the spring of 1841. At several times subsequently we have obtained them from the same source, sparingly.

REMARKS. This species is allied to *N. proxima*, Say, and *N. tenuis*, Turton, but is distinct from both in the number and arrangement of the teeth; also in respect to form, anterior and posterior umbonial angles, and in its greater width.

### **densestriata** Adams *Mangelia*

Plate 31, fig. 8

1850, C. to C. no. 4, p. 65.

Shell fusiform: white: with narrow prominent ribs, ten or eleven on each whorl, and crowded regular excessively fine deep spiral striae, which cover the entire surface and are not interrupted in crossing the ribs: apex acute: spire with rather convex outlines: whorls seven, subangular near the summit, with a rather deep suture: last whorl long, and gradually attenuated into a wide canal.

Mean divergence  $40^{\circ}$ ; length of spire .13 inch; total length .28 inch; breadth .11 inch.

Jamaica.

[*Mangelia densestriata* C. B. Ad., is a white variety of *Pleurotoma badia* Reeve, of the collections at St. Thomas and of Mr. R. Swift, of Philadelphia.—Krebs 1866, p. 396.]

**dietziana Adams Corbula**

Plate 47, figs. 5-6

1852, C. to C. no. 12, pp. 235-236.

C. t. solida, valde distorta, juniore vix inequivalvi, seniore perinequivalvi, inequilaterali; margine antice rotundata, aliunde rectilineari, postice infra acuminata: albida, radiis rubris, inequalibus, saepe confluentibus, in juniore obsoletis, ornata: costis magnis, subacutis, concentricis, in seniore irregularibus et in valva parva exilibus: apicibus prominulis, vix involutis: umbonibus planulatis, postice valde angulatis: dentibus robustis. Long. 10' '' .7; alt. 8' '' .4; lat. 9' '' .1; junioris, long. 10' '' .1; alt. 6' '' .6; lat. 4' '' .3.

Shell solid, much distorted, moderately inequivalve in the first stage of growth, afterwards very inequivalve, inequilateral; anteriorly well rounded, with the other margins subrectilinear, posteriorly and inferiorly acuminate: whitish, with unequal often confluent bright red rays, which are indistinct in the first stage of growth: with concentric blunt edged unequal ribs which are more irregular in the last stage of growth; with both valves sculptured alike in the first stage of growth, but in the second, the small valve is only striated: beaks prominent, slightly involute: umbones flattened, with a strong posterior angle: teeth rather stout.

Length .42 inch; height .33 inch; breadth .36. The corresponding dimensions of a shell commencing the second stage of growth are .4 inch; .26 inch; .17 inch.

This species is remarkable for two very distinct stages of growth, with a very abrupt transition from the first to the second. Until a little more than half grown, it is very much like *C. Blandiana* in the form of the outline, in the sculpture, and in having the valves similarly sculptured, and nearly equal. In the second stage of growth, the larger valve increases nearly three times as much as the other, and the growth is abruptly and strongly directed inwards so as greatly to increase the breadth of an old shell. The sculpture is more irregular, and on the small valve it is much finer and is covered with a coarse deciduous epidermis. Posteriorly the small valve is deeply set into the larger one. So abrupt is the change from the first to the second stage of growth, that the edge of the umbonial angle in the first

makes an angle with the edge in the second of only about  $115^{\circ}$ , and the general form is made very irregular. It is the analogue of *C. speciosa*, which inhabits the west coast of tropical America.

*Station.*—Unknown.

*Habitat.*—Kingston harbor (Jamaica), along "the Palisades," southeast from the city; A. Barratt! C.B.A.! 22 specimens were obtained, of which several were collected by my companion Dr. Barratt, who kindly gave me nearly all his specimens of this remarkable shell.

**diminuta Adams Pleurotoma**

Plate 31, fig. 3

1850, C. to C. no. 4, p. 62.

*Pleurotoma quadrata* (?) Rv. The figure of this species in Reeve's Conch. Icon. represents quite accurately a species, which inhabits Jamaica, but the figure is three times the linear dimensions of our shell, although it is not said to be magnified. If our specimens belong to a distinct species, it may receive the name of **P. diminuta**.

Jamaica.

**dubia Adams Pleurotoma**

Plate 31, fig. 2

1845, Proc. Boston Soc. Nat. Hist. 2, p. 4.

*Pleurotoma dubia* a *P. multilineata* haud multum differt; costae angustiores sunt, et ad basim compressae. Forsan var.

Jamaica.

**dubiosa Adams Rissoa**

Plate 33, fig. 5

1850, C. to C. no. 7, p. 114.

Shell long ovate conic: white, translucent: with, on each whorl, nineteen or twenty obtuse ribs, which are produced on the last whorl to the anterior extremity: apex subacute: spire with the outlines moderately curvilinear: whorls seven, rather convex, with a well impressed suture: aperture moderately effuse: labrum well advanced: excurved, moderately thickened.

Mean divergence about  $28^{\circ}$ ; length of spire .115 inch; total length .185 inch; breadth .065 inch.

Jamaica.

[Is *Rissoina chesneli* Michaud.—Desjardins 1949, Jour. de Conch. **89**, p. 197.]

**effusa Adams Litiopa**

Type lost.

1850, C. to C. no. 5, p. 71.

Shell elongated, ovate: of a uniform brown wax color, sub-transparent: apex obtuse: spire with the outlines very convex above, nearly rectilinear in the rest: whorls six, quite convex, with a well impressed suture: aperture ovate, anteriorly produced so as to resemble a very broad short canal: labrum thin, not very sharp, somewhat reflected: columella slightly twisted.

Mean divergence about  $35^{\circ}$ ; length of spire .06 inch; total length .11 inch; breadth .06 inch.

Jamaica.

**elatioer Adams Pleurotoma**

Plate 29, fig. 7

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 4.

P. t. minima, subconica, albida, fuscescente, lineis flavido-fuscis decurrentibus inequalibus a costis interruptis—ornata; spira elongata; anf. 6, haud multum convexis, singulatim costis 12 haud robustis, et striis decurrentibus subprofundis, una profundiore—instructis; sinu minime profundo; canali brevissimo. Div.  $22^{\circ}$ ; spirae long. .125 poll.; long. tot. .19 poll.; lat. .075 poll.

Jamaica.

**elongata Adams Fissurella**

Plate 41, fig. 7

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 8.

F. t. elongata, tenui, diaphana, fusca, albido-maculata, costulis 20 radiantibus, totidem brevioribus alternatim dispositis, et 40 brevissimis marginalibus ornata; incrementi striis maximis; anterius concava; posterius convexa; intus coerule-scente; fissura atro-marginata, media utrumque sinuata. Lon. .375 poll.; lat. .2 poll.; alt. .11 poll. Dec. ant.: Dec. post. : : 1 : 2.

Jamaica.

**emersonii Adams Cerithium**

Plate 37, figs. 12–14

1839, Boston Journal of Natural History **2**, pp. 284–285, pl. 4, fig. 10.

C. testa parva, conica, elongata, longitudinaliter rugosa, lineis granulatis cincta; anfractibus septemdecim, planulatis; apice acuta; sutura sub-impressa, ampla; apertura sub-quadrata; labro pectinato; columella in spiram ducta; cauda recurvata.

DESCRIPTION. *Shell* conical, elongate, with a regularly granulated surface, dark reddish brown; *whorls*, sixteen to seventeen, flattened, with two revolving series of prominent granules at the upper and lower margins, and a middle series, nearer to the upper than to the lower one, and less prominent, commencing between the fourth and eighth whorl from the base, and becoming more distinct as it approaches the base; in each series the granules are connected by a rather narrow but very elevated revolving line, which rises nearly as high as the granules, so that in worn specimens the appearance is of a continuous line moderately dilating into granules; the latter are also connected by wrinkles extending across each whorl; upper side of the whorls with an acute edged carina; *apex* acute; *suture* deeply impressed, broad; *body whorl* abruptly terminating with a granulous carina; *aperture* sub-rhombic, nearly square, [285] about one sixth the length of the aperture; *labrum* pectinated by the revolving granulous lines; *columella* spirally twisted; *canal* less than half the length of the aperture, recurved.

Length, .45 inch; breadth, .12 inch.

This is the common size; one specimen, however, is about six tenths of an inch in length.

Inhabits New Bedford harbor on the Fairhaven side, and Nantucket? [Massachusetts.]

Cabinets of the Boston Society of Natural History, of Geo. B. Emerson, Esq., of A. A. Gould, M.D., P. G. Seabury Esq., of New Bedford, and my own.

*Var. a.* Granules obsolete, with simple, broad, elevated, revolving lines, the middle one on several of the lower whorls as prominent as the outer ones.

Cabinets of William H. Taylor, Esq. of New Bedford, and my own.

REMARKS. This shell was first presented to me in Nantucket, as a native of the island, and a number of individuals were afterwards given to me by Pardon G. Seabury, Esq. of

New Bedford, who found them at Fairhaven. From these specimens, the species and variety were described at a meeting of the Society in August last. Since then I have seen an individual of the variety, which was found on an island in the harbor of New Bedford. At Fairhaven, I have found several specimens, (none of them living, though some of them were quite fresh), which had been thrown upon the beach with the *Cerithium reticulatum*, Totten. Their station is yet to be ascertained, but is probably below low-water mark.

I take pleasure in offering this humble tribute of respect to George B. Emerson, Esq., President of this Society.

[*Cerithium Emersonii* C. B. Ad., is very like *C. Costata* Da Costa.—Krebs 1866, p. 394.]

[Is *Cerithiopsis subulata* Montagu.—Johnson 1934, Proc. Boston Soc. Nat. Hist. 40, no. 1, p. 108.]

**erythronotus Adams Chiton**

Plate 42, fig. 5

1845, Proc. Boston Soc. Nat. Hist. 2, p. 9.

*C. t. parva*, subelongata, flavido-alba, irregulariter rubromaculata; areis lateralibus costatis, costis nodulosis, areis dorsi striatis; margine squamuloso. Long. .55 poll.; lat. .3 poll.

Jamaica.

**eulimoides Adams Rissoa**

Plate 33, fig. 9

1850, C. to C. no. 7, pp. 115–116.

Shell elongate conic: white, translucent in a spiral line below the suture: smooth and shining, with a broad very obtuse varix on each whorl, forming a slightly oblique line with the labrum: apex rather obtuse: spire with the axis moderately curved, convex on the left and rectilinear on the right side: whorls seven or eight, scarcely convex, with a lightly impressed suture: aperture scarcely effuse: labrum well excurved, not advanced, moderately thickened.

[116] Mean divergence about 26°; length of spire .14 inch; total length .2 inch; breadth .09 inch.

Jamaica.

**exigua Adams Mitra**

Type lost.

1845, Proc. Boston Soc. Nat. Hist. 2, p. 2.



M. t. minima, ovali-elongata, albida; anf. 6, supra costellis plurimis et infra costis latis—instructis, supra atropurpureis, infra fusco-maculatis; ultimo infra sicut supra insculpto; canali brevi. Spirae long. .075 poll.; long. tot. .13 poll.; lat. .06 poll.

Jamaica.

**exiguum** *Adams Cerithium*

Type lost.

1850, C. to C. no. 7, p. 118–119.

Shell long ovate conic, sinistrorsal: wax color: with, on the middle whorls, two, and on the lower whorls, three spiral ridges, of which the middle one is more slender, and numerous transverse ridges, the intersections being well developed nodules; anteriorly with three additional smaller less strongly nodulous spiral ridges: apex very acute: spire with the outlines most curvilinear along the middle, nearly rectilinear above and below: whorls ten, planulate, with the place of the suture distinguished by a somewhat larger groove; last whorl much smaller than the penult whorl, gradually tapering to the end: aperture rather small, subrhombic: canal very short, nearly straight.

[119] Mean divergence as far as the penult whorl about  $17^{\circ}$ ; length .09 inch; breadth .035 inch.

Jamaica.

**exile** *Adams Cerithium*

Plate 38, fig. 8

1850, C. to C. no. 7, p. 120.

Shell conic, turritid, very slender: brownish red, paler at the apex, whitish on the nodules: with one slightly elevated and three well elevated spiral lines, and on each whorl about twelve rather large obtuse ridges, the intersections being moderately developed into nodules; with another spiral well elevated line at the periphery of the last whorl: apex very acute: spire with the outlines rectilinear: whorls twelve to fourteen, quite convex, with a well impressed suture; last whorl terminating abruptly, concave anteriorly: aperture suborbicular: canal extremely short, reduced behind to a broad deep notch.

Mean divergence about  $10^{\circ}$ ; length of spire .085 inch; total length .1 inch; breadth .03 inch. A fragment consisting of

the lower five whorls of a larger shell is .04 inch wide.  
Jamaica.

**exilis Adams Chemnitzia**

Type lost.

1850, C. to C. no. 5, p. 74.

Shell very slender: white: with about fifteen to eighteen stout transverse ribs, which terminate just below the convexity of the last whorl; with numerous spiral striae in the intercostal spaces, but not anteriorly; with the intercostal spaces on the last whorl anteriorly depressed below the adjacent surface of the anterior region: nucleus with about one and one-half smooth whorls, nearly at right angles to the rest of the shell: spire with rectilinear outlines: whorls ten besides the nucleus, planulate, with a moderately impressed suture: aperture rather short, subelliptical: labium scarcely thickened: umbilical region scarcely indented.

Mean divergence about  $10^{\circ}$ ; length of spire .145 inch; total length .165 inch; breadth .037 inch.

Jamaica.

[*Chemnitzia exilis* C. B. Ad., *C. flavo cincta* C. B. Ad., *C. laevis* (= *levis*) C. B. Ad., and *C. subulata* C. B. Ad., are very like each other.—Krebs 1866, p. 395.]

**fenestrata Adams Columbella**

Plate 41, fig. 2

1850, C. to C. no. 4, pp. 57-58.

Shell much elongated, ovate conic, sub-angular on the middle of the last whorl: opaque white around the aperture, with, at the summit of the whorls, a spiral opaque white band, which is interrupted by the angles of an approximate series of [58] brown spots, which have the form of the summits of Gothic windows, and in which the deep brown of the summit fades in descending to the middle of the whorls, where the shell is transparent; with three linear spiral series of alternating white and brown on the middle and anterior part of the last whorl: with spiral striae anteriorly, otherwise smooth: apex acute: spire with the outlines nearly rectilinear: whorls eight, nearly plane, with a lightly impressed suture: aperture in the form of a  $\theta$  but rather wider: labrum thickened and well excurved, smooth within, sinuate above.

Mean divergence  $30^{\circ}$ ; length of spire .16 inch; total length .25 inch; breadth .08 inch.

Jamaica.

**flavocincta** *Adams Chemnitzia*

Plate 49, fig. 8

1850, C. to C. no. 5, p. 74.

Shell moderately elongated: white, with a broad spiral band of yellowish brown along the suture: with about twenty-eight transverse well rounded rather slender ribs, which become obsolete on the anterior surface; with excessively minute spiral striae, in the intercostal spaces, coarser and traversing the ribs on the anterior region: nucleus consisting of about one and one-half smooth whorls, very oblique: whorls eight or nine besides the nucleus, slightly convex below the middle, slightly shouldered, with a distinct suture: aperture rather small, elliptical: labium moderately thickened: umbilical region scarcely indented.

Mean divergence about  $12^{\circ}$ ; length of spire .11 inch; total length .145 inch; breadth .04 inch.

Jamaica.

[See note under *C. exilis* C. B. Adams.]

**flavocincta** *Adams Pleurotoma*

Plate 29, fig. 1

1850, C. to C. no. 4, pp. 63-64.

Shell ovate-conic, much elongated: white, with a spiral band of yellowish brown on the upper and on the lower parts of the whorls, with spots of the same descending from the upper band into the intercostal spaces; with linear bands of the same below the middle of the last whorl: plicately and transversely ribbed on the middle of the whorls; with a very broad moderately elevated spiral ridge along the middle of the whorls; with a slight linear spiral ridge at the summit of the whorls, and a third spiral ridge of intermediate size at the lower part of the whorls: apex subacute: spire with the outlines nearly rectilinear: whorls about seven, scarcely convex, with an indistinct suture: aperture small, but rather wide: sinus moderate, near the upper end of the labrum: canal very short.

Mean divergence about  $28^{\circ}$ ; length of spire .11 inch; total length .19 inch; breadth .07 inch.

Jamaica.

**flavum Adams Cerithium**

Plate 37, fig. 11

1850, C. to C. no. 7, p. 122.

Shell conic, turritid: bright yellowish brown: with three prominent spiral carinae, and about twenty-six less prominent transverse slender ridges, the intersections being feebly nodulous; anteriorly with an additional slightly nodulous spiral ridge: apex acute: spire with the outlines nearly rectilinear: whorls about nine, a little convex, with a distinct suture; last whorl terminating very abruptly, concave anteriorly: aperture suborbicular: canal extremely short, very wide.

Mean divergence nearly  $20^{\circ}$ ; length of spire .12 inch; total length .15 inch; breadth .045 inch.

Jamaica.

**fluctuata Adams Marginella**

Plate 32, fig. 3

1850, C. to C. no. 4, pp. 56-57.

Shell obovate: whitish, with very narrow longitudinal strongly waved lines of brown, which extend from the summit to the anterior extremity, and which, being more conspicuous at the summit and at intervals, form spiral series, a little above and a little below the greatest convexity of the shell: spire entirely [57] concealed by the last whorl, with a callus reaching from the lip over the summit: labrum rather sharp, finely denticulate within: columella with five plaits, the anterior of which are larger. This species resembles *M. frumentum* Sowb.

Length .17 inch; breadth .11 inch.

Jamaica.

[*Marginella fluctuata* C. B. Ad., is very near *M. chrysolina* Redf.—Krebs 1866, p. 396.]

**fulva Adams Corbula**

Plate 47, fig. 13

1852, C. to C. no. 12, pp. 240-241.

C. t. ovato-triangulari, crassa, (inequi- [241] valvi?) vix inequilaterali, postice subrostrata; margine ventrali excurvata: fulva, intus roseo tincta: concentrice supra striata, infra fortiter sulcata: apicibus parvis, haud involutis: umbonibus perconvexis, postice biangulatis: dentibus mediocribus. Long. 7' ' ' .9; alt. 5' ' ' .6; lat. 5' ' ' .1.

Shell ovate-triangular, thick, (inequivalve?) subinequilateral, subrostrated posteriorly; ventral margin excurved: yellowish brown, tinged with red within: striated above, and strongly furrowed below, concentrically: beaks small, not involute: umbones very convex, posteriorly biangulated: teeth moderately developed. It differs from *C. Swiftiana* in being less rostrated; it is also shorter than *C. Kjoeriana*; and differs from both in color, and in being very strongly sulcated. We have therefore ventured to describe it from a single right valve.

Length .31 inch; height .22 inch; breadth .21 inch.

*Station.*—Unknown.

*Habitat.*—The specimen (in Mus. Amh.[erst] was said to have come from the Amazon; but the species is not a *Potamomya*.

**fulvo-cincta Adams Eulima (?)**

Type lost.

1850, C. to C. no. 7, p. 111.

Shell ovate-conic, turritid: translucent, white, with a spiral band of bright brown below the middle of the whorls, and another along the suture, both of which bands are much and irregularly interrupted; with a few transverse irregular stripes of the same; smooth and shining: apex rather obtuse: spire with the outlines nearly rectilinear: whorls seven, planulate, with an indistinct suture: aperture narrow: columella subtruncated.

Mean divergence about  $20^\circ$ ; length .2 inch; breadth .065 inch.

Jamaica.

**fusca Adams Pleurotoma**

Plate 29, fig. 9

1845, Proc. Boston Soc. Nat. Hist. 2, p. 4.

P. t. parva, fusca; sutura profunda; anf. 5, singulatim costis 8 vel 9, et multis striis decurrentibus inequidistantibus—instructis; labro expanso; sinu parvo; canali brevissimo. Div.  $35^\circ$  ad  $25^\circ$ ; spirae long. .12 poll.; long. tot. .22 poll.; lat. .1 poll.

Jamaica.

**fusca Adams Pyramis**

Plate 38, figs. 20-21

1839, Boston Journal of Natural History 2, pp. 282-284, pl. 4, fig. 9.

P. testa parvula, conica, decisa; epidermide fusca, nitida; anfractibus sex, convexis; sutura impressa, sub-duplicata; apertura ovali, supra angulata, infra rotundata; labro tenui; columella convexa, reflexa, haud plicata.

DESCRIPTION. *Shell* conical, rather elongate, subperforate; *spire* truncated; *epidermis* brown, shining, not membranous, not separable from the shell; *whorls* about six, not reckoning those which are lost at the apex, with minute striae of growth; *suture* strongly impressed, often double; sometimes with a revolving line at the upper side of the whorl; aperture about two-fifths the length of the shell, parallel to the axis, oval, angular superiorly, rounded inferiorly; *labrum* not thickened; *body whorl* entering the aperture in the upper of the left side, and separating the margins; *columella* emerging at the middle of the labrum, convex, reflected, smooth, without any fold; operculum?

Length, .15 inch; breadth, .07 inch.

Inhabits the harbors of New Bedford [Massachusetts] and vicinity.

Cabinets of the Boston Society of Natural History, of A. A. Gould, M.D., George B. Emerson, Esq., and my own.

REMARKS. This shell was found after my return from New Bedford, among a large number of the *Turbo obligatus*, and *Actaeon trifidus*, which were brushed into a box from wet planks, to which they were clinging, not far above low water mark. Six specimens were thus found; also four more with the *A. trifidus* in a parcel of sand from the harbor of New Bedford. Since then I have found a single specimen by dredging a few feet below low water mark in Dartmouth harbor. The middle of the body whorl and the lower part of the upper whorls were brown, but the rest was whitish. I have also received several specimens from P. G. Seabury, Esq. who found them at Tiverton, R. I., in company with the *Turbo minutus*, Totten, in the sand.

It resembles the *Jaminia exigua* Couthouy, Bost. Journ. Nat. Hist. II. 92, in several important characters but differs in others. The epidermis is dark brown, close, and shining; that of the *J. exigua* is very pale, nearly white, membranous and loose, and dull; the body whorl in our shell is much less ventricose and more cylindrical; incremental striae plainly

visible on the [284] epidermis; aperture less; no fold on the columella. It approaches nearly to the *Turitella bisuturalis* Say, which, however, is pellucid, with five whorls, suture not deeply impressed, is more elongate, and whorls flattened.

This species may perhaps be referred to Brown's genus *Pyramis*. Specimens with a revolving line on the upper side of the whorls, may be regarded as a well marked variety.

**fuscocincta Adams Pleurotoma**

Plate 30, fig. 6

1850, C. to C. no. 4, p. 62.

Shell clavate pyramidal: pale yellowish white, with a sutural line of brown, anteriorly wax yellow with revolving lines of yellowish white: with a spiral series of large smooth well rounded nodules, on slightly elevated wide ridges on the lower half of the whorls; anteriorly with a few spiral raised lines: apex acute: spire with the outlines rectilinear: whorls seven or eight, not convex, with the suture not impressed: aperture rather wide: canal very short.

Mean divergence  $33^{\circ}$ ; length of spire .17 inch; total length .27 inch; breadth .13 inch.

Jamaica.

**fusco-lineata Adams Pleurotoma**

Type lost.

1845, Proc. Boston Soc. Nat. Hist. 2, p. 4.

*P. t. parva*, albida, lineis pluribus fuscis irregulariter interruptis cincta; anf. 7, singulatim costis 10 ad 12 et striis profundis decurrentibus haud costas superantibus—instructis; sinu minime profundo; canali brevissimo. Div.  $25^{\circ}$ ; spirae long. .13 poll.; long tot. .2 poll.; lat. .08 poll.

Jamaica.

**fusiforme Adams Cerithium**

Plate 38, fig. 4

1850, C. to C. no. 7, pp. 120–121.

Shell ovate-fusiform: reddish black, [121] whitish at the apex, darkest on the ridges, paler between them and anteriorly: with, on most of the whorls, three spiral ridges, of which the upper two are nearer together and in the upper half of the shell are confluent, and of which the upper one is larger: with numerous scarcely perceptible transverse ridges, which on the spiral ridges are excessively developed

into closely set nodules; anteriorly with another subnodulous spiral ridge, and with transverse striae: apex acute: spire with the outlines curvilinear: whorls eight or nine, slightly convex, with an indistinct suture; last whorl much smaller than the penult whorl: aperture suborbicular: labrum well excurved and advanced, slightly thickened: labium with a small callus above: canal very short, straight, wide.

Divergence in the upper whorls about  $35^{\circ}$ ; length of spire .075 inch; total length .1 inch; breadth .04 inch.

Jamaica.

[See note under *C. gemmulosum* C. B. Adams.]

**fusiformis** Adams *Pleurotoma*

Plate 30, figs. 7-8

1850, C. to C. no. 4, pp. 64-65.

Shell fusiform: white, with a tinge of brown along the suture and in the intercostal spaces: with large obtuse pliciform ribs, about nine on each whorl, and numerous unequal inequidistant spiral raised lines, of which one a little above the pe- [65] riphery of the whorls is much larger, giving a subangular aspect to the whorls: apex acute: spire with the outlines nearly rectilinear: whorls five or six, rather convex, with a well impressed suture: aperture long obovate: sinus small: canal wide and short.

Mean divergence  $40^{\circ}$ . Length of spire .1 inch; total length .18 inch; breadth .085 inch.

Jamaica.

[See note under *P. albida* C. B. Adams.]

**gemmulosa** Adams *Odostomia*

Plate 40, fig. 1

1850, C. to C. no. 7, p. 109.

Shell ovate-turritid: white: rather thick; with, on the upper whorls, three, and on the lower whorls four stout prominent obtuse spiral ridges, and on each whorl about twenty to twenty-two transverse ridges, which are continued over the summits of the spiral ridges with well developed nodular intersections; anteriorly with five or six similar spiral ridges issuing from the aperture, and not decussated: apex subacute: spire with the outlines moderately convex: whorls seven and one-half, subplanulate, with a canaliculate suture: last whorl subacute anteriorly: aperture ovate, rather acute



above, moderately effuse and pointed anteriorly: columellar plait more prominent than the spiral ridges on the labium above it.

Mean divergence nearly  $20^\circ$ ; length .155 inch; breadth .055 inch.

Jamaica.

**gemmulosum** *Adams Cerithium*

Plate 38, fig. 13

1847, Proc. Boston Soc. Nat. Hist. **2**, p. 228 [nude name]; 1850, C. to C. no. 7, p. 120.

Shell conoid, turritid: reddish black, sometimes wax-colored on the lower part of the whorls: with three spiral ridges, of which the middle one is more elevated; and on each whorl about thirty-three small transverse ridges, with the intersections nodulous; with a fourth ridge which is slightly nodulous at the periphery of the last whorl, anterior to which are only incremental striae: apex acute: spire with the outlines moderately curvilinear: whorls twelve, moderately convex, with a well impressed suture; last whorl abruptly terminating, concave anteriorly; aperture broadly ovate: labrum very thin, well advanced along the middle: canal very short, nearly straight, with a broad deep notch behind.

Mean divergence nearly  $30^\circ$ ; length of spire .17 inch; total length .21 inch; breadth .08 inch.

Jamaica.

[*Cerithium gemmulosum* C. B. Ad. There are two different species in one tube, but the one which we take to be the *C. gemmulosum* is closely allied to *C. iota* C. B. Ad., *C. albobittatum* C. B. Ad., and *C. fusiforme* C. B. Ad.—Krebs 1866, p. 394.]

**gibberulum** *Adams Cerithium*

Plate 37, fig. 3

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 5.

C. t. minima, tenui, nigrescente; anf. 9. singulatim plicis 18, et striis decurrentibus latis 5 vel 6, intersectionibus nodiferis—instructis; anf. ultimo varice dorsali, plicis obsoletis et striis minoribus—instructo; apertura emarginata. Div.  $30^\circ$  ad  $25^\circ$ ; spirae long. .17 poll.; long. tot. .24 poll.; lat. .085 poll.

Jamaica.

**globulosus Adams Pedipes**

Plate 49, fig. 9

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 12.

*P. quadridens* ? Pfr. P. t. globulosa, crassa, castanea; lineis elevatis, inequalibus, inequidistantibus, decurrentibus, ornata; labro acuto, intus incrassato, supra unidentato; labio supra dente maxima, lamelliformi, transversa, ornato; columella bidentata; dentibus et columella albis. Div.  $90^\circ$ ; spirae long. .08 poll.; long. tot. .19 poll.; lat. .14 poll.

Jamaica.

**gouldii 'C. B. Adams' Pfeiffer Truncatella** Plate 49, fig. 101846, Zeitschrift für malakozoologie **3**, p. 183 [nude name in the synonymy of *Truncatella caribaeensis* Reeve].

[Is a synonym of *Truncatella succinea* C. B. Adams.—Clench and Turner 1948, *Johnsonia* **2**, p. 158.]

**Gouldia**

1847, Catalogue of the Genera and Species of Recent Shells in the collection of C. B. Adams, p. 29.

Syn. *Thetis* Ad. This name having been preoccupied by Mr. Sowerby for the two fossil species in the Green Sand formation of England, I propose the above in honor of my friend Dr. A. A. Gould.

**gouldii Adams Natica**

Plate 41, fig. 12

1847, Catalogue of the Genera and Species of Recent Shells in the collection of C. B. Adams, p. 21.

Syn. *N. canaliculata* Gould; This name having been preoccupied by Lamarck for another shell, I propose to substitute for it that of the eminent naturalist who discovered this species.

**gracilis Adams Eulima**

Type lost.

1850, C. to C., no. 7, p. 110.

Shell ovate-conic, turritid: white, translucent, opaque along the suture: smooth and shining, with an impressed spiral line next below the suture: apex acute: spire with the outlines nearly rectilinear: whorls thirteen, slightly convex, with an indistinct suture; last whorl gradually tapering an-

teriorly, rather short: aperture rather narrow: labrum much advanced along the middle.

Mean divergence about  $20^{\circ}$ ; length .24 inch; breadth .06 inch.

Jamaica.

**gracilis Adams Marginella**

Plate 32, fig. 14

1851, C. to C. no. 8, p. 130.

Shell between fusiform and cylindric, slender: white, with three spiral bands of orange brown, of which the upper one appears on the spire, a part of the middle one is seen in the deflection of the suture in the last part of the penult whorl; the middle band is sometimes indistinct: smooth and shining: apex rather obtuse: spire moderately lengthened, with the outlines quite curvilinear: whorls nearly four, moderately convex, with the suture not very distinct; last whorl long: aperture long and narrow; lip moderately thickened, slightly incurved; varix slightly extended on the penult whorl; with four very oblique plaits.

Length .26 inch; greatest breadth .09 inch; least breadth .075 inch; length of aperture .175 inch.

This species resembles *M. avena* Val., (*M. varia* Sowb.), but is much smaller, and much more slender, and has a longer spire.

Jamaica.

**granulosa Adams Lucina**

Plate 46, figs. 3-4

1845, Proc. Boston Soc. Nat. Hist. 2, pp. 9-10.

L. t. parva, globulosa, alba, nodulis subquincuncialibus plerumque ornata; dentibus lateralibus obso- [10] letis, cardinalibus robustis. Long. .34 poll.; alt. .31 poll.; lat. .35 poll.

Jamaica.

**greenii Adams Cerithium**

Plate 37, figs. 17-18

1839, Boston Journal of Natural History 2, pp. 287-288, pl. 4, fig. 12.

C. testa nigro-rubra, infra cylindraca, supra tereti, rugosa; spira elongata; anfractibus duodecim; apice laevi, acuta; sutura sub-duplicata; apertura ovali, parva; columella sub-spirali; cauda perbrevis.

DESCRIPTION. *Shell* blackish red, cylindrical in the lower half, tapering above, thickly and deeply rugose [288] with three revolving elevated lines, swelling upon the rugae into granules; the lower series of granules rather larger, and the upper one less than the middle series; the upper series nearer to the middle one, and obsolete on the upper whorls; the lower series appearing first in the progress of growth; *spire* elongate; *whorls* about twelve; apical ones smooth, nearly white and pearly; *suture* rather broad, impressed, divided by a revolving black ridge, which is obsolete between the upper whorls, and is prolonged around the body whorl, with two other black ridges emergent from the aperture; *aperture* oval, nearly as broad as long, scarcely more than one sixth the length of the shell; *columella* rather prominent below, subspiral; *labrum* obtusely notched by the revolving lines; *canal* very short, not more than one sixth of the length of the aperture, slightly recurved.

Length about .18 inch; breadth .05 inch.

Inhabits Dartmouth harbor [Massachusetts], and was found clinging to marine plants, a few feet below low-water mark, in company with the *Cerithium reticulatum* Totten, and *Cerithium nigrocinctum* Nob.

Cabinet of the Boston Society of Natural History, and my own.

REMARKS. Aug. 29th of the present year I obtained this species in the harbor of Dartmouth. The seaweed was rinsed in a bucket of water, by which process a great number of the *C. reticulatum* were washed off, among which were found several specimens of this species and of the *C. nigrocinctum*.

I take pleasure in dedicating this species to Thomas A. Greene, Esq. of New Bedford.

[Is in the genus *Cerithiopsis*. — Johnson 1934, Proc. Boston Soc. Nat. Hist. 40, p. 108.]

### helicoidea Adams *Vitrinella*

Plate 35, fig. 1

1850, Monograph of *Vitrinella*, p. 9.

V. t. discoidea, alba, opaca vel translucente, linea suturali impressa, et striis transversis inequalibus insculpta: apice perobtusa: spira convexa, vix elevata: anfractibus quatuor, subconvexis, valde accrescentibus: sutura vix impressa:

labio subcrasso: umbilico magno, profundo, carina spirali instructo.

Discoidal: white, opaque and translucent in transverse alternating lines: with a single impressed spiral line near the summit of the whorls, and very fine irregular transverse striae: apex very obtuse: spire slightly and convexly elevated: whorls four, moderately convex, rapidly increasing, with a lightly impressed suture; last whorl regularly rounded, a little compressed beneath. Aperture not modified by the last whorl: labium with a rather thick deposit: umbilicus large and deep, with a spiral carina, exhibiting all the whorls. Mean divergence about  $150^{\circ}$ ; length of spire .01 inch; total length .03 inch; greatest breadth .075 inch; least breadth .06 inch.

Port Royal, Jamaica.

[This milky-transparent species has been redescribed and figured by Miss Bush from a slightly larger specimen from off Cape Hatteras in 16 fathoms.

The "impressed spiral line" mentioned by Adams is the internal suture, visible by transparence, not external sculpture. The spiral figure of the suture, in dorsal view, is rather large, slightly exceeding half of the total diameter. The umbilicus is like a spiral stair, its side walls vertical, slightly overhung by the small spiral cord. The columella is a little thickened, and runs forward near its upper insertion. Growth-striae are extremely weak, where visible. Diameter 1.75 mm., height 1 mm.;  $3\frac{1}{2}$  whorls.—Pilsbry 1946, p. 2].

**hyalina Adams** *Vitrinella*

Type lost.

1850, Monograph of *Vitrinella*, p. 5.

V. t. globosa, alba, subtransparente, laevi, nitida: apice obtusa: spira convexa, elevata: anfractibus quatuor, perconvexis, sutura impressa, anf. ultimo magno, regulariter rotundato, subtus valde indentato.

Globose: white, subtransparent: smooth and shining: apex obtuse: spire with the outlines very convex: whorls four, very convex, with a well impressed suture; last whorl rather large and regularly rounded: aperture slightly modified by the penult whorl: umbilical region well indented. Mean divergence about  $95^{\circ}$ ; length of spire .02 inch; total length .05

inch; greatest breadth .065 inch; least breadth .055 inch.

Port Royal, Jamaica.

[The glass tube which should contain this species had been shattered before it came into my possession, and the specimen was not found. In addition to Professor Adams' original label there is a slip upon which Miss Bush had written: "not true *Vitrinella*=*Natica*? K.J.B."\*—Pilsbry 1946, p. 4.]

**imbricatula Adams Lucina**

Plate 46, figs. 7-8

1845. Proc. Boston Soc. Nat. Hist. 2, p. 10.

*L. pectini* affinis, sed t. brevior, crassior, orbiculari, subequilaterali, costulis valde imbricatis ornata. Long. .9 poll.; alt. .85 poll.; lat. .5 poll.

Jamaica.

**inaequalis 'C. B. Adams' H. and A. Adams Plecotrema**

1853 [Nov. 1854] Proc. Zool. Soc., London, p. 122.

[A manuscript name never published by C. B. Adams.]

**inequalis Adams Thracia**

Plate 45, fig. 14

1842, American Journal of Science and Arts 43, p. 145, text figure.

T. testa fragili, per-inequilaterali, per-inequivalvi, irregulariter striata, postice truncata; valva sinistra subplanulata; altera perconvexa; callo nymphali cochleariformi, anterieus elongato; ossiculo lunato, semicirculari.

Shell white, very thin, broadly and behind narrowly truncate, very inequilateral and inequivalve, much deflected to the left anteriorly; with the striae of growth unequal, numerous and crowded at the extremities, where, under a magnifier, the surface appears shagreened by minute wrinkles of the striae; epidermis very thin, brownish, thicker at the extremities; left valve nearly flat, with five obtuse angles radiating from the beak; right valve much larger and very convex, emarginate in the whole of the posterior truncation, with a groove and elevated umbonal angle defining the areolar region, its inferior margin sinuous; beaks small, pointed, lamelliform, the right one moderately excavated for the reception of the other; nymphoal callosities spoon-shaped,

\* Katherine J. Bush.

very much produced forwards and inwards; ossiculum semi-circular and lunate, with an impression on the centre of each side, but much deeper on one side, situated between the spoon-shaped apophyses and the dorsal margin.

Dimensions.—Length 1.2 inch; height .75 inch; width .45 inch; length of ossiculum .1 inch.

Cabinet of Middlebury College.

Habitat, Gulf of Mexico.

Remarks.—A single specimen of this interesting species was presented to the cabinet of this college by the Rev. Wm. T. Hamilton, of Mobile, Ala. It is remarkable for the disparity of the valves, the irregularity of its form, and the sharp lamelliform beaks.

[*Thracia inequalis*.—We are requested by Prof. Adams to state, that this shell, which was described in our last July number, is the *Periploma trapezoides*, Desh. Consequently the name of *Thracia inequalis* must take the rank of a synonym. The species has recently been found in Mobile Bay. The editors.—1843, American Journal of Science and Arts 44, p. 420.]

### **intermedium** Adams **Cerithium**

Plate 38, figs. 9, 12

1850, C. to C. no. 7, p. 119.

Shell conoid, turritid, sinistrorsal: reddish black or dark brown, with a broad white spiral band on the lower part of the whorls; white near the apex: with, on the upper whorls, two, and on the lower whorls, three nodulous spiral ridges, and anteriorly three additional less strongly nodulous spiral ridges: apex acute: spire with the outlines rectilinear above, moderately curvilinear below: whorls about twelve, planulate, with the place of the suture distinguished by a rather deeper groove: last whorl terminating rather abruptly: aperture rather small, obliquely obcordate: canal short, nearly closed at the origin, much deflected obliquely backwards. This species is intermediate between *C. ornatum* and *C. modestum*.

Mean divergence about 20°; length .2 inch; breadth .07 inch.

Jamaica.

**intermedius** *Adams Murex*

Plate 39, fig. 15

1850, C. to C. no. 4, p. 60.

Shell elongated, ovate fusiform: whitish, with dingy brown spots behind the varices, and a few dark brown spiral lines within the aperture, and spots of the same on the labrum: with six varices on each whorl; with imbricate spiral striae; with strongly crenulated spiral very prominent ridges, which are slightly fringed in crossing the varices, and of which the upper two are approximate, and the next lower one is small: apex acute: spire with moderately convex outlines: whorls eight, very angular above the middle, and concave above the angle, with a deep suture; last whorl with a broad deep groove anteriorly, which is divided into pits by the varices: aperture obovate: canal rather short but white.

Mean divergence  $43^{\circ}$ ; length of spire .46 inch; total length .85 inch; breadth .4 inch.

This species is similar to *M. erosus* *Brod.* and *M. alveatus* *Kr.*

Jamaica.

[This species is in the genus *Tritonalia*.—Clench and Turner.]

**interrupta** '*C. B. Adams*' *Philippi Littorina lineata* var.

Plate 38, fig. 18

R. A. Philippi 1856 [in] *Conchylien-Cabinet* 2, part 9, p. 24, pl. 3, figs. 14–15 (Jamaica).

[This species was never described by Adams though specimens under this name occur in his collection. We figure a paratype, MCZ no. 186123, that agrees in all essential details with the figured specimen of Philippi. The specimen which Philippi figured is here considered to be the lectotype.]

**interrupta** *Adams Vitrinella*

Plate 35, figs. 4–5

1850, Monograph of *Vitrinella*, p. 6.

*V. t. globosa*, subconica, alba, subtransparente: sulcis elevatis tribus supra, et sulcis minoribus quinque vel sex subtus, spiralibus insculpta; striis transversis candidis subdistantibus a sulcis interruptis ornata: apice perobtusata: spira elevata, convexa: anfractibus quatuor, convexis, sutura haud valde



impressa; anf. ultimo magno, regulariter rotundato, subtus late et profunde indentato.

Depressed globose conic: white, subtransparent in the last whorl: with three rather large more or less elevated spiral grooves above, and five or six of less size beneath; with somewhat distant opaque white transverse striae, which are interrupted by the spiral grooves: apex very obtuse: spire with very convex outlines: whorls four, quite convex, with a moderately impressed suture; last whorl rather large, rapidly increasing, well rounded: aperture scarcely modified by the penult whorl: umbilical region widely and deeply indented. Mean divergence about  $100^\circ$ ; length of spire .015 inch; total length .035 inch; greatest breadth .045 inch; least breadth .038 inch.

Port Royal, Jamaica.

[The nuclear shell, of a trifle over two whorls, is smooth. With a third whorl, three spiral ridges begin abruptly, their intervals crossed by axial threads as in the detail finished in fig. 5. On the last whorl there are about nine spirals, those above the periphery slightly larger and more widely spaced. The last spirals, around the umbilicus, are quite weak, so that the count of ribs may be a little indefinite, 8 to 10. The larger of two specimens in the Adams collection is broken, our figures of it left unfinished except for a detail of sculpture, fig. 5. The two specimens measure:

Diameter 1.2 mm., height 1 mm.;  $3\frac{1}{2}$  whorls.

Diameter 1.05 mm., height 0.82 mm.

Except by its somewhat smaller size, this species very closely resembles *C. sanibelense* Pils. It belongs to a new subgenus of *Cyclostrema* to be defined in another place by Mr. McGinty and the author. *C. interruptum* (C.B.Ad.), *C. sanibelense* Pils. and *C. zacalles* Mazyck appear to be three size stages, otherwise nearly alike.—Pilsbry 1946, p. 5].

[Is *Parviturboides*.—Pilsbry and McGinty 1950, *Nautilus* **63**, p. 84.]

### **iota Adams Cerithium**

Plate 37, fig. 16

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 5.

*C. t. minima*, atro-rubra; sutura profunda; anf. 10, plicis decurrentibus tribus, (anf. ultimi 4,) et plicis longitudinalibus

minoribus, intersectionibus nodiferis—instructis; canali brevissimo. Div. supra  $25^{\circ}$ , infra nihil; spirae long. .095 poll.; long tot. .12 poll.; lat. .03 poll.

Jamaica.

[See note under *C. gemmulosum* C. B. Adams.]

**jamaicensis Adams Eulima**

Plate 36, fig. 5

1845, Proc. Boston Soc. Nat. Hist. 2, p. 6.

E. t. gracili, lactea, diaphana, fascia alba opaca suturali—cincta; sutura lineari, subprofunda; anf. 13, planis, laevibus; apertura minima; labro expanso. Div.  $20^{\circ}$ ; spirae long. .23 poll.; long tot. .325 poll.; lat. .1 poll.

Jamaica.

**jamaicensis Adams Littorina**

Plate 38, fig. 19

1850, C. to C. no. 5, pp. 71-72.

Shell oblong conic: with transverse somewhat oblique flames of rusty brown or slate color or black, on a white ground, which are interrupted on the middle of the whorls by a spiral slate-colored or black band, which is of unequal width in different shells and in different parts of the same shell, but is itself sometimes interrupted by the continuity of the transverse flames of white and slate color; brown on the columella; brownish black within, with a spiral band of white near the anterior extremity: solid, with very deep rather distant spiral striae, of which there are about eight on the penult whorl, and which are more crowded anteriorly: apex very acute: spire with the outlines nearly rectilinear: whorls seven, convex, with a lightly impressed suture; last whorl with an angular and subcarinated periphery: aperture rather broadly ovate: columella arcuate and flattened. The sculpture of this shell is like that of *L. carinata* Orb. and the form is like that of *L. lineata* Orb. (*L. ziczac* Desh. et al.) but is rather more robust, and the shell is more [72] solid. A variety of coloring has all the shell black except on the upper third of the whorls and on the anterior part. A variety of sculpture and coloring has the striae enlarged nearly to the width of the intervening ridges, and is mostly black with spirally elongated spots of white on the ridges.

Mean divergence  $58^{\circ}$ ; length of spire .36 inch; total length .72 inch; breadth .44 inch.

Jamaica.

[Is a synonym of *Littorina ziczac* Gmelin.—Bequaert 1943, *Johnsonia* 1, p. 15].

**jamaicensis Adams Natica**

Plate 41, fig. 11

1850, C. to C. no. 7, pp. 111–112.

Shell obliquely ellipsoidal: pale brown or livid, somewhat mottled, often with three more or less distinct revolving series of transverse curved brown flames; with a white spiral infrasutural stripe; with the umbilical callus and most of the labial deposit dark brown: with obsolete spiral striae; with the oblique infrasutural striae quite distinct: apex acute: spire prominent, with the outlines moderately curvilinear: whorls nearly five, rather convex, with a well impressed suture: aperture not very wide, ovate but [112] compressed in the left outline: labial deposit rather thick; umbilical callus nearly filling the rather narrow umbilicus.

Mean divergence about  $120^{\circ}$ ; length of aperture .42 inch; total length .53 inch; breadth .43 inch.

Jamaica.

**jamaicensis Adams Terebra**

Plate 38, fig. 22

1850, C. to C. no. 4, p. 58.

Shell not very slender, regularly tapering above the last whorl: slate colored, with a series of darker spots on a white spiral stripe next below the suture; with a white spiral line emerging from the top of the aperture, and a brown one from the middle of the same; white between the brown stripe and the columella: with longitudinal unequal wrinkles, which extend from the suture nearly to the middle of the whorls; with excessively minute lightly impressed spiral striae: apex acute: spire with the outlines almost rectilinear: whorls twelve or thirteen, nearly plane: aperture long ovate: notch wide: columella slightly twisted. This species closely resembles the more slender *T. stylata* Hinds of the Philippine Islands.

Mean divergence  $16^{\circ}$ ; length 1.9 inch; breadth .43 inch.

Jamaica.

[The original types of this species are lost. We have selected a specimen named by C. B. Adams to be a neoholotype.]

**jayana Adams Pleurotoma**

Plate 30, fig. 4

1850, C. to C. no. 4, p. 61.

Shell clavate-pyramidal: black, with a broad spiral pale yellowish nodiferous band, and another of the same color anteriorly: with a series of broad close-set smooth not prominent nodules on the lower half of the whorls of the spire; anteriorly with four or five distant raised revolving lines, which are sometimes granulous, the granules being white: apex acute: spire with the outlines nearly rectilinear: whorls eight, planulate above the series of nodules, with a lightly impressed suture; last whorl subangular: aperture small: sinus a little below the extremity of the labrum: canal very short.

Mean divergence  $30^{\circ}$ ; length of spire .31 inch; total length .5 inch; breadth .24 inch.

This species resembles *P. zebra* Kr., for which it was for some time mistaken.

Jamaica.

**jayanum Adams Amphidesma**

Plate 43, figs. 3-4

1845, Proc. Boston Soc. Nat. Hist. 2, p. 10.

A. t. orbiculari, flexuosa, haud hiante, lamellis concentricis crebris, interdum obsoletis, striisque radiantibus exilissimis ornata; (juniorum intus rubro-maculata; seniorum albidis vel flavis;) interdum rubro-radiata; dentibus 2, magnis, divaricatis, subremotis. Long. 1.41 poll.; alt. 1.36 poll.; lat. .7 poll.

Jamaica.

**kjoeriana Adams Corbula**

Plate 47, figs. 1-2

1852, C. to C. no. 12, p. 237.

C. t. *C. Swiftianae* simili; sed posterius vix rostrata, paullulum productiore: rugis concentricis robustioribus, in lunulam productis; valvis ambobus similiter insculptis: angulo umbonali acutiore, a margine dorsali plus remota. Speciminis magni long. 12' ' ' .2; alt. 7' ' ' .6; lat. 5' ' ' .2.

This species so closely resembles *C. Swiftiana*; that a speci-

fication of the differences will suffice for description. *C. Kjoeriana* is not so distinctly rostrated, although usually a little more elongated posteriorly: the concentric ridges are stouter, and are continued into the lunule; both valves are sculptured alike: the umbonial angle is more acute and distinct, and is a little more distant from the posterior dorsal margin.

Length of a large specimen .48 inch; height .3 inch; breadth .26 inch.

*Station.*—In mud, in 4 or 5 fathoms water; C.B.A.!

*Habitat.*—St. Thomas; T. Bland! in sched. in Mus. Amh. [erst] Kingston harbor, Jamaica; C. B. A.! We obtained 70 specimens, most of which are immature.

### **Knoxiana Adams Corbula**

Plate 47, figs. 11-12

1852, C. to C. no. 12, pp. 238-239.

*C. t. ovato-rhombica, subcrassa, subequivalvi, vix inequilaterali, postice truncata et infra acuminata; margine ventrali recta vel haud multum excurvata: albida: rugis concentricis reclivatis acutis regularibus, in speciminibus [239] magnitudinem variantibus, ad aream posticam crebrioribus: apicibus parvis, haud involutis: umbonibus subplanulatis, postice concavis, acutissime angulatis; area postica sulco bisecta, a labiis angulo disjuncta; dentibus validis, brevibus. Long. 12' '' .7; alt. 8' '' .1; lat. 7' '' .1; spec. alterius, long. 9' '' .4; alt. 7' '' .9.*

Shell ovate-rhombic, moderately thick, subequivalve, slightly inequilateral, posteriorly truncated, and acuminated below, with the ventral margin straight or moderately excurved: whitish: with concentric regular acute-edged reclivate ridges, varying in size in different specimens, smaller and more crowded in the posterior area: beaks small, not involute: umbones flattened, with a very acute much developed angle, with the posterior area more or less concave and divided along the middle by a furrow, separated by an angle from the corselet: teeth short and strong.

Length .5 inch; height .32 inch; breadth .28 inch; another shell is .37 inch long, and .31 high.

*Station.*—In mud, in 3 or 4 fathoms water; C.B.A.!

*Habitat*.—Kingston harbor, Jamaica; C.B.A.! We obtained 2 entire shells and 20 odd valves of this rare species. It is an analogue of *C. bicarinata* of the Panama zoological province.

**krebsiana Adams Corbula**

Plate 48, fig. 3

1852, C. to C. no. 12, p. 234.

*C. t. trigona*, perinequivalvi, inequilaterali; valva dextra rostrata; margine ventrali antice rotundata, postice recta: albida, supra et antice rubro tinctorum: valva parva concentric striata; valva dextra concentric sulcata, sulcis crebris, parvis: apicibus prominentibus, involutis: umbonibus: convexis: dentibus parvis. Long. 6.1 millim.; alt. 5.1 millim.; lat. 3.8 millim.

Shell trigonal, very inequivalve, inequilateral, with the large valve rostrated; with the ventral margin rounded anteriorly, nearly straight posteriorly: white, often tinged with pink on the beaks and umbones except posteriorly: small valve finely concentric striated; large finely and closely furrowed: beaks prominent, much involuted: umbones very convex; with small posterior angles, one on the small valve and two on the other: teeth small.

Length .24 inch; height .2 inch; breadth .15 inch.

Probably it resembles *C. operculata* Phil.

*Station*.—Muddy bottom, at a depth of 3 or 4 fathoms; C.B.A.!

*Habitat*.—In the harbor of Kingston, between K. and Port Royal; C.B.A.! About 60 specimens were obtained, most of which are less than .2 inch long.

Jamaica.

**laevigata Adams Rissoa**

Plate 34, fig. 7

1850, C. to C. no. 7, p. 114.

Shell long ovate conic, rather slender: white, translucent: smooth: apex acute: spire with the outlines slightly convex: whorls nearly seven, scarcely convex, with a moderately impressed suture: aperture moderately effuse: labrum well advanced and excurved, rather thick.

Mean divergence about 28°; length of spire .08 inch; total length .12 inch; breadth .045 inch.

Jamaica.

[Is *Rissoina browniana* d'Orbigny.—M. Desjardin 1949, Jour. de Conch. **89**, p. 205.]

**laevissima** Adams **Rissoa**

Plate 33, fig. 7

1850, C. to C. no. 7, p. 115.

Shell long ovate conic: dingy white, with a very pale reddish brown spiral band on the upper part of the whorls, and two others on the middle and anterior part of the last whorl; but these bands are often obsolete, and speedily disappear in weathering: surface highly polished: apex very acute: spire with the outlines slightly curvilinear: whorls nine, slightly convex, with a moderately impressed suture: aperture rather small, very effuse: labrum well excurved and advanced, very much thickened. Conf. *Rissoina Browniana* Orb. Moll. du Cuba, Tab. XII. f. 33-35.

Mean divergence about  $30^{\circ}$ ; length of spire .13 inch; total length .2 inch; breadth .09 inch.

Jamaica.

[Is *Rissoina browniana* d'Orbigny.—M. Desjardin 1949, Jour. de Conch. **89**, p. 205.]

**lanceolata** Adams **Mangelia**

Plate 31, fig. 9

1850, C. to C. no. 4, p. 66.

Shell very long, lanceolate: brownish, more or less tinged with purple, with fine spiral lines of white and of dark brown, which are more conspicuous on the ribs; with a darker and wider brown line along the suture: with six very prominent acute transverse ribs on each whorl, which are nearly or quite continuous on the successive whorls; with a spiral elevated line, on the middle of the whorls, which is obsolete in the intercostal spaces and has nodulous intersections with the ribs: apex acute: spire with rectilinear outlines: whorls eight, scarcely convex, with a lightly impressed suture: labrum finely denticulate within: sinus shallow: canal not very short.

Mean divergence  $23^{\circ}$ ; length of spire .26 inch; total length .44 inch; breadth .14 inch.

Jamaica.

**latior** *Adams Chemnitzia*

Type lost.

1850, C. to C. no. 5, p. 72.

Shell moderately elongated: white: with about twenty to twenty-four prominent transverse ribs, the ends of which mostly alternate at the suture, and which are produced on the last whorl into the umbilical indentation: with numerous crowded spiral striae, which ascend the sides of the ribs without being produced over their summits: nucleus consisting of about one smooth globular whorl, with its axis nearly at right angles to the axis of the shell: spire with the outlines a little convex: whorls about nine after the loss of the nucleus, slightly convex, with a distinct suture: aperture obliquely ovate, acuminate above: labium much thickened: umbilical region moderately indented.

Mean divergence  $22^{\circ}$ ; length of spire .165 inch; total length .215 inch; breadth .065 inch.

Jamaica.

**latior** *Mighels and Adams Cingula*

Plate 39, fig. 2

1842, Boston Journal of Natural History 4, p. 48, pl. 4, fig. 22.

C. testa minima, ovato-conica, laevi, pallida; anfractibus quatuor, convexis; sutura impressa; spira quam apertura longiore; anfractu postremo magno; apertura sub-ovata; operculo corneo.

*Shell* minute, ovate-conic, smooth, pale horn-color; whorls more than four, convex; suture much impressed; spire three-fifths of the length of the shell; last whorl broad, larger than the rest of the shell; aperture ovate-orbicular, left margin with a lamina; operculum horny.

Length .08 inch; breadth .05 inch; divergence 60 degrees.

*Habitat.* Casco Bay; taken from the stomach of a haddock in the spring of 1841.

It is in the cabinet of J. W. Mighels.

REMARKS. This species has a slight resemblance to *C. minuta*, Totten, in the absence of sculpture; but the spire is shorter, more pointed, and its divergence is much greater, giving a very different form to the shell. It is, moreover, a much smaller shell. It appears also to be allied to *Turbo reticulatus* Montagu, but is distinct from that species in not having as many turns by one and a half; it differs, also, in



not being "*strongly* striate, both longitudinally and transversely," and in not having the "aperture thickened by a rib." It has been found very rarely, usually in company with *C. semicostatus* and *C. arenarius* Mont.

**latum** *Adams Cerithium*

Plate 38, fig. 5

1850, C. to C. no. 7, p. 122.

Shell conic above, cylindric below: whitish, with a spiral brown band occupying the suture and the upper spiral ridge, on which however the granules are white: with three spiral ridges, of which the lower one is a little larger, and very small transverse ridges, which are developed on the spiral ridges into very large nodules; anteriorly with an additional nodulous ridge: apex acute: spire with the outlines quite curvilinear in the upper three-fifths: whorls seven, of which two are nuclear and smooth, slightly convex, with an indistinct suture; last whorl nearly as large as the penult whorl, terminating rather abruptly: aperture broadly ovate; labrum well excurved, moderately thickened: canal very short and wide, nearly straight.

Divergence in the upper whorls about  $40^{\circ}$ ; length of spire .07 inch; total length .09 inch; breadth .038 inch.

Jamaica.

**levis** *Adams Chemnitzia*

Plate 49, figs. 3-4

1850, C. to C. no. 5, p. 73.

Shell much elongated: white: with about twenty-eight to thirty transverse rather stout ribs, which are not produced below the convexity of the last whorl; without spiral striae; with the intercostal spaces of the last whorl anteriorly depressed below the surface of the anterior region; with scarcely perceptible lines of growth anteriorly: nucleus consisting of about one and one-third smooth whorls, quite oblique: spire with the outlines nearly rectilinear: whorls nine or ten, scarcely convex, a little constricted above: aperture rhombic ovate: labium scarcely thickened: umbilical region not indented.

Mean divergence about  $10^{\circ}$ ; length of spire .12 inch; total length .165 inch; breadth .04 inch.

Jamaica.

[See note under *C. exilis* C. B. Adams.]

**ligata** *Mighels and Adams Fasciolaria* Plate 38, fig. 16

1842, Boston Journal of Natural History 4, pp. 51-52, pl. 4, fig. 17.

F. testa elongata, fusiformi, crassa, rubro-fusca, transversim costulata; anfractibus sex, convexis: spira acuminata; sutura valde impressa; apertura ovato-elongata; labro crenato: columella plicis duabus.

*Shell* elongated, fusiform, rather thick, of a reddish-brown [52] color, when fresh, covered with a thin and almost perfectly transparent epidermis; whorls six, well rounded, and covered with six or seven equidistant, revolving, thread-like ribs, with grooves alternating; suture well impressed; spire regularly tapering, pointed; aperture oblong-oval, polished; within of a bright reddish-brown color; canal rather narrow, nearly straight; labrum rather thin, crenulated by the ribs and grooves; columella arcuated above the middle; two distinct, oblique, delicate folds above the commencement of the canal.

Length .7 inch; breadth .3 inch; divergence 45°.

*Cabinets* of Dr. Gould, J. G. Anthony, J. W. Mighels, and C. B. Adams.

*Habitat.* Mingan, in the Gulf of St. Lawrence; taken from the stomachs of cod-fishes, by Mr. Foster, fisherman, in the summer of 1841.

REMARKS. This remarkable and truly beautiful shell is not very nearly allied to any species with which we are acquainted, unless it be that of *F. fusiformis* Valenc., from New Holland. That species, however, is much larger than our shell, is much less regularly and strongly ribbed, and has a tooth-like process on the labium, of which our shell is destitute. We suppose this to be the first and only species of the genus that has ever been found on our coast.

**ligata** 'C. B. Adams' *H. and A. Adams Mangelia*

1853, Genera of Recent Mollusca 1, p. 100.

[So far as we can detect this species was never described by C. B. Adams. It must be considered a nude name.—Clench and Turner.]

**ligata** *Adams Sclalaria*

Type lost.

1850, C. to C. no. 4, pp. 67.

Shell rather short, conic: white: varices thirteen on each whorl, rather strong, well elevated, continuous across the suture and but slightly depressed by it: whorls five or six, scarcely contiguous: aperture very slightly elongated obliquely: umbilical region with a small ridge parallel with the labium.

Mean divergence nearly  $50^{\circ}$ ; length of spire .15 inch; total length .25 inch; breadth .14 inch.

Jamaica.

**livido-maculata** *Adams Monodonta* Plate 39, fig. 11

1845, Proc. Boston Soc. Nat. Hist. 2, p. 7.

M. t. albida, maculis pluribus lividis fusciscentibus, magnis, ornata; sutura profunda; anf. 6, subangulatis, striatis, striis latis inequalibus decurrentibus; apertura transversa, ovata; labro infra bi-vel ter-emarginato; umbilico profundo, bi-vel tri-carinato. Div.  $90^{\circ}$ ; spirae long. .45 poll.; long. tot. .65 poll.; lat. .75 poll.; umbilici diam. .14 poll.

Jamaica.

**maculata** *Adams Pleurotoma* Plate 29, fig. 3

1850, C. to C. no. 4, p. 62.

Shell ovate-fusiform: white with a spiral series of large distant yellowish brown spots on the upper part of the whorls; anteriorly with a spiral band of very pale yellowish brown terminating often in a deeper spot on the labrum: with eleven or twelve transverse ridges on each whorl, which are decussated by several spiral prominent lines: apex acute: spire with the outlines moderately convex: whorls seven, angular, with a well impressed suture: aperture small, nearly in the form of a  $\surd$  [see plate 39, fig. 1]: labrum well excurved, denticulate within: sinus not very small, near the upper extremity of the labrum: canal short, turning to the left.

Mean divergence  $31^{\circ}$ ; length of spire .1 inch; total length .17 inch; breadth .08 inch.

This species has some resemblance to *P. quadrata* Rv.

Jamaica.

**maculo-striata** *Adams Monodonta* Plate 39, fig. 13

1845, Proc. Boston Soc. Nat. Hist. 2, pp. 6-7.

M. t. parva, crassa, intus virescente, olivacea, extra maculis subradiantibus elongatis paucis irregulariter ornata; anf.  $6\frac{1}{2}$ , striis et lineis elevatis planulatis albo et nigro alternatim maculatis decurrentibus—instructis [7] labro intus subcrenulato, infra bi- vel tri-dentato; umbilico profundo. Operculo flavo; anf. 15. Div.  $100^\circ$  ad  $80^\circ$ ; spirae long. .3 poll.; long. tot. .48 poll.; lat. .5 poll.; umbilici diam. .1 poll.

Jamaica.

**megasoma Adams Cerithium**

Plate 37, fig. 8

1850, C. to C. no. 7, pp. 119–120.

Shell long ovate conic: mostly brownish or reddish black, white within the aperture: thick, with three small spiral rather minutely granulous ridges, of which the upper two are [120] larger and more distant, and intermediary spiral striae; anteriorly with six or seven additional feebly granulous small spiral ridges; often (?) with one broad varix on the left side: apex acute: spire with the outlines rectilinear except in the lower part: whorls about eight (?), a little convex, with a moderately impressed suture; last whorl large and rather ventricose: aperture subovate, rather acuminate at both extremities: labrum rather sharp, much thickened a little behind the edge, feebly striated within: labium with a small prominent callus above: canal very short.

Mean divergence nearly  $40^\circ$ ; length of spire .36 inch; total length .58 inch; least breadth .25 inch; greatest breadth .3 inch.

Jamaica.

[See note under *C. variabile* C. B. Adams.]

**megastoma Adams Vitrinella**

Plate 35, fig. 2

1850, Monograph of Vitrinella, p. 7.

V. t. depressa, transverse ovata, alba translucente, laevi, nitida apice obtusa: spira convexa anfractibus tribus, subconvexis, sutura conspicua; anf. ultimo prope aperturam maximo, regulariter rotundato.

Much depressed, transversely ovate: white, translucent: smooth and shining: apex very obtuse: spire convex, but little elevated: whorls a little more than three, moderately

convex, with a distinct suture; last whorl very large, rapidly increasing in the last part, well rounded: aperture scarcely modified by the last whorl: umbilical region very widely and deeply indented. Mean divergence about  $130^{\circ}$ ; length of spire .01 inch; total length .033 inch; greatest breadth .06 inch, least breadth .045 inch.

Port Royal, Jamaica.

[Is in the genus *Teinostoma*. The shell is transparent, glassy, quite thin and globose for *Teinostoma*, with very large aperture, and a very small, sloping umbilical callus, which is flat or slightly concave, the base rising around it. The wholly superficial suture is bordered by a false sutural line by transparency; sometimes this gives the illusion of a deeply impressed suture. Diameter 2 mm., height 1.2 mm.; nearly  $3\frac{1}{2}$  whorls.

This was rather abundant. By the very small umbilical callus it agrees with *Pseudorotella*, as Miss Bush has noted on the label. The paratype figured is the largest in the lot. Adam's measurements were apparently from a smaller one. Except in size, the dozen specimens are all very much alike.—Pilsbry 1946, p. 5].

**melanura Adams Cerithium**

Plate 38, fig. 10

1850, C. to C. no. 7, p. 117.

Shell like that of *C. modestum*, but snow white except the dark brown apex, much more slender, with the outlines less curvilinear, and the aperture smaller.

Mean divergence about  $17^{\circ}$ ; length .2 inch; breadth .045 inch.

Jamaica.

**melanura Adams Rissoa (?)**

Plate 33, fig. 2

1850, C. to C. no. 7, p. 116.

Shell conic, turritid: white, subtransparent, with the apex black: nearly smooth, shining, with some spiral striae, which are quite distinct anteriorly and at the lower part of the whorls of the spire, and are obsolete on the upper part of the whorls: apex acute: spire with outlines nearly rectilinear: whorls eight, quite convex, with the suture rather deep: aperture scarcely effuse: labrum thin (?), well excurved below the middle: columella straight, subtruncate. On account of

the imperfect condition of the labrum in the specimens before me, it remains doubtful, whether this shell is a *Rissoa*; it is evidently kindred to *R. tervaricosa* Ad., whose generic character is also doubtful, the labrum being thickened by the last varix.

Mean divergence about  $28^\circ$ ; length of spire .21 inch; total length .28 inch; breadth .11 inch.

Jamaica.

[See note under *R. tervaricosa* C. B. Adams.]

**mendicarius** *Mighels and Adams* **Chiton** Plate 42, fig. 6

1842, Boston Journal of Natural History 4, p. 42, pl. 4, fig. 8.

C. testa elongata, in medio longitudinaliter ad latus irregulariter granulata, cinerea, nubeculata; areis-parum conspicuis; margine coriaceo, rubro.

*Shell* cinereous, with dark clouds, long-oval with obtuse dorsal ridges, surface with elevated dots or granules disposed in longitudinal lines, except towards the margin, where they are irregular and larger; no visible concentric striae; triangular areas very indistinct, outer ones small; margin coriaceous, red.

Length, 1 inch; breadth, .4 inch; width of margin, .06 inch.

*Habitat.* Casco Bay. This very distinct species was taken from the stomach of a haddock in June, 1841. Only a single specimen has been found, which is in the cabinet of J. W. Mighels.

[This specimen was destroyed in the Portland fire. See R.I. Johnson 1949, *Occasional Papers On Mollusks* 1, pp. 213-218.]

**minor** *Adams* **Pleurotoma** Plate 31, fig. 7

1845, Proc. Boston Soc. Nat. Hist. 2, p. 4.

P. t. minima, solida, flavido-fusca, fasciis albis duabus aliquanto interruptis, (altera ad spiram pertinente, altera anf. ultimum infra cingente.)—cincta; anf. 6, subnodulosis, singulariter costis 9 robustis convexis, striis latis decurrentibus—instructis. Div.  $25^\circ$ ; spirae long. .11 poll.; long. tot. .16 poll.; lat. .07 poll.

Jamaica.

**minor Adams Rissoa scalaroides**

Plate 34, fig. 4

1850, C. to C. no. 7, p. 113.

Variety (?) *minor* is but .15 inch long.

[*Rissoa minor* C. B. Ad., *R. multicosata* C. B. Ad., *R. scalarella* C. B. Ad., and *R. scalaroides* C. B. Ad., are syn. with *Rissoina Catesbya* [= *catesbyana*] d'Orb.—Krebs 1866, p. 397.]

**mirabile Adams Cerithium**

Plate 38, fig. 1

1850, C. to C. no. 7, p. 118.

Shell ovate conic, turrated, sinistrorsal: white, with a sutural band of blackish brown, which commences a few whorls below the light brown apex with an intervening white space: with a narrow very prominent sutural ridge, on which is the band of blackish brown, and a stouter strongly nodulous spiral ridge along the middle of the whorls, anteriorly with one or two additional slightly nodulous spiral ridges: apex very acute: spire with the outlines rectilinear in the upper half, quite fusiform in the lower half: whorls about fifteen, nearly planulate, with an indistinct suture; last whorl very much smaller than the penult whorl: aperture suborbicular, extremely small: with two small canals, which are deflected nearly at right angles to the axis of the shell, and are open only at the extremity. This extraordinary species of subgenus *Triphora* is remarkable for the minute size of the aperture.

Mean divergence to the penult whorl about  $20^{\circ}$ ; length .2 inch; breadth .062 inch; length of aperture only .025 inch!

Jamaica.

**modesta Adams Scalaria**

Plate 49, fig. 6

1845, Proc. Boston Soc. Nat. Hist. 2, p. 7.

S. t. subcrassa, albida, haud nitente; sutura profunda; anf. 9, costulis 11 robustis acutis retro subreclinibus, et striis decurrentibus exilissimis haud crebris—instructis; ultimo anfractu haud carinato. Div.  $35^{\circ}$ ; spirae long. .275 poll.; long. tot. 4 poll.; lat. .175 poll.

Jamaica.

**modesta** Adams **Truncatella**

Plate 40, fig. 17

1851, C. to C. no. 8, pp. 132-133.

Shell much elongate, ovate conic: yellowish horn color, with a white upper margin of the whorls: with about twenty-one prominent compressed ribs, and numerous spiral striae, which are interrupted by the ribs: apex truncate with the loss of — whorls: spire with the outlines somewhat curvilinear: whorls remaining after truncation seven, moderately convex, margined above: aperture subovate, slightly angulated anteriorly.

[133] Length (after truncation) .175 inch; breadth .06 inch; length of aperture .045 inch.

Jamaica.

[This is a species of *Turbonilla*. —Clench and Turner 1948, *Johnsonia* 2, p. 162.]

**modestum** Adams **Cerithium**

Plate 39, fig. 8

1850, C. to C. no. 7, p. 117.

Shell conic, turritid, sinistrorsal: reddish black, weathering to a cinereous color: with, on the upper whorls, two, and on the middle and lower whorls three spiral ridges, which are of equal size on the lower two-thirds of the shell; and numerous transverse ridges, the intersections being well developed nodules; anteriorly with two or three additional spiral ridges, which are less strongly nodulous, and which are separated by a broad groove from a small ridge around the base of the canal: apex very acute: spire with the outlines quite curvilinear: whorls about fourteen, planulate, with the place of the suture distinguished by a somewhat larger groove; last whorl abruptly terminating: canal short, slightly turning to the right.

Mean divergence about  $23^\circ$ ; length .225 inch; breadth .07 inch.

Jamaica.

**monilifera** Adams **Mitra**

Plate 36, fig. 9

1850, C. to C. no. 4, p. 57.

Shell between a fusiform and rhomboidal shape: brownish black, with a white spiral band which is a little above the



suture, and which is small and indistinct on the upper whorls and increases with the progress of growth, and which is dilated into spots on the ribs; with rather acute longitudinal ribs, about fourteen on each whorl, and numerous excessively minute unequal raised spiral lines, which are larger at the anterior extremity, and more nodulous on the ribs; anteriorly with a broad well impressed groove, which commences in the aperture above the plaits, and contracts the general form: apex acute: spire with nearly rectilinear outlines: whorls eight or nine, rather convex, with a rather deep suture: columella with four plaits.

Mean divergence  $45^{\circ}$ ; length of spire .38 inch; total length .74 inch; breadth .36 inch.

This species resembles *M. microzonias* Lam. in which the ribs are obtuse, the outlines of the spire are more convex, and the general form is narrower. It also resembles *M. leucodesma* Reeve.

Jamaica.

### **monilifera** 'C. B. Adams' Krebs **Pleurotoma**

1866, Annals Lyceum Natural History New York 8, p. 397.

[*Pleurotoma monilifera* C. B. Ad., and *P. pygmaea* C. B. Ad., both from Jamaica, are *Columella Broderipii* Sowb.—Krebs 1866, p. 397.]

[Krebs probably meant *Columbella monilifera* Sowerby. *Pleurotoma pygmaea* C. B. Adams is certainly not a *Columbella*—Clench and Turner.]

### **multicostata** Adams **Chemnitzia**

Plate 49, fig. 7

1850, C. to C. no. 5, pp. 74-75.

Shell moderately elongated: white, or tinged with yellowish brown: with about thirty-four to thirty-eight [75] slender transverse ribs, which become obsolete on the anterior surface; in the intercostal spaces, with rather coarse distant spiral raised lines, which traverse the ribs only at their anterior extremities on the last whorl: nucleus consisting of little more than one smooth whorl, very oblique: spire with the outlines slightly convex: whorls nine besides the nucleus, scarcely convex, with a well impressed suture: aperture

ovate, subacute above: labium slightly thickened: umbilical region scarcely indented.

Mean divergence about  $12^\circ$ ; length of spire .125 inch; total length .165 inch: breadth .045 inch.

Jamaica.

[*Chemnitzia multicosata* C. B. Ad., and *C. substriata* C. B. Ad., may, when a sufficient number of specimens are at hand, prove to be synonyms.—Krebs 1866, p. 395.]

**multicosatus** *Adams Chiton*

Plate 42, fig. 3

1845, Proc. Boston Soc. Nat. Hist. 2, p. 8.

C. t. praelonga, intus rubella, extus pallide virente, punctis albis et atro-virentibus, lineaque dorsali pallida ornata; areis lateralibus perelevatis, costatis, costis 6 ad 8 nodosis; areis dorsi costulis 20 gracilibus, compressis,—instructis; margine squamoso, alternatim virente alboque. Long. .9 poll.; lat. .42 poll.

Jamaica.

**multicosata** *Adams Rissoa*

Plate 33, fig. 4

1850, C. to C. no. 7, pp. 114–115.

Shell ovate conic, turritid: white: with, on each whorl, about twenty-eight very regular ribs, which are produced on the last whorl to the anterior extremity, and numerous distinct spiral striae on the anterior half of the last whorl, which impress the summits of the ribs; on the rest of the shell between the ribs are [115] very faintly impressed microscopic spiral striae: apex acute: spire with the outlines moderately curvilinear: whorls seven, quite convex, with a well impressed suture: aperture deeply effuse: labrum much excurved and very thick. Conf. *Rissoina elegantissima* Orb. Moll. du Cuba, Tab. XII. f. 27–29.

Mean divergence about  $26^\circ$ ; length of spire .12 inch; total length .18 inch; breadth .07 inch.

Jamaica.

[Is a *Rissoina*.—Desjardin 1949, *Jour. de Conch.* 89, p. 194.]

**multilineata** *Adams Pleurotoma*

Plate 29, fig. 10

1845, Proc. Boston Soc. Nat. Hist. 2, pp. 3–4.

P. t. minima, flavido-fusca, albo-multilineata; anf. 6, sing-

ulatim costis 8 ad 10 latis, ad basim expansis, et striis creberrimis decurrentibus inequalibus—instructis; sutura profunda; sinu magno; canali brevissimo. [4] Div.  $35^{\circ}$  ad  $25^{\circ}$ ; spirae long. .11 poll.; long. tot. .18 poll.; lat. .08 poll.

Jamaica.

**muricoides Adams Fusus**

Plate 39, fig. 9

1845, Proc. Boston Soc. Nat. Hist. 2, p. 3.

F. t. parva; anf. 6, singulatim costis 9 vel 10 propinquis, et striis decurrentibus inequalibus partim granosis—instructis; apertura violacescente, angusta; labro crasso, intus albo-denticulato; labio subrugoso; canali brevi. Div.  $40^{\circ}$ ; spirae long. .32 poll.; long. tot. .6 poll.; lat. .25 poll.

Jamaica.

[*Fusus muricoides* C. B. Ad., is a *Ricinula*.—Krebs 1866, p. 396.]

**muricoides Adams Mangelia**

Plate 31, fig. 11

1850, C. to C. no. 4, p. 65.

Shell fusiform and slender: pure white: with six narrow subacute prominent ribs on each whorl, which are sinuated posteriorly on the right side, and which are continuous along the spire like a *Murex*; with very numerous microscopic spiral striae in the intercostal spaces: apex acute: spire with the outlines nearly rectilinear: whorls six, slightly convex, with a lightly impressed suture: last whorl gradually attenuated below into a wide canal.

Mean divergence  $32^{\circ}$ ; length of spire .09 inch; total length .18 inch; breadth .07 inch.

Jamaica.

**mutabile Adams Cerithium**

Plate 37, fig. 9

1845, Proc. Boston Soc. Nat. Hist. 2, p. 5.

C. t. parva, subtenui, nigra, rubescente, irregulariter albo-maculata; sutura profunda; anf. 9, haud multum convexis, plicis decurrentibus pluribus, 3 majoribus, et plicis longitudinalibus inequalibus, intersectionibus nodiferis—instructis; canali brevissimo. Div.  $33^{\circ}$ ; spirae long. .22 poll.; long. tot. .22 [sic] poll.; lat. .15 poll.

Jamaica.

**nanum** *Adams Cerithium*

Type lost.

1850, C. to C. no. 7, pp. 117-118.

Shell conic, turrated, sinistrorsal: wax brown, [118] dark at the apex, sometimes with a white space next below the apex, followed by a white spiral band: with, on the upper whorls, two, and on the lower whorls, three nearly equal spiral ridges, and many transverse slender ridges, the intersections being well developed nodules; anteriorly with two additional smaller less strongly nodulous spiral ridges: apex very acute: spire with the outlines nearly rectilinear: whorls about nine, planulate, with the place of the suture distinguished by a somewhat larger groove; last whorl terminating very abruptly: aperture suborbicular, rather small: canal short, nearly straight.

Mean divergence about  $20^{\circ}$ ; length .11 inch; breadth .08 inch.

Jamaica.

**newtoniana** *Adams Corbula*

Plate 47, figs. 9-10

1852, C. to C. no. 12, p. 240.

C. t. obovata-rhombica, tenui, (inequivalvi?) perinequilateralis, antice brevissima, antice et postice excurvata; margine ventrali recta: alba: concentrice irregulariter et exiliter striata: apicibus parvis, haud multum editis, haud involutis: umbonibus subangulatis; dentibus gracilibus. Long.  $12'' .7$ ; alt.  $8'' .6$ ; lat.  $7'' .9$ .

Shell between an obovate and rhombic form, thin, (inequivalve?) very inequilateral, the anterior part being very short, anteriorly and posteriorly well rounded; ventral margin straight: white: with fine irregular striae of growth: beaks small but somewhat prominent, acute, not involute: umbones with an obtuse angle extending diagonally through the posterior half of the disk; teeth prominent, not robust.

Length .5 inch; height .34 inch; breadth .31 inch.

*Station.*—Unknown.

*Habitat.*—St. Thomas; T. Bland! in sched. in Mus. Amh. [erst]. We have only 4 specimens of the left valve.

**Neritina**

All species, originally described by C. B. Adams in this

genus will be included under land and freshwater genera of Jamaica.

**nigrescens** *Adams Natica jamaicensis* var. Type lost.

1850, C. to C. no. 7, p. 112.

Variety *nigrescens* is more concave [than *jamaicensis*] around the umbilicus, is rather larger and thicker, and has the callus and interior of the aperture nearly or quite black. Jamaica.

**nigrescens** *Adams Pleurotoma* Plate 29, fig. 11

1845, Proc. Boston Soc. Nat. Hist. 2, p. 3.

P. t. parva, atro-violacescente; anf. 8, sulco sinum sequente, exilissime decussato—instructis, ceterum granulosis, decussatis; labro crassissimo; sinu haud multum profundo; canali brevissimo. Div. 30°; spirae long. .2 poll.; long. tot. .3 poll.; lat. .11 poll.

Jamaica.

**nigrocinctum** *Adams Cerithium* Plate 38, figs. 11, 14

1839, Boston Journal of Natural History 2, pp. 286–287, pl. 4, fig. 11.

"C. testa parvula, conico-cylindrica, granulosa, nigro-rubra; anfractibus tredecim, sinistrorsum volventibus; spira elongata, acuta; sutura subduplicata; apertura subelliptica, parva; cauda recurvata.

"DESCRIPTION. Shell blackish red, conic-cylindrical, with three revolving series of granules; the middle series equally distant from the others, and, on the whorls of the lower half of the shell, of equal size, but diminishing above, and wanting on the upper fifth; the upper row is less than the lower one on the whorls of the upper fourth or fifth part of the shell, and is wanting upon several of the first whorls; the lower series is also wanting upon the extreme apical whorls, but, in descending from the apex, appears before the others; the granules are formed by the revolution of two impressed lines across numerous longitudinal ribs or rugae; spire elongate, very acute; whorls about thirteen; suture rather broad; impressed, divided by a revolving somewhat granulous black ridge, which in the progress of growth gradually changes its situation, and forms the lower side of the last whorls, and another similar revolving ridge appears in its place; an im-

pressed line upon each side of the sutural ridge, and two others emergent from the aperture, are continued around the lower half of the last whorl; *aperture* subelliptical, less than one-fifth the length of the shell; *labrum* deeply concave; *columella* prominent below, black; *labium* regularly arched, surpassing the labrum, notched by the revolving impressed lines; *canal* recurved, about one third as long as the aperture.

Length, .3 inch; breadth, .08 inch.

[287] Inhabits Dartmouth harbor [Massachusetts], and is found clinging to sea-weed a few feet below low water mark. associated with the *Cerithium reticulatum* Totten, and *Buccinum lunatum* Say.

Cabinet of the Boston Society of Natural History, of Dr. A. A. Gould, of Prof. Hitchcock, and my own.

REMARKS. July 5th, of the present year, I found an immature specimen of this species in the harbor of Dartmouth, and at a subsequent visit to the same locality, obtained about two dozen specimens in various stages of growth.

This species is easily distinguished from *Cerithium reticulatum*, not only by the obvious character of heterostrophy, but by others more important, and too evident to require remark. It is more nearly allied to the *C. perversum*, Lam., from which it differs in the black sutural ridge, and in the middle series of granules, which in the *C. perversum* is nearer to the upper than to the lower series. It differs from the *Murex adversus* of Montague and Turton, (*Cerithium adversum*, Brown,) in having the canal recurved, the whorls very distinctly defined by the impressed suture, and in the color, which, in the *Cerithium adversum*, is opaque light brown; the figure of Brown differs also in other respects from our shell.

### **nitens Adams Fusus**

Plate 39, fig. 17

1850, C. to C. no. 4, pp. 60-61.

Shell ovate fusiform: white, with spiral series, [61] of more or less waved transversely much elongated spots of brown; on the last whorl are two more series of shorter spots of the same color: with a varicoid rib a little behind the labrum; with rather coarse revolving striae anteriorly; otherwise

smooth and shining: apex acute: spire with the outlines slightly convex: whorls eight or nine, moderately convex: aperture rather long, subelliptical, acute above: labrum sharp: canal very short, and very wide.

Mean divergence  $38^{\circ}$ ; length of spire .29 inch; total length .57 inch; breadth .24 inch.

Jamaica.

[*Fusus nitens* C. B. Ad., described from a single Jamaica specimen, is not, perhaps, a *Fusus*.—Krebs 1866, p. 396.]

**nitens Adams Tellina**

Plate 44, figs. 3-4.

1845, Proc. Boston Soc. Nat. Hist. 2, p. 10.

T. t. nitida, rosacea, zonis pallidis ornata; parte posteriore elevata, infra angulata; dentibus lateralibus anterioribus obsoletis. Long. .75 poll.; alt. .4 poll.; lat. .17 poll.

Jamaica.

**nivea Adams Marginella**

Plate 32, fig. 13

1850, C. to C., no. 4, p. 56.

Shell obovate, white, translucent, with numerous spots of opaque white: smooth and shining: apex acute: spire small, short, vitreous, wholly opaque white: whorls about three and one-half: aperture long, effuse above: varix stout, produced to the apex: columella with four prominent plaits.

Mean divergence about  $100^{\circ}$ ; length of spire .06 inch; total length .37 inch; breadth .22 inch.

This species resembles *M. pruinosa* Hinds, but is much smaller, more regularly obovate, the spire is shorter, and the coloration is different except in the opaque white spots.

Jamaica.

[See note under *M. albida* C. B. Adams.]

**nodata Adams Pleurotoma**

Plate 29, fig. 14

1850, C. to C. no. 4, p. 64.

Shell fusiform, elongated: brown, with white tubercles: with a spiral series of large obtuse undivided scarcely elongated tubercles, which are connected by a small elevated spiral line; whorls slightly shouldered; anteriorly with a few distant elevated spiral lines: apex acute: spire with the outlines nearly rectilinear: whorls seven, a little convex, with

a moderately impressed suture: aperture rather narrow: sinus rather shallow: canal not very short. This species resembles *P. albinodata* Rv., which has the tubercles divided by a deeply impressed spiral line.

Mean divergence  $33^\circ$ ; length of spire .2 inch; total length .31 inch; breadth .1 inch.

**nodulosa** Adams **Purpura**

Plate 32, fig. 10

1845, Proc. Boston Soc. Nat. Hist. **2**, pp. 2-3.

*P. t. solida*, *parva*, *rhombica*; anf. 5, nodulis seriatis, et striis subimbricatis decurrentibus, aterrimis, maculis albidis inter secundae et quartae serierum nodulos—[3] ornatis; labro incrassato, intus 4-denticulato. Div.  $45^\circ$ ; spirae long. .32 poll.; long. tot. .62 poll.; lat. .32 poll.

Jamaica.

[*Ricinula nodulosa* C. B. Ad., is *R. ferruginosa* Rv.—Krebs 1866, p. 397.]

[This species is in the genus *Sistrum*, Clench 1947, *Johnsonia* **2**, p. 91.]

**obeliscus** Adams **Chemnitzia**

Type lost.

1850, C. to C. no. 5, pp. 72-73.

Shell much elongated: white: with twenty-six to thirty transverse prominent ribs, which are not produced below the convexity of the last whorl; with numerous crowded spiral striae in the intercostal spaces, and a little above the middle of the whorls a broad smooth depressed spiral line, and similar lines on the middle and anterior of the last whorl: spire with the outlines rectilinear: whorls eleven after the loss of the nucleus, planulate, [73] with a very distinct suture: aperture ovate-rhomboidal: labium slightly thickened: umbilical region not indented.

Mean divergence about  $10^\circ$ ; length of spire .21 inch; total length .25 inch; breadth .05 inch.

Jamaica.

[*Chemnitzia obeliscus* C. B. Ad., is described from three pieces of different and very imperfect individuals.—Krebs 1866, p. 395.]



**obesa** *Adams Litiopa*

Type lost.

1850, C. to C. no. 5, p. 71.

Shell ovate: of a uniform brown wax color, subtransparent: smooth: apex obtuse: spire with the outlines moderately convex: whorls five, rather convex, with a distinct suture; last whorl large: aperture large, obliquely subrhomboidal, effuse, but scarcely produced anteriorly: labrum very thin, retreating above, scarcely reflected: columella slightly arcuate.

Mean divergence about  $55^\circ$ ; length of spire .08 inch; total length .185 inch; breadth .11 inch.

Jamaica.

**obesum** *Adams Buccinum*

Plate 32, fig. 11

1845, Proc. Boston Soc. Nat. Hist. 2, p. 7.

B. t. parva, lata, fusiformi, supra et infra acuminata, atra, albo-fasciata; anf. 5, costis parvis prominulis, et striis decurrentibus haud costas superantibus—instructis; labro incrasato sed acuto, intus 6-denticulato, supra sinuato; labio subcalloso. Div.  $45^\circ$ ; spirae long. .11 poll.; long. tot. .21 poll.; lat. .11 poll.

Jamaica.

[Adams later considered this to be a *Columbella*. — C. to C. no. 4, p. 55, 1850.]

**occidentalis** *Mighels and Adams Trochus* Plate 40, fig. 13

1842, Boston Journal of Natural History 4, pp. 47–48, pl. 4, fig. 16.

T. testa, pallida, imperforata, anfractibus septem, convexis; carinis pallide fuscis; infra laevi; sutura impressa; columella callosa.

*Shell* rather small, somewhat solid, sub-translucent, pale horn color, with light brown revolving carinae, of which there are three on the upper whorls, and four to six on the lower one; whorls seven, convex; suture distinct; spire three-fifths of the length of the shell; apex acute; last whorl with a smooth space between the carinae and two or three course revolving striae around the umbilical region; aperture moderately depressed, transversely ovate; labrum crenulated by the carinae; columella callous; umbilical region indented.

Height .5 inch; greatest basal diameter .43 inch; divergence 60 degrees.

*Cabinets of Bost. Soc. Nat. Hist.*, G. B. Sowerby, Mons. Largillier, J. W. Mighels and C. B. Adams.

[48] *Habitat*. Casco Bay; taken from stomachs of haddock, in the summer of 1840, and subsequently.

REMARKS. This is the only species of true *Trochus* that has ever been discovered on this Atlantic coast. It is not nearly allied to any species with which we are acquainted, unless we regard *Turbo (Margarita) cinereus*, Couth.—*Trochus costalis*, Loven, as a true *Trochus*. A careless observer would be likely to confound them; but besides several other essential points of difference, our shell is easily distinguished from all the known species of *Margarita*, by the absence of an umbilicus.

**occulta** *Mighels and Adams* **Bulla**

Plate 32, fig. 13

1842, Boston Journal of Natural History 4, p. 54, pl. 4, fig. 11.

B. testa parva, ovato-cylindrica: spira occulta: labro supra elevato, medio recto; apertura sub-angusta, infra lata, rotundata.

*Shell* small, of a dingy white color, ovate-cylindrical, covered with very minute transverse striae, and with indistinct longitudinal striae of growth; spire concealed; labrum extends a little below the spire, nearly *straight* above the *centre*, regularly rounded below and at the base; aperture narrow at the upper part; rather broad at the base.

Length  $1/5$  inch; breadth  $3/20$  inch.

*Cabinets of Bost. Soc. Nat. Hist.*, Amherst and Middlebury Colleges, J. W. Mighels, and C. B. Adams.

REMARKS. If not identical with, this shell is the analogue of, *B. triticea* Couth. It however differs from that species in being proportionately wider. It is very scarce.

[Fossil, Westbrook, in the vicinity of Portland, Maine. The lectotype, MCZ 156452, from the Adams collection, is too poor a specimen to be photographed. We have made a copy of the original figure.]

**ornata** *Adams* **Lucina**

1847, Proc. Boston Soc. Nat. Hist. 2, p. 228 [nude name].

[Is a synonym of *Lucina antillarum* Reeve, non *L. ornata*

Reeve 1850 according to C. B. Adams 1852, *Contributions to Conchology* no. 12, p. 243.]

**ovalis Adams Pedipes**

Plate 41, fig. 14

1849, C. to C. no. 3, pp. 41-42.

*Pedipes ovalis* may be a variety of *P. quadridens* Pfr.; but when full grown it is oval; the spiral ribs on the last whorl are broad and approximate, and on the whole shell they are smooth, without the irregular microscopic granulations of *P. quadridens*: [42] the color is yellowish brown or waxen: the aperture is similar to that of Dr. Pfeiffer's species, but the tooth of the right side is less conspicuous.

Length .12 inch; breadth .09 inch: of *P. quadridens*, length .16 inch; breadth .135 inch.

Jamaica.

**ovata Adams Cardita**

Plate 48, figs. 8-9

1845, Proc. Boston Soc. Nat. Hist. 2, p. 9.

C. t. ovata, lamellis decumbentibus inequalibus et striis radiantibus profundis lamellas persecantibus—ornata; lamellis posterioribus haud insectis, striatis; margine vix crenulato.

Jamaica.

**ovuloides Adams Columbella**

Plate 41, fig. 4

1850, C. to C. no. 4, p. 53.

Shell long obovate: yellowish brown, rarely blackish brown, irregularly mottled with large angular spots of white, often with a band of white around the middle of the last whorl, with the apex white: with numerous fine spiral striae, of which those that are on the upper part of the whorls and at the anterior extremity of the shell are coarser; with excessively minute unequal striae of growth: apex acute: spire with very concave outlines: whorls nine, the penult whorl only being very convex, with a well impressed suture, which near the end is rapidly curved upwards towards the apex: aperture very long and linear: labrum much produced in a broad [54] curve along the middle, incurved, rather sharp but stout, denticulate; within: labium with a deposit of moderate thickness: columella somewhat produced.

Mean divergence of the spire  $50^\circ$ ; length of the spire .22 inch; total length .7 inch; breadth .26 inch.

HABITAT—Bahamas. Fine specimens were collected on Turks Is. by Dr. A. Barrett of Pittsfield, Mass. This beautiful shell is well known in our collections, but I cannot learn that it has been described.

**ovuloides Adams Odostomia**

Plate 40, fig. 4

1850, C. to C. no. 7, pp. 109–110.

Shell rather long-ovate: white: smooth and shining, with a scarcely impressed spiral line next below the suture: apex subacute: spire with the outlines moderately convex: whorls five and one-half, slightly convex, with a lightly impressed [110] suture; last whorl long and fusoid: aperture ovate, scarcely effuse anteriorly: columellar plait quite oblique.

Mean divergence about  $30^\circ$ ; length .115 inch; breadth .055 inch.

Jamaica.

**papillosus Adams Chiton**

Plate 42, fig. 4

1845, Proc. Boston Soc. Nat. Hist. 2, p. 9.

C. t. minima, lata, virente, albido atroque crebre maculata, papillosa; areis a costula gracili discretis; margine exilissime squamuloso, alternatim virente albidoque. Long. .21 poll.; lat. .13 poll.

Jamaica.

**parva Adams Thetis**

Plate 44, figs. 5–6

1845, Proc. Boston Soc. Nat. Hist. 2, p. 9.

T. t. minima albida, lamellis elevatis robustis concentricis ornata; umbonibus parvis, acutis; margine supra angulato, alibi rotundato; pallii impressione simplici. Long. .16 poll.; alt. .14 poll.; lat. .09 poll.

Jamaica.

See *Gouldia*.

**parvus Adams Triton**

Plate 40, fig. 12

1847, Proc. Boston Soc. Nat. Hist. 2, p. 228 [nude name]; 1850, C. to C. no. 4, pp. 59–60.

Shell elongate, subfusiform: dingy white on the spire with

irregular pale brown stains, on the last whorl pale brown, with two revolving whitish stripes of which the outer one is linear; sometimes the shell is wholly brown except the fascia; with longitudinal narrow rounded ribs, of which there are 10 or 12 on each whorl including the varices, which are not easily distinguished from the ribs, and which are distant a little more than a semi-revolution; with numerous spiral unequal elevated lines, which are continuous over the ribs, and of which the anterior ones are larger and granose: apex acute: spire with slightly convex outlines: whorls seven, convex, slightly more inflated above the middle, with a well impressed suture: aperture subelliptical, with a small well defined gutter posteriorly: labrum crenulate within: labium a little thickened: canal short, wide, a little recurved: with an umbilical indentation.

Mean divergence  $35^{\circ}$ ; length of spire .25 inch; total length .47 inch; breadth .21 inch.

This species was described in Mss. five years since, but being in- [60] formed that it was identical with *T. angulatus* Reeve I suppressed the description. It proves to be quite different.

Jamaica.

**pauperculus** *Adams Murex*

Plate 39, fig. 16

1850, C. to C. no. 4, p. 60.

Shell elongated, obliquely subfusiform: whitish, within the aperture yellowish: with three not very stout varices on each whorl, and slender intermediary varicoid ridges; with a few distant spiral ridges, the intersections being nodulous: apex subacute: spire with the outlines a little convex: whorls six, quite convex, with a deep suture: aperture elliptical: canal short, rather wide and recurved.

Mean divergence  $42^{\circ}$ ; length of spire .33 inch; total length .71 inch; breadth .3 inch.

Jamaica.

[This species is in the genus *Aspella*.—Clench and Turner.]

**pectinata** *Adams Lucina*

Plate 46, figs. 5-6

1847, Proc. Boston Soc. Nat. Hist. 2, p. 288 [nude name]; 1852, C. to C. no. 12, p. 245.

*L. t. Lucinae pectini* affini, sed perobliqua, postice declivi, exilissime concentrice striata; costis radiantibus latioribus, pluribus [246] bi- vel tri-furcatis. Long. 18.8 millim.; alt. 13 millim.; lat. 10 millim.

It must also resemble *L. obliqua* Reeve, said to have been collected by Benson at Chusan. But in that shell, the concentric and radiant lines are described in the same terms, and the posterior margin is figured as broadly subtruncate.

*Habitat.*—Jamaica; C.B.A.! It is found, rarely among collections of West Indian shells.

### **pectinella Adams Lucina**

Plate 46, figs. 9-10

1852, C. to C. no. 12, p. 246.

*L. t. suborbiculari*, margine dorsali subrecta, marginibus alteris rotundatis; costis radiantibus planulatis, subapproximatis, nonnullis anguste bifurcatis, ad extremitates nullis; lineis elevatis concentricis regularibus, costas superantibus; striis concentricis intermediis microscopicis; lunula conspicua, cordata, subelongata; limbo interno a costis pectinato; dentibus lateralibus magnis. Long. 7.8 millim.; alt. 8.1 millim.; lat. 2.8 millim.

Dredged in 4 or 5 fathoms, in soft mud, in the harbor of Kingston, Jamaica; C.B.A.!

### **pellucida Adams Lima**

Plate 43, figs. 8-9

1846, Proc. Boston Soc. Nat. Hist. 2, p. 103.

*L. t. tenuissima*, hyalina, costulis quadraginta tenuissimis instructa.

Long. .41; alt. .63; lat. .25 poll. *L. loscombii* Sowb., affinis. Hab. Jamaica.

### **pilula Adams Lucina**

Plate 46, figs. 11-12

1852, C. to C. no. 12, p. 246.

*L. t. Lucinae divaricatae* affini; sed minore, crassiore, globosa; apicibus prominentibus, haud obliquis; lunula parva, subdepressa, subcordata; striis divaricatis crebris, radiantibus microscopicis, evanescentibus; limbo crenulato. Long. 10.7 millim.; atl. 9.9 millim.; lat. 7.3 millim.

The lunule is not elongate as in *L. Americana*, and the

marginal crenulations are stronger, and the depressions between them are prolonged into the interior.

*Habitat.*—We have received 2 specimens from M. Krebs as West Indian shells.

**plicata Adams Pleurotoma** Plate 31, fig. 1; Plate 32, figs. 5-6

1840, Boston Journal of Natural History 3, pp. 318-320, pl. 3, fig. 6.

*P.* testa parva, crassa, ovato-fusiforimi, albido-fusca, striis et plicis decussata; epidermide tenui; anfractibus sex; sutura valde impressa; apertura ovata; labro arcuato, sinu lato; cauda brevi; columella acuta.

[319] Shell small, thick, ovate-fusiform, cinereous brown through (and light or dark brown beneath) the epidermis; epidermis membranous, thin, dull, cinereous; whorls six to seven, convex; suture deeply impressed; spire five-ninths of the length of the shell, longitudinally and coarsely plicate below the first or second whorls (which are smooth), decussated by transverse small ribs or coarse striae; body-whorl larger than the spire, sculptured as the upper whorls, with 10 to 12 longitudinal ribs, extending to the canal, either continuous or alternating with those on the penultimate whorl, with 13 to 15 transverse striae on the back of the body whorl, oblique on the canal, very oblique on its left side; aperture elongate-ovate, the line of its length at an angle of about  $30^{\circ}$  with the axis of the shell four-ninths of the length of the shell; labrum brown or yellowish-brown internally, somewhat arcuate, much thickened by the last plication, beneath which is a groove, reaching from the sinus to the canal, and sharpening the edge; sinus a little below the junction of the labrum with the last whorl, rounded and broad at the bottom, occupying one-fifth of the length of the labrum, in mature specimens nearly as deep as broad; canal short; columella somewhat excurved, acutely terminated; labium in its upper third arching over to meet the labrum; umbilicus wanting; operculum unknown.

Average size; length, .5 inch; breadth, .25 inch; largest specimen, .52 inch by .21 inch.

Cabinets of the Bost. Soc. Nat. Hist., of Middlebury College, of Mr. C. F. Shiverick, of New Bedford, and my own.

[320] Station. This species lives in mud below low water mark.

Habitat. Harbour of New Bedford.

Remarks. During the summer of 1839, two dredging machines were worked in the harbour of New Bedford. This species was found in the mud thrown up, with several others rarely or never found above low-water mark. Mr. Shiverick has found it at Clark's Cove, in Dartmouth. It resembles *Fusus harpularius*, but the presence of a very distinct sinus, as well as the coarseness of the revolving striae, readily distinguishes it.

[Name changed to *Pleurotoma plicosa* C. B. Adams.]

**plicosa Adams Pleurotoma** Plate 31, fig. 1; Plate 32, figs. 5-6  
1850, C. to C. no. 4, p. 54.

*Pleurotoma plicata* Ad. Bost. Journ. Nat. Hist. III. p. 318. pl. 3. f. 6. This name having been pre-occupied by Lamarck for a fossil shell, my species may take the name of *Pleurotoma plicosa*.

**praecognita Adams Nerita** Plate 41, fig. 10  
1845, Proc. Boston Soc. Nat. Hist. 2, p. 7.

N. t. crassa, olivacea, albo-marmorata; anf. 3, superioribus convexiusculis; ultimo costulis rotundatis crebris, striatis, numerum (a 20 ad 25) et latitudinem in diversis exemplis disparibus—ornato; labro acuto, a costulis eleganter pectinato, intus juxta marginem polito, interius crasso et crenulato, et supra infraque bituberculato; labio medio excavato et bidentato, alibi plicato vel noduloso. Operculo pallide murino, creberrime papilloso. Long. 1.05 poll.; lat. 1.3 poll.

Jamaica.

**princeps Mighels and Adams Cemoria** Plate 38, fig. 15  
1842, Boston Journal of Natural History 4, pp. 42-43, pl. 4, fig. 9.

C. testa alba, procera, costulata, rima intus in canalem producta, fornice obtectus; fornice lateraliter testae alis adjuncto; apertura ovata, crenulata.

Shell clear white, elevated, conical, with twenty five to thirty slight, obtuse ribs, and intervening small ones, the dividing striae minutely punctured; summit decumbent,



with a single minute whorl; apex visible on the right side; anterior slope rectilinear, posterior slope sub-rectilinear; from the rima within, a narrow groove with callous sides proceeds anteriorly, covered in part by a flattened arch, which arises [43] from the summit of the rima, and is strengthened above by a plate uniting it with the sides of the shell; aperture ovate, slightly crenate.

Length, .46 inch; width, .33 inch; height, .35 inch.

*Cabinets* of G. B. Sowerby, J. W. Mighels, and C. B. Adams.

*Habitat.* This shell was taken from the stomach of a had-dock, by Mr. Newbegin, a fisherman, in July, 1840, seventy five to one hundred miles off the mouth of Kennebec river, on fishing ground called by the fishermen "*Monhegan Falls.*" The water at that place is from forty to seventy five fathoms in depth.

REMARKS. This very singular and truly splendid species resembles *C. noachina* Linné, but differs from that shell in the following characters; in *C. noachina* the ribs are more elevated, the corresponding interior sulci are much more obvious; posterior slope much and regularly curved, shell smaller; proportionately longer, not so high, interior arch without wings. Only four specimens have been found.

[Is *Puncturella noachina* Linné.—I. P. Farfante 1947, *John-sonia* 2, p. 138.]

### **princeps** *Adams Rissoa*

Plate 34, fig. 1

1850, C. to C. no. 7, p. 116.

Shell ovate conic, turritid: white: with very numerous crowded slender ribs, which become obsolete on the last whorl, and strong crowded spiral striae, which become larger on the last whorl: apex acute: spire with rectilinear outlines: whorls ten, nearly planulate, slightly contracted next below the suture, which is moderately impressed: aperture very effuse: labrum very much advanced a little below the middle, well excurved, moderately thickened. This species resembles *R. albida* Ad., but that shell is much smaller, and the outlines of its spire are curvilinear.

Mean divergence about 30°; length of spire .25 inch; total length .37 inch; breadth .14 inch.

Jamaica.

[Is a *Rissoina*.—M. Desjardin 1949, *Jour. de Conch.* **89**, p. 202.]

**producta** Adams **Jaminia**

Plate 41, figs. 8-9

1840, Boston Journal of Natural History **3**, pp. 322-323, pl. 3, fig. 8.

J. testa parva, albida, cylindracea; epidermide fusca, nitida, erosa; anfractibus octo; sutura impressa; spira producta, truncata; apertura sub-ovata, supra contracta, infra late rotundata; columella uniplicata.

Shell small, moderately thick, ashy white beneath the epidermis, conico-cylindric, with fine irregular striae of growth; epidermis brown, smooth, closely adhering, eroded chiefly in the incremental striae; whorls eight or eight and a half, slightly convex; suture very distinct, impressed; spire about three-fourths of the length of the shell, or slightly more, truncated at tip; last whorl about one third of the bulk of the spire; on two or three of the last whorls may sometimes be seen an indistinct impressed revolving line, just below the suture, and also more rarely on the middle and lower part of the whorls; aperture with its plane at an angle of about  $16^\circ$  with the length of the shell, sub-ovate, contracted above, broadly rounded below; labrum rather thin, regularly arched, but more so in the lower half; columella with a single, rather obtuse plait; labium with a slight lamina, which is often obsolete; no umbilicus; operculum very small, thin, horny, nearly transparent, sub-triangular, apex on one side.

Length, .25 inch; greatest breadth, .07 inch. Of the operculum; length, .033 inch; breadth, .025 inch.

Cabinets of Bost. Soc. Nat. Hist.; of Middlebury College; of Dr. A. A. Gould, of Boston; of Prof. Hitchcock, of Amherst; and my own.

Habitat. A cove on the east side of Fairhaven. [323] It was found near high-water mark, on a beach of fine gravel, but, as most of the shells were destitute of the animal, it may be doubted whether this is their proper station.

Remarks. This species was discovered in September, 1839, in company with great numbers of the *Venus gemma*, Totten, and many of the *Jaminia fusca*, Nob. It has a striking resemblance to the latter species, but is much more elongate, has two more whorls, the body whorl is much less

inflated, and the suture is rather more deeply impressed.

**proxima** *Adams Natica*

Plate 41, fig. 13

1850, C. to C. no. 7, p. 111.

Shell obliquely ellipsoidal: mostly fawn color, or livid, white anteriorly, and on the callus, with an ill defined dingy white stripe next below the suture; anteriorly with a circle of transverse curved brown flames; above the middle of the last whorl, with a narrow pale revolving stripe, on which are rather distinct sagittate spots of dark brown; sometimes next below the middle is a similar but more faintly and closely spotted line: thin, smooth, and shining, with the oblique infrasutural striae rather feeble: apex subacute: spire prominent, with the outlines moderately curvilinear: whorls five, quite convex, with a well impressed suture: aperture not very wide, ovate but compressed in the left outline: labial deposit rather thick, but subtransparent: umbilical callus about half filling the umbilicus in the lower and right side: umbilicus rather narrow, deep, partially concealed by the labial deposit.

This species resembles the young of *N. canrena*, but the spire is longer; the aperture is narrower, and the form consequently not ovate: the umbilical callus is rather smaller; the shell is thinner: the plan of coloring, although similar, is constantly different.

Mean divergence about  $120^\circ$ ; length of aperture about .52 inch; total length .7 inch; breadth .6 inch.

Jamaica.

**pulchella** *Adams Lucina*

Types lost.

1845, Proc. Boston Soc. Nat. Hist. 2, p. 10.

L. t. parva, subcordata, rubella, albomarginata, striis obliquis parallelis, posterioribus undatis, anterioribus divaricatis—ornata; dentibus lateralibus robustis. Long. .28 poll.; alt. .28 poll.; lat. .18 poll.

Jamaica.

[Adam's types are not in existence. This name does not appear in his catalogue of his collection which he published in 1847. It would appear that he detected that this species was

a synonym and changed the labels accordingly.—Clench and Turner.]

**pulchellum** *Adams Buccinum*

Plate 32, fig. 12

1851, C. to C. no. 8, pp. 130–131.

Shell ovate fusiform: pale yellowish brown, with the spiral ridges dark reddish brown, ex- [131] cept on the upper whorls: with twelve spiral prominent cord-like ridges, half of which appear on the spire, decussated by much less prominent regular transverse ridges, with the intersections well developed into nodules: apex acute: spire with the outlines moderately curvilinear: whorls five, rather convex, with the suture moderately impressed; last whorl but little ventricose: aperture rather narrow and sinuous; lip slightly thickened, not denticulate within, (in old shells?) with the notch of medium size.

Mean divergence about  $40^\circ$ ; length .145 inch; breadth .06 inch; length of aperture .06 inch.

Jamaica.

**pulchellum** *Adams Cerithium*

Type lost.

1850, C. to C. no. 7, p. 121.

Shell turritid, conic above, subcylindric in the lower three-fifths, conic above: snow white, with a spiral band of bright brown, which commences several whorls below the apex, and is placed on the inferior spiral ridge: with two spiral ridges, of which the upper one is larger, and is double on the lower whorls; with small transverse ridges, which are developed on the spiral ridges into rather large nodules; anteriorly with two other spiral ridges, of which the upper one is subnodulous: apex acute; spire with the outlines slightly concave in the upper half and slightly convex in the lower half, often truncate with the loss of five whorls: whorls about eleven, a little convex, with a well impressed suture; last whorl a little smaller than the penult whorl, terminating obtusely: aperture suborbicular: labrum well excurved, moderately thickened: canal very short and wide, nearly straight.

Divergence in the upper whorls about  $22^\circ$ ; length of spire .135 inch; total length .17 inch; breadth .045 inch.

Jamaica.

**pulchellus Adams Triton**

Plate 40, fig. 8

1850, C. to C. no. 4, p. 60.

Shell fusiform: reddish at the apex, pale yellow, with spiral unequal bands of gray, of which there are two on the whorls of the spire and two more on the last whorl; with the aperture more or less orange red: decussate with many small unequal longitudinal and spiral ridges, with unequal nodulous intersections; varices five, last one very large: apex acute: spire with the outlines nearly rectilinear between the varices: whorls eight, rather convex, subangular at or a little above the middle, with a well impressed suture: aperture subelliptical, somewhat acuminate at both extremities: labrum grooved within under the last varix, denticulate on both sides of the groove: labium transversely wrinkled: canal moderately bent to the left and upwards.

Mean divergence  $45^{\circ}$ ; length of spire .33 inch; total length .72 inch; breadth .36 inch.

This shell resembles a small and slender *T. chrysostoma*.  
Jamaica.

[*Triton pulchellus* C. B. Ad., is a young *T. chlorostomum* Lam.—Krebs 1866, p. 398.]

**pulchellus Adams Turbo (?)**

Plate 40, fig. 9

1845, Proc. Boston Soc. Nat. Hist. 2, p. 7.

T. t. minima, albida, maculis rubris quadratis inequalibus, majoribus nigrescentibus, serie decurrente dispositis, ornata; sutura profunda; anf. 5, mediis carinatis, lineis elevatis pluribus decurrentibus—instructis; labro tenui; umbilico nullo. Div.  $45^{\circ}$ ; spirae long. .09 poll.; long. tot. .165 poll.; lat. .1 poll.  
Jamaica.

**pulcher Adams Trochus**

Plate 40, fig. 7

1850, C. to C. no. 5, p. 69.

Shell conical, much elevated: pale claret color, with a dark brown apex, and large ill defined spots of white; with spiral series of minute dark red oblong spots, which are proportioned to the size of the spiral ridges on which they are placed; the ridges of least size are not spotted: solid, with ten or twelve minute spiral ridges, of which one near the

base of the whorls is larger, and three are of an intermediate size, viz., one on each side of the suture and one on the middle of the whorls; on the lower side of the last whorl are sixteen or eighteen other minute revolving ridges, of which every second or third is spotted: apex acute: spire with the outlines nearly rectilinear: whorls seven and one-half, a little concave, acutely prominent in the lower part; last whorl subangular, moderately convex beneath: aperture subquadrate, iridescent within: columella subtruncate: umbilicus wanting. The whorls in this shell have the same form as in *T. jujubinus*, and the general form of the shell is like that of *T. pyramidatus*.

Mean divergence  $48^{\circ}$ ; length of spire .26 inch; total length .38 inch; breadth .27 inch.

Jamaica.

**pulchra Adams Risso**

Plate 33, fig. 8

1850, C. to C. no. 7, p. 114.

Shell subovate, turritid: white, with a pale yellowish brown spiral band on the upper part of the whorls, and a similar band anteriorly: with spiral ridges increasing from two on the upper whorls to four or five on the penult whorl, (of which the upper one is smaller,) and on the last whorl seven, which are crossed, with well developed nodulous intersections, by twenty to twenty-two small transverse ridges; anteriorly with three nodiferous approximate spiral ridges, which are separated from the other seven by a broad groove: apex acute: spire with the outlines moderately curvilinear: whorls ten, quite convex, with a well impressed suture: aperture very effuse: labrum well advanced and excurved, very much thickened.

Mean divergence about  $22^{\circ}$ ; length of spire .155 inch; total length .225 inch; breadth .08 inch.

Jamaica.

[Is *Rissoina cancellata* Philippi. — Desjardins 1949, *Jour. de Conch.* **89**, p. 204.]

**puncta Adams Chemnitzia**

Type lost.

1850, C. to C. no. 5, p. 72.

Shell much elongated: white: with about twenty-six to

thirty rather prominent transverse ribs, which are not produced below the convexity of the last whorl; with numerous crowded spiral striae in the intercostal spaces, one of which striae, a little above the middle of the whorls, and another along the suture are wide and deep, resembling spiral series of punctures; intercostal spaces depressed anteriorly below the adjacent anterior surface: spire with the outlines rectilinear: whorls ten or eleven, after the loss of the nucleus, scarcely convex, with a distinct suture: aperture ovate-rhombic: labium scarcely thickened: umbilical region scarcely indented.

Mean divergence about  $16^\circ$ ; length of spire .185 inch; total length .22 inch; breadth .05 inch.

Jamaica.

[*Chemnitzia puncta* C. B. Ad. is described from two miserable specimens.—Krebs 1866, p. 395.]

### **puncto-striata** *Mighels and Adams* **Bulla**

Plate 32, figs. 17-18

1842, Boston Journal of Natural History 4, pp. 43-44, pl. 4, fig. 10.

B. testa alba, solida, eleganter striata; striis crebris, inequidistantibus, punctatis; spira occulta; apertura magna.

*Shell* white, rather solid, ovate, with crowded, inequidistant, distinctly punctate striae; spire concealed; aperture very large, contracted at the upper third by the intrusion of the body whorl; labrum rising above the apex, very sharp and regularly arcuate; labium with a very thin lamina extending to the apex.

Length, .38 inch; breadth, .24 inch.

*Habitat.* Casco Bay; taken from the stomach of a haddock; in the summer of 1841.

REMARKS. This remarkable and truly beautiful shell, resembles an enlarged specimen of *B. lineolata*, Couth., to which it is allied; but it is easily distinguished by its larger size, by the elevation of the labrum above the apex, and above all, by the punctate striae. Only a single specimen has been found. It is in the cabinet of J. W. Mighels.

### **puncto-striata** *Adams* **Tornatella**

Plate 40, figs. 5-6

1840, Boston Journal of Natural History 3, pp. 323-324, pl. 3, fig. 9.

T. testa parva, elliptica, alba, nitida; anfractibus quinque convexis; sutura valde impressa; anfractu ultimo supra laevi, infra puncto-striato; apertura subovata; umbilico parvo.

Shell small, elliptic, white, glossy, not very thin; whorls five, convex; suture deeply impressed; spire rapidly attenuated, sub-acutely tipped, four-ninths of the length of the shell, smooth; body whorl more than three-fourths of the shell, somewhat shouldered above, smooth on the upper third, below with impressed, parallel, punctate lines, five or six of them distant on the middle, either equally or unequally distant, and six to eight closely approximate on the lower fourth; one line only appears above the aperture, running near and at length into the suture of the body whorl; aperture in the same plane with the axis, the line of its length making with the axis an angle of not more than  $10^\circ$ , five-ninths of the length of the shell, sub-ovate, contracted above by the intrusion of the body-whorl, regularly but narrowly rounded below; labrum sharp, prominent, with a short, abrupt curve above, then straight to the middle, arched in the lower half; columella with an obtuse fold; labium moderately reflected below; umbilicus small, partly covered by the reflected labium.

Length, .16 inch; breadth, .095 inch: of a large specimen, length, .18 inch; breadth, .1 inch.

Cabinets of the Bost. Soc. of Nat. Hist.; of Mr. C. F. Shiverick; and my own.

Station and habitat; the same with *Pleurotoma plicata*.

Remarks. In 1838 I found two specimens, after a violent storm, on the shore at New Bedford. Three specimens were found with the preceding species, and several have been obtained by Mr. Shiverick.

**purpurascens Adams Chiton**

Plate 42, fig. 2

1845, Proc. Boston Soc. Nat. Hist. 2, p. 9.

C. t. praelonga, purpureo-rubente concentric striata; margine lato, exilissime squamuloso, caerulescente, alternatim pallidiore. Long. 1.1 poll.; lat. .5 poll.

Jamaica.

**purpurascens Adams Columbella**

Type lost.

1845, Proc. Boston Soc. Nat. Hist. 2, p. 2.



*C. t. parva*, pallide purpurea, striis decurrentibus supra labrum in fauces productis ornata; anf.  $5\frac{1}{2}$ ; apertura elongata; columella supra excavata. Div.  $50^\circ$ ; spirae long. .09 poll.; long. tot. .27 poll.; lat. .13 poll.

Jamaica.

[*Columbella purpurascens* C. B. Ad., is placed next to *C. dormitor* Sowb., and is the same species.—Krebs 1866, p. 395.]

**purpureo-maculata Adams Psammobia** Plate 45, figs. 1-2

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 10.

*P. t. brevis*, posterius truncata, albida, maculis paucis purpureis coerulescentibus, interdum obsolete, ornata; ligamento brevi, crasso.

Jamaica.

[See note under *Psammobia affinis* C. B. Adams.]

**pusilla Adams Chemnitzia**

Plate 49, fig. 11

1850, C. to C. no. 5, p. 74.

Shell very slender: white: with about twelve rather stout transverse ribs, which are not produced below the convexity of the last whorl; without spiral striae; with the intercostal spaces on the last whorl depressed anteriorly below the adjacent surface of the anterior region, which is smooth; nucleus consisting of about one and one-half smooth whorls, very oblique: spire with rectilinear outlines: whorls ten or eleven besides the nucleus, moderately convex, with a well impressed suture: aperture ovate: labium not perceptibly thickened: umbilical region scarcely indented. This species resembles *C. levis*.

Mean divergence about  $8^\circ$ ; length of spire .11 inch; total length .135 inch; breadth .03 inch.

Jamaica.

**pygmaea Adams Columbella**

1850, C. to C. no. 4, p. 58.

[Is a synonym of *C. costulata* Adams, which see; non *C. pygmaea* Sowerby ]

**pygmaea Adams Pleurotoma**

Plate 29, fig. 13

1850, C. to C. no. 4, p. 63.

Shell ovate-fusiform, much elongated: with a broad irregular band of yellowish brown along the upper part of the whorls and below the middle of the last whorl: with small transverse approximate ribs, about fifteen on each whorl, and rather distant spiral elevated lines, the intersections being developed into large nodules: nucleus smooth and opaque white: apex subacate [*sic*]: spire with convex outlines: whorls about six, moderately convex, with a lightly impressed suture: aperture rather narrow: sinus rather large and deep, near the upper end of the labrum: canal very short.

Mean divergence  $30^{\circ}$ ; length of spire .075 inch; total length .13 inch; breadth .055 inch.

Jamaica.

[See note under *P. monilifera* C. B. Adams.]

**quadrilineata** Adams **Pleurotoma** Plate 29, fig. 12

1850, C. to C. no. 4, p. 64.

Shell clavate-pyramidal: white, with one or two fine spiral lines of brown along the suture, and four similar lines just below the periphery of the last whorl, all of which lines are interrupted by the ribs, and with similar but paler lines at the upper part of the whorls and anteriorly: with obtuse moderately elevated transverse ribs, about eleven on each whorl; with many excessively minute finely granose spiral elevated lines, which are more conspicuous where colored as above described, and which are obsolete at the summit of the ribs: apex acute: spire with the outlines nearly rectilinear; whorls seven, subangular above the middle, with a well impressed suture: aperture long-obovate, subacuminate at both extremities: labrum well excurved: sinus shallow: canal short.

Mean divergence about  $30^{\circ}$ ; length of spire .12 inch; total length .21 inch; breadth .08 inch.

Jamaica.

**reevii** Adams **Pleurotoma**

1850, C. to C. no. 4, p. 54.

*Pleurotoma violacea* Hinds. Proc. Zool. Soc. Lond. March 28, 1843. The name of this species was anticipated by me

in January 1842, for a species which inhabits Maine. Mr. Hinds' species may therefore take the name of *P. Reevii*.

**reticulata Adams Chemnitzia**

Type lost.

1850, C. to C. no. 5, p. 75.

Shell moderately elongated: white: with about twenty-six to thirty rather strong transverse ribs, which become obsolete on the anterior surface; with very coarse distant spiral raised lines, decussating the ribs: nucleus consisting of a little more than one smooth whorl, very oblique: spire with the outlines a little convex; whorls about seven besides the nucleus, slightly convex, with a well impressed suture: aperture ovate, acute above: labium scarcely thickened: umbilical region not indented.

Mean divergence about  $12^\circ$ ; length of spire .09 inch; total length .125 inch; breadth .04 inch.

Jamaica.

**reticulata Mighels and Adams Turritella**

Plate 40, figs. 14-15

1842, Boston Journal of Natural History 4, pp. 50-51, pl. 4, fig. 19.

T. testa turrilo-subulata; anfractibus duodecim, convexis, longitudinaliter plicatis, transversim striatis; sutura valde impressa; apertura sub-orbiculari.

*Shell* turreted, very slender, of a dingy white or ash color; whorls eleven to twelve, convex, distinctly, though somewhat irregularly plicate longitudinally, with from three to five delicate, impressed, revolving striae on the five lower whorls; from and above the fifth whorl the transverse striae gradually diminish in number, until they wholly disappear on the upper two or three whorls. The whole surface of the shell has a reticulated appearance. Suture well impressed; aperture sub-orbicular; labrum thin; operculum horny.

Length .7 inch; breadth .2 inch; divergence  $20^\circ$ .

*Cabinets* of Bost. Soc. Nat. Hist., Dr. Gould, J. W. Mighels, and C. B. Adams.

[51] *Habitat*. Bay Chaleur, in the Gulf of St. Lawrence; taken from the stomachs of cod fishes (*Morrhua americana* Storer,) by Mr. Foster, fisherman, in the summer of 1841, to whom we are indebted for specimens.

REMARKS. This species is allied to *T. erosa* Couth., but is easily recognized by the longitudinal ribs, and by its more slender form.

**rosea Adams Pholas**

1850, C. to C. no. 5, pp. 75-76.

[This name of Adams is a synonym of *P. corticaria* 'Gray' Sowerby 1849, Thesaurus Conchyliorum **2**, p. 495, pl. 108, figs. 94-96. Paratypes MCZ 155633-155634. The lectotype is the specimen figured in the Thesaurus.]

This species was discovered by me in the bark of a log, on the shore of the Bay of Port Royal, near Kingston, Jamaica, in March, 1844. Specimens were distributed with the Mss. name of *P. rosea*, subsequently altered to *P. corticaria*. Some were sent to the British Museum and to Mr. Cuming's collection, where they were seen by Mr. Hanley, who affirmed them to be not distinct from a variety of *P. pusilla* Linn. In deference to his opinion, the description was suppressed from my 'Synopsis' of new species from Jamaica. In part X of Sowb. Thes. Conch. (Dec.?) 1849, a description of this species is published for the first time, with the name of '*P. corticaria* Gray, Mss.,' as being in the British Museum, without indication of habitat. It is said that 'the specimens, having bored in floating mahogany, have taken a reddish color.' This color was derived from the bark of the tree. The shells did not penetrate the wood, and where they were in contact with it, they were distorted, as if unable to penetrate it. Mss. names are not quotable as having the value conferred by authorship, and the name must stand as above. It is unfortunate that the descriptions of several of the new marine species of shells from Jamaica should have been suppressed, in deference to the eminent authority above mentioned, and distributed with erroneous names.

**rubella Adams Marginella**

Plate 32, fig. 4

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 1.

M. t. tenui, elongata, fasciis tribus rubellis ornata; anf. 4; spira vitrea; labro albo, maculis tribus rubellis ornato, aper-turam supra angustante; columella 4-plicata. Diverg. 100°; spirae long. .025 poll.; long. tot. .35 poll.; lat. .17 poll.

Jamaica.

**rugulosum** Adams **Cerithium**

Plate 38, fig. 17

1850, C. to C. no. 7, pp. 121-122.

Shell conoid, turritid: white: with one slightly elevated and three much elevated spiral lines, and on each whorl about sixteen to eighteen transverse ridges, the intersections being well developed into nodules, anteriorly with a fourth spiral nodulous slender ridge: apex acute: spire with the outlines nearly rectilinear: whorls about ten, quite convex, with a well impressed suture; last whorl terminating rather abruptly, somewhat concave [122] anteriorly: aperture suborbicular: canal reduced almost to a broad deep notch.

Mean divergence about  $13^\circ$ ; length of spire .13 inch; total length .16 inch; breadth .055 inch.

Jamaica.

[See note under *C. vicinum* C. B. Adams.]

**scalarella** Adams **Rissoa**

Plate 33, fig. 3

1845, Proc. Boston Soc. Nat. Hist. 2, p. 6.

*R. t. parva*, solida, alba; anf. 8, singulatim costis 14 robustis ad extremitatem infra productis—instructis; apertura infra late haud profunde sinuata; labro valde incrassato. Div.  $22^\circ$ ; spirae long. .1 poll.; long. tot. .15 poll.; lat. .06 poll.

Jamaica.

[The following additional note appeared in the *Contributions to Conchology* no. 7, p. 114, 1850.]

In the *Zeitschrift fur Malac.* *R. Scalarella* is referred to the genus *Rissoina*, on account of the presence of a solid calcareous operculum. Some fresh specimens obtained by me near Kingston in 1844, were found to have a horny operculum.

[See note under *R. minor* C. B. Adams.]

[Is *Rissoina catesbyana* d'Orb.—M. Desjardin 1949, *Jour. de Conch.* 89, p. 198.]

**scalariformis** Adams **Truncatella**

Type lost.

1845, Proc. Boston Soc. Nat. Hist. 2, p. 12.

*T. t. solida*, elongata, decollata; anf. 4 vel 5 reliquis, singulatim costis 10 robustis et striis decurrentibus exilissimis—ornatis. Div.  $20^\circ$ ; long. post decoll. .16 poll.; lat. .08 poll.

Jamaica.

[Is *Truncatella scalaris* Michaud.—Clench and Turner 1948, *Johnsonia* 2, p. 160.]

**scalaroides** Adams **Rissoa**

Plate 33, fig. 6

1850, C. to C. no. 7, p. 113.

Shell long ovate conic: white: with, on each whorl, sixteen or eighteen stout ribs, which are continued to the anterior extremity: apex acute: spire with the outlines moderately curvilinear; whorls seven and one-half, slightly convex, with a well impressed suture: aperture moderately effuse: labrum well advanced and excurved, rather thick.

Mean divergence about  $27^\circ$ ; length of spire .13 inch; total length .2 inch; breadth .08 inch.

Variety (?) *minor* is but .15 inch long.

Jamaica.

[See note under *R. minor* C. B. Adams.]

[Is *Rissoina chesneli* Michaud.—Desjardins 1949, *Jour. de Conch.* 89, p. 196.]

**semicostata** 'Montagu' **Mighels and Adams** **Cingula**

Plate 39, figs. 7, 18

1842, Boston Journal of Natural History 4, p. 49, pl. 4, fig. 23.

C. testa minima, ovata; anfractibus quinque, convexis, infra carinatis, supra plicatis; spira conica; sutura valde impressa; apertura suborbiculari; operculo corneo.

Syn. *Turbo semicostatus* ? Montagu.

Shell very small, ovate-conical, of a ferruginous red color, very thin; whorls for the most part five, convex; with longitudinal ribs on the upper half, and revolving impressed striae on the lower half; last whorl carinate; spire conical, obtuse; suture well impressed; aperture nearly orbicular; labrum thin, sharp; labium smooth; operculum horny.

Length .11 inch; breadth .7 inch; divergence  $45^\circ$ .

Cabinets of Bost. Soc. Nat. Hist., Dr. Gould, Mons. Largillier, J. G. Anthony, and our own.

Habitat. Casco Bay; taken from stomachs of haddock in the summer of 1841.

REMARKS. We offer this with some hesitation, as identical with *T. semi-costatus* Mont. If it should finally prove to be distinct, we would propose to call it *Cingula carinata*.

**seminuda Adams Jaminia**

Plate 41, figs. 5-6

1839, Boston Journal of Natural History 2, pp. 280-282, pl. 4, fig. 13.

*J. testa parvula, acuto-conica, nitida, albida, sub-translucida; anfractibus septem, convexis, decussatim granulosis; anfractu postremo infra striato; apertura elliptica, basi effusa; columella reflexa, uniplicata.*

DESCRIPTION. *Shell*, acute-conic, glossy white, diaphanous; *whorls*, about seven, convex; upper whorls [281] and upper half of the body whorl, rugose longitudinally, with three impressed revolving lines, presenting a decussate or granulous appearance; upon the lower half of the body whorl are four additional impressed revolving lines, one of which runs around at the inferior abrupt termination of the rugae, which are eighteen to twenty; *suture* broad, divided by an indistinct spiral ridge; *apex* acute; *aperture* elliptical, one third the length of the shell; *labrum* not thickened, pectinated by the revolving lines, which are distinctly seen upon the inner side; inferior margin effuse; *columella* with a single sub-oblique fold, arcuate, reflexed; operculum?

Length, .15 inch; breadth, .07 inch.

Inhabits Dartmouth harbor [Massachusetts].

Cabinets of the Boston Society of Natural History, of William H. Taylor, Esq. of New Bedford, and my own.

Remarks. Of this species I found four specimens only, which are all that I have seen. They were found in Dartmouth, at the village of Ponygansett, four miles southwest from New Bedford. They were about five feet, perpendicular depth, below low water mark, upon single valves of the *Pecten concentricus* Say, in company with the *Nassa lunata* Say, *Columbella avara* Say and the *Nucula margaritacea* Lam. The valves of the *Pecten*, on which they were found, were taken from the bottom by my hands at a venture, when bathing. A dredge would probably reveal more.

This species probably belongs to Brown's genus *Jaminia*, which is nearly allied to his *Pyramis*, but as descriptions of these genera are not accessible, it is with some doubt that I have referred it to *Jaminia*. It undoubtedly belongs to the same genus with the *Actaeon* [282] *trifidus* Totten. (Am. Journ. Sc. XXVI, 368) but this generic name is appropriated to a genus of naked Mollusca.

In size and form this shell resembles the *A. trifidus*, but differs from it in the convex whorls, granulous surface, and revolving lines which are all very distinct and less numerous, while in the *A. trifidus* two or three only are distinct, and the others are nearly obsolete,—in the aperture, which is not angular superiorly, and is more effuse and less rounded inferiorly. It is more nearly allied to *Turbo spiralis* Montague, Test. Brit. p. 323, but differs in the number of volutions and in the presence of the revolving lines around the rugose surface. In the figure the *Turbo spiralis* is broader in the middle of its length, but this species is broader below the middle; the aperture is also shorter.

I take pleasure in affixing the specific name suggested by Dr. Gould.

**servile** '*C. B. Adams*' *Krebs Cerithium*

1866, Annals Lyceum Natural History New York 8, p. 394 [nude name].

[*Cerithium servile* C. B. Ad., is not in the Amherst Cabinet; perhaps Adams found it to be syn. with his *C. ambiguum*.—Krebs 1866, p. 394.]

[This species was never described by Adams. Specimens may have been sent to Krebs under this name, a name which was later discarded by Adams.—Clench and Turner.]

**solida** *Adams Cingula* (?)

Plate 39, fig. 3

1850, C. to C. no. 5, p. 70.

Shell subconic, well elevated: dark brown, with the lip and apex white: with a few distant subgranular elevated spiral lines, of which the alternate ones are much more minute; anteriorly smooth: apex obtuse: spire with the outlines nearly rectilinear: whorls five, slightly shouldered above, scarcely convex, with a well impressed suture: aperture orbicular, parallel with the axis of the spire: lip reflected on the left side and on the adjacent part of the anterior side: umbilical region moderately indented.

Mean divergence about 32°; length of spire .05 inch; total length .085 inch; breadth .045 inch.

Jamaica.

**solida** *Adams Pleurotoma*

Plate 29, fig. 8

1850, C. to C. no. 4, pp. 61-62.



Shell clavate pyramidal: very dark brown or nearly black, with the intercostal spaces pale brown: with a very slight keel on the upper part of the whorls, and a smooth space below it, and somewhat oblique transverse ribs abruptly commencing above the middle of the whorls, and spiral striae in the intercostal spaces; anteriorly with prominent raised revolving lines decussating the transverse ribs: apex subacute: spire with the outlines nearly rectilinear: whorls eight, a little convex, with a moderately impres- [62] sed suture, which is crenulated by the entrance of the ribs from above: aperture rather small: labrum produced along the middle and in dead shells usually broken off: sinus deep, a little below the extremity of the labrum: canal very short. This species is allied to *P. unicolor* Sowb., *P. rustica* Sowb., and *P. fuscescens* Gray.

Mean divergence  $27^{\circ}$ ; length of spire .45 inch; total length .68 inch; breadth .28 inch.

Jamaica.

**solidula** Adams *Odostomia*

Plate 40, fig. 2

1850, C. to C. no. 7, p. 110.

Shell cylindrical in the lower half, conic above: dingy white: thick and smooth: apex subacute: spire with the outlines moderately curvilinear: whorls six, moderately convex, with a distinct suture; last whorl rather long: aperture ovate, a little effuse and pointed anteriorly: columellar plait stout, obtuse, quite oblique.

Mean divergence about  $20^{\circ}$ ; length .11 inch; breadth .04 inch.

Jamaica.

[See note under *O. canaliculata* C. B. Adams.]

**soror** Adams *Lucina*

Plate 45, figs. 11-12

1852, C. to C. no. 12, p. 247.

L. t. suborbiculari; margine superiore antice et postice declivi, inferiore antice subarcuata; cinereo-albida; microscopice creberrime punctulata; striis concentricis exilissimis creberrimis; umbonibus prominentibus; apicibus subobliquis; lunula minutissima; limbo simplici; dentibus lateralibus

obsoletis. Long. 19.6 millim.; alt. 18 millim.; lat. 12.7 millim.

Except in form, it resembles *L. Janeirensis*. It was obtained with *L. pectinella*.

Dredged in 4 or 5 fathoms, in soft mud, in the harbor of Kingston, Jamaica; C.B.A.!

**squalidus Adams Chiton**

Plate 42, fig. 7

1845, Proc. Boston Soc. Nat. Hist. 2, p. 8.

*C. t. albida, atro-maculata, maculis maximis, rugosa; areis a costa robusta discretis; valvis extremis costis 8 ad 10 instructis; margine membranaceo, setosa. Long. 1.15 poll.; lat. .7 poll.*

Jamaica.

**squamulosus Adams Chiton**

Plate 42, fig. 1

1845, Proc. Boston Soc. Nat. Hist. 2, p. 8.

*C. t. olivacea, linea pallide virente dorsali—ornata; areis lateralibus squamosis inequalibus prostratis—obtectis; areis dorsi mediis sublaevibus, puncto-striatis; margine exile squamuloso, alternatim cinereo-virescente viridique. Long. .7 poll.; lat. .4 poll.*

Jamaica.

**striosa Adams Rissoa**

Plate 34, fig. 8

1850, C. to C. no. 7, p. 116.

Shell ovate conic, somewhat turritid: dingy white or corneous: with, on each whorl, twenty-five to twenty-eight moderately developed transverse folds, which are obsolete on the lower part of the middle whorls and on most of the last whorls; with very numerous crowded deeply impressed spiral striae; with an infrasutural impressed line larger than the striae and constricting the whorls: apex acute: spire with the outlines moderately curvilinear: whorls nine, rather convex, with a moderately impressed suture: aperture somewhat effuse, large: labrum well advanced, much excurved, moderately thickened.

Mean divergence about 26°; length of spire .135 inch; total length .2 inch; breadth .08 inch.

Jamaica.

[Is a *Rissoina*. — M. Desjardin 1949, *Jour. de Conch.* **89**, p. 203.]

**subangulata Adams Rissoa**

Plate 34, fig. 9

1850, C. to C. no. 7, pp. 112-113.

Shell long ovate conic: white: with on each whorl, eleven or twelve rather acute but stout ribs, which spread to their bases with concave sides, and which on the last whorl are produced to the anterior extremity; sometimes with very lightly im- [113] pressed microscopic spiral striae: apex acute: spire with slightly convex outlines, often with a curved axis: whorls seven and one-half, quite convex, with a well impressed suture: aperture moderately effuse and rather large: labrum well produced and excurved, rather thick. The name of this species was originally suggested by specimens, in which the axis is more than usually distorted. Since it has been used in other collections, and in my printed catalogue of North American shells, I have not deemed it expedient to substitute a more appropriate name.

Mean divergence about  $35^{\circ}$ ; length of spire .13 inch; total length .21 inch; breadth .095 inch.

Jamaica.

**subcostulata Adams Columbella**

Plate 41, fig. 1

1845, Proc. Boston Soc. Nat. Hist. **2**, p. 2.

C. t. C. *pygmaeae* Sowb. affini, exiliore, costis minus elevatis, apertura latiore; fusco irregulariter maculata et reticulata. Div. ib.; spirae long. .165 poll.; long. tot. .285 poll.; lat. .125 poll.

Jamaica.

[*Columbella catenata* Sowb., and *C. subcostata* [sic] C. B. Ad. Specimens with these two names are positively the same species.—Krebs 1866, p. 395.]

**subglobosa Adams Lucina**

1847, Proc. Boston Soc. Nat. Hist. **2**, p. 228 [nude name].

[Is a synonym of *Lucina janeirensis* Reeve, according to C. B. Adams 1852, *Contributions to Conchology*, no. 12, p. 245.]

**substriata Adams Chemnitzia**

Type lost.

1850, C. to C. no. 5, pp. 73-74.

Shell moderately elongated: white, with a slight tinge of wax color next above the suture: with about twenty-two to twenty-four transverse rather stout ribs; in the intercostal spaces and anteriorly with very numerous crowded excessively minute spiral striae, which are scarcely perceptible under a common magnifier; on the middle of the whorls is a spiral series of shallow pits in the intercostal spaces; on the last whorl, with the anterior extremities of the intercostal spaces moderately depressed below the surface of the anterior region: spire with rectilinear outlines: whorls about eight, planulate, with a distinct suture: aperture rhombic-ovate: labium scarcely thickened: umbilical region scarcely indented.

[74] Mean divergence about  $12^\circ$ ; length of spire .09 inch; total length .115 inch; breadth .04 inch.

Jamaica.

[See note under *C. multicosata* C. B. Adams.]

**subulata Adams Chemnitzia**

Type lost.

1850, C. to C. no. 5, p. 73.

Shell much elongated, subulate: white, or pale brownish white with two spiral bands of pale wax color, and a third of the same color anteriorly: with about twenty-eight to thirty rather prominent slender transverse ribs, which are not quite obsolete below the convexity of the last whorl; in the intercostal spaces and anteriorly with numerous excessively fine crowded spiral striae, of which one next below the suture is larger: nucleus consisting of about one and one-half whorls, moderately oblique: spire with a slightly curved axis, with the outlines scarcely convex: whorls ten after the loss of the nucleus, rather convex, with a well impressed suture: aperture ovate, acute above: labium slightly thickened: umbilical region slightly indented.

Mean divergence about  $11^\circ$ ; length of spire .13 inch; total length .17 inch; breadth .045. inch.

Jamaica.

[See note under *C. exilis* C. B. Adams.]

**succinea Adams Truncatella**

Plate 40, fig. 11

1845, Proc. Boston Soc. Nat. Hist. 2, p. 12.

T. t. magna, succinea-rubente, decollata; anf. 5 vel  $5\frac{1}{2}$  perditis; anf. reliquis  $3\frac{1}{2}$  vel 4, costis crebris (ultimi obsoletis)—ornatis; apertura albida; operculo convexo, calcareo, corneo-marginato. Div.  $22^\circ$ ; spirae long. post decoll. .2 poll.; long. tot. .31 poll.; lat. .13 poll.

Jamaica.

**sulphurea Adams Helix**

Type lost.

1849, C. to C. no. 3, p. 33.

Shell sub-globose, conic above, and a little tapering below; yellow, nearly transparent; smooth and shining; spire with the outlines a little convex, well elevated, conic; apex very small and acute; whorls four, a little convex, with a well impressed finely margined suture; last whorl very long; aperture sub-subovate; labrum very thin and sharp; columella much produced, nearly straight; umbilicus none.

Mean divergence  $90^\circ$ ; greatest breadth .175 inch; least breadth .13 inch; height .16 inch.

Perhaps this is a young shell, but probably not of any described species.

1850, C. to C. no. 6, p. 98.

On page 33 we described *Helix sulphurea* as 'perhaps a young shell.' This opinion was founded on its papyraceous appearance. Mr. Chitty, from whom the original specimens were received, has recently furnished a series, which shows that this shell, with all the generic characters of *Helix*, is the last embryonic stage of the West Indian variety of *Dolium perdis!*

[Is *Tonna maculosa* Dillwyn.—Turner 1948, *Johnsonia* 2, p. 169.]

**swiftiana Adams Corbula**

Plate 48, figs. 1-2

1852, C. to C. no. 12, pp. 236-237.

C. t. subovoidea, solidissima, inequalvi, vix inequilaterali, postice acute rostrata; margine ventrali excurvata: albida: rugis irregularibus et striis concentricis; junioribus exilissime radiatim striatis: apicibus parvis, haud involutis: um.

bonibus perconvexis, antice subangulatis, postice acute angulatis: dentibus robustis. Long. 10' '' .4; alt. 5' '' .9; lat. 5' '' .9.

Shell subovoid, very solid, inequivalve, slightly inequilateral, acutely rostrated posteriorly, anteriorly well rounded and glo- [237] bose, with the dorsal margins nearly straight and the ventral margin well excurved: whitish: with moderately developed concentric irregular ridges and striae; with the larger valve sculptured more regularly and deeply than the other; with very minute radiating striae in the young: beaks small, not involute: umbones very convex, indistinctly angulated anteriorly, with a sharp but not very prominent angle posteriorly: teeth robust. It is the analogue of *C. nasuta*, which inhabits the Pacific coast of tropical America.

Length .41 inch; height .235 inch; breadth .235 inch.

*Station*.—Sand, in 3 or 4 fathoms water; C.B.A.!

*Habitat*.—St. Thoms; T. Bland! in sched. in Mus. Amh. [erst]. In the east part of the harbor of Kingston, Jamaica; C.B.A.! About 250 specimens were collected.

### **tenera Adams Arca**

Plate 43, figs. 1-2

1845, Proc. Boston Soc. Nat. Hist. 2, p. 9.

*A. t. albida*, subtenui, elliptica, decussata, media compressa, umbonibus planulatis, approximatis; costulis radiantibus crenulatis; striis concentricis pilearibus; dentibus paucis; hiatu minimo. Long. .8 poll.; alt. .5 poll.; lat. .4 poll.

Jamaica.

### **tenera Adams Patella**

Types lost.

1845, Proc. Boston Soc. Nat. Hist. 2, p. 8.

*P. t. tenui*, fragili, diaphana, albida, fusco-radiata, (radiis plerumque 8) maculata, vel reticulata, exile decussata, anterius et posterius convexa; margine acuto, exile pectinato. Long. .72 poll.; lat. .53 poll.; alt. .15 poll.; alt. exemp. long. .74 poll.; lat. .55 poll.; alt. .21 poll.; dec. ant.: dec. post. : : 5 : 8.

Jamaica.

### **tenuicostatus Mighels and Adams Pecten** Plate 44, fig. 9

1842, Boston Journal of Natural History 4, pp. 41-42, pl. 4, fig. 7.

*P. testa parva*, tenui, sub-equivalvi; valva superiore pler-

umque rubro-fusca, tenuicostata, costis majoribus 25 usque ad 30, totidem minoribus; auribus costulatis; valva inferiore pallide rubro-fusca; extus et intus laevi.

*Shell* small, sub-orbicular, higher than long, thin, equilateral, sub-equivalve, upper valve a little more convex; with twenty-five to thirty slender ribs and smaller ones intermediate; for the most part reddish-brown; inferior valve smooth, paler than the upper; ears slightly unequal, those of the upper valve delicately ribbed, of the other smooth; color internally the same as externally; inner surface of the lower valve smooth, that of the upper grooved.

Length, .5 inch; height, .56 inch; width, .14 inch.

*Cabinets* of Mons. Largillier, J. W. Mighels, and C. B. Adams.

*Habitat.* Casco Bay, taken from stomachs of haddock in the summer of 1840. We have found but four specimens.

[42] **REMARKS.** This is unquestionably a very rare species. It does not appear to be very nearly allied to any of the other species found on our coast. Further research will be necessary to determine whether or not the specimens already found are mature. Like most of the *Pectens*, this shell varies very much in coloring.

### **terebellum** Adams **Cerithium**

Plate 37, figs. 5-7

1847, Catalogue of the Genera and Species of Recent Shells in the collection of C. B. Adams, p. 19.

Syn. *C. terebrale* Ad.; this name having been pre-occupied by Lamarck for a fossil shell, I propose as a substitute, *C. terebellum*.

### **terebrale** Adams **Cerithium**

Plate 37, figs. 5-7

1840, Boston Journal of Natural History 3, pp. 320-321, pl. 3, fig. 7.

*C. testa parva, elongata, fusca, saepe albo-cincta; anfractibus duodecim, planulatis, cum quatuor elevatis lineis; spira elevata, conica; sutura subimpressa; apertura ovata, parva.*

Syn. *C. Emersonii*, var. nov.

Shell small, elongated, brown, frequently with a white band, with rather slight incremental striae; whorls eleven or twelve, flattened; spire seven-eighths of the length of the shell, five-sixths of its bulk, its opposite sides containing an

angle of about  $20^\circ$ , conic, with four elevated, obtuse, revolving lines on each whorl, of which the first and second, and third and fourth are equidistant; the space between the second and third is obviously less on the upper whorls, but approaches to an equality with the other spaces, in the growth of the shell; the first three ridges are equal, and the fourth small and depressed, [321] so as to lie almost wholly beneath the first of the succeeding whorl; the suture consequently appears on the upper side of the first ridge, and is moderately impressed; spaces between the ridges crossed by more or less elevated irregular lines, or coarse striae of growth; last whorl on the upper half, sculptured as the spiral whorls, with a fifth smaller revolving line on the lower part; aperture ovate, one-eighth of the length of the shell, the line of its length making an angle of about  $25^\circ$  with the axis of the shell; labrum thin; canal rather more than a third as long as the aperture, turning to the left.

Length, .46 inch; width, .13 inch.

Cabinet of Bost. Soc. Nat. Hist., of Middlebury College, of Mr. C. F. Shiverick, and my own.

Station. In soft mud, below low water mark.

Habitat. New Bedford and the vicinity.

Remarks. This species was at first regarded as a variety of *C. Emersonii*, but the subsequent examination of numerous specimens has satisfied me that the distinctive characters are constant. It differs from that shell in having a large elevated ridge in place of the carina on the upper part of the whorls, and in having three equal ridges in the upper whorls of the spire. The entire want of granulations distinguishes it from the common type of that species. It is distinguished from the *Murex tubercularis* of Montagu by the same character. The latter is said to have but three revolving ridges, and is also of much less size than our shell. A number of dead specimens have been obtained by dredging, and Mr. Shiverick has found a few in a fresh condition.

[Name changed to *Cerithium terebellum* C. B. Adams, *non C. terebrale* Lamarck.]

**tervaricosa Adams Rissoa**

Plate 34, fig. 3

1845, Proc. Boston Soc. Nat. Hist. 2, p. 6.



*R. t. tenui*, diaphana, albida, interdum pallide fusco exilissime tessellata; sutura profunda; anf. 9, convexis, singulatim ter-varicosis, varicibus candidissimus, in seriebus tribus continuis, et striis exilissimis distantibus decurrentibus—ornatis. Div.  $23^{\circ}$ ; spirae long. .17 poll.; long. tot. .225 poll.; lat. .08 poll.

Jamaica.

[*Rissoa tervaricosa* C. B. Ad., is syn. with *R. melanura* C. B. Ad., and *Eulima incerta* d'Orb.—Krebs 1866, p. 397.]

**tessellata Adams Phasianella\***

Plate 36, fig. 12

1850, C. to C. no. 4, pp. 67–68.

Shell ovate conic: with fine rather distant parallel spiral lines of brown, which descend more rapidly than the whorls; with transverse irregular flames of olive brown or red, which have white shadows on the left side, and which form with [68] the spiral lines a rather irregularly tessellated arrangement of colors: surface very glossy: apex subacute: spire with slightly convex outlines: whorls four, moderately convex, with a well impressed suture; last whorl abruptly rounded or subangular: aperture ovate-elliptical: with a small umbilicus. A variety from some other West Indian island is of a nearly olive brown, but without any difference in the spiral lines of dark brown, which do not appear to be subject to the variability of coloring which is so common in this genus.

Mean divergence about  $68^{\circ}$ ; length of spire .11 inch; total length .2 inch; breadth .15 inch.

Jamaica.

**Thetis Adams**

1845, Proc. Boston Soc. Nat. Hist. 2, p. 9.

*G. t. Astarte* affini, sed dente laterali remota anteriore in

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\*This name of Adams is both a synonym and homonym of *Phasianella tessellata* 'Beck' Potiez and Michaud as well as a similar name by Anton. References are as follows:

*Phasianella tessellata* 'Beck' Potiez and Michaud 1838, Galerie des Mollusques, p. 312, pl. 29, figs. 7–8 (Martinique [Lesser Antilles]).

*Phasianella tessellata* Anton 1839, Verzeichniss der Conchylien, p. 61 (South America).

utraque valva—instructa; pallii impressione vix vel haud sinuata.

**tincta Adams Vitrinella**

Plate 35, figs. 3, 6

1850, Monograph of Vitrinella, p. 8.

V. t. subdiscoidea: alba, anfractum ultimum rubro tincta, striis plurimis et carinis duobus parvis cincta: apice obtusa; spira convexa; anfractibus tribus, valde accrescentibus, sutura impressa: umbilico profundo.

Globose discoidal: white, translucent, with strains of reddish purple on the last whorl: with numerous spiral striae, and two small distant revolving carinae on either side of the periphery of the last whorl: apex obtuse: spire convex, but little elevated: whorls three, rapidly increasing from the first, with a well impressed suture; last whorl somewhat concave beneath the lower carina: aperture scarcely modified by the last whorl: umbilicus deep, not very wide. Mean divergence about  $135^{\circ}$ ; length of spire .015 inch; total length .035 inch; greatest breadth .055 inch; least breadth .045 inch.

Port Royal, Jamaica.

[This species is represented by two specimens. The type (fig. 6) is badly broken, but has the surface somewhat better preserved, showing pale brownish vinaceous radial clouds on the upper surface of the last whorl, which is minutely striate spirally. The base also has very minute spiral striation. The shape is depressed subglobose, with low convex spire. Whorls about  $2\frac{3}{4}$  to 3, joined by a distinctly impressed suture. The periphery is flattened and obtusely biangular. The base has a median angle.

In the second specimen (fig. 3) the "strains of reddish purple" mentioned by Professor Adams are not visible on the white surface, which is dull and beachworn, showing spiral striation only where protected, in the umbilical concavity. The peristome is thin, and in this shell irregularly broken. The columella is reflexed, with a median point at the termination of a strong but narrow spiral cord which contracts the umbilicus. The parietal callus is very thin. Diameter 1.1 mm., height 0.7 mm.

The reflection of the columella is somewhat exaggerated by reason of the broken outer lip, and consequent rolling of the

shell towards the left, in order to show the full width of the aperture.

The most remarkable feature of the type specimen of this species is the color, which suggests *Omphalius* of the *fasciatus* group, which is also somewhat similar in structure of columella and umbilicus. I have not been able to compare young *Omphalius* nearly as small as *V. tincta*, but the smallest seen do not have the carinate base or such minute striation as *V. tincta*, and the apical whorl seems larger, though it is not perfect in those compared. Moreover, *V. tincta* does not appear to be pearly within. The color variegation is elsewhere unknown in Vitrinellidae, I believe.—Pilsbry 1946, p. 4.]

**trilineata** Adams **Pleurotoma**

Plate 29, fig. 15

Plate 49, fig. 5

1845, Proc. Boston Soc. Nat. Hist. 2, p. 3.

*P. t. minima*, alba, lineis tribus pallide fuscis fasciata; anf.  $6\frac{1}{2}$ , subangulatis, lineis pluribus elevatis decurrentibus, et costulis longitudinalibus—instructis; labro crasso; sinu profundo; canali brevissimo. Div.  $25^\circ$ ; spirae long. .1 poll.; long. .185 poll.; lat. .075 poll.

Jamaica.

**truncata** Mighels and Adams **Thracia**

Plate 43, figs. 5-7

1842, Boston Journal of Natural History 4, p. 38, pl. 4, fig. 1.

T. testa parva, solida, per-inequilaterali, postice truncata, et striata: callo nymphali producto.

*Shell* small, white, rather solid, abruptly truncate posteriorly, very inequilateral; surface with three regions; the anterior region separated from the posterior by an umbonial angle, which extends from the beak to the lower extremity, marked with numerous minute incremental striae; posterior region with the incremental striae distinct and much crowded; areolar region narrow, with regular striae of growth; epidermis thin, of a pale straw-color; beaks small, that of the right side moderately excavated for the reception of the left; posterior dorsal margin straight, descending abruptly to an angle with the anterior, which is also straight, making an angle with the inferior, which is moderately curved: anterior margin regularly rounded; anterior dorsal margin slightly curved; ligament rather large and prominent; interi-

or of a clear white; nymphaeal callosity not spoon-shaped, produced; pallial impression deeper than wide.

Average length, .75 inch; height, .5 inch; width, .29 inch.

*Cabinets of Bost. Soc. Nat. Hist.*, J. W. Mighels, and C. B. Adams.

*Habitat.* Casco Bay, Me., obtained in 1840, from stomachs of haddock.

REMARKS. Although this shell is small, its solidity, quite unusual in the genus, forbids the supposition that it is immature. It is remarkably distinct from other species in the disparity of the anterior and posterior sides, whose length are as eight to three. It must be regarded as exceedingly rare, three or four years exploration having developed only four or five specimens.

### **variabile Adams Cerithium**

Plate 37, fig. 2

1845, Proc. Boston Soc. Nat. Hist. 2, p. 5.

*C. t. parva, solida, nigra, irregulariter albo-maculata; sutura profunda; anf. 9, convexis, striatis, striis creberrimis decurrentibus; spirae anf. plicis 4 angustis decurrentibus, et plicis longitudinalibus, intersectionibus nodiferis—constructis; labro intus incrassato et crenato; labio supra uniplicato; canali brevi. Div. 30°; spirae long. .34 poll.; long. tot. 51 poll.; lat. .2 poll.*

Jamaica.

[*Cerithium variabile* C. B. Ad. We take this to be syn. with *C. minimum* Gmel. and *C. zonale* Brug., perhaps also with *C. septemstriatum* Say, *C. ferrugineum* Say, *C. megasoma* C. B. Ad., and *C. nigrescens* Menke.—Krebs 1866, p. 394.]

### **varicosa Mighels and Adams Margarita**

Plate 36, fig. 8

1842, Boston Journal of Natural History 4, p. 46, pl. 4, fig. 14.

*M. testa parva, tenui, conica; anfractibus quatuor, convexis; longitudinaliter costulatis, transverse striatis; sutura sub-canaliculata; umbilico magno, profundo.*

*Shell* small, thin, low, conical, of a dingy white or drab color; whorls four, convex, covered with numerous longitudinal, oblique ribs, intersected by a great number of transverse, revolving striae, which are most conspicuous on the lower part and base of the lower whorl. The striae on the

upper part of the whorls can only be seen with a magnifier. Suture distinct, sub-canaliculate; umbilicus rather large and deep, bounded by two rather rugged varices, intersected by the ribs which are continued to the verge of the umbilicus; aperture circular; labrum simple, sharp; within perlaceous.

Height, .25 inch; diameter of base equal to the height; divergence, 90 degrees.

*Habitat.* Bay Chaleur; taken from the stomach of a cod-fish, (*Morrhua americana* Storer) in the summer of 1841, by our fisherman, Mr. Foster.

REMARKS. Only a single specimen of the above dimensions has been obtained, and one other, much smaller and somewhat worn. It is easily distinguished from all its congeners by the longitudinal, oblique ribs, and the two varices at the base. It is in the cabinet of J. W. Mighels.

### **versicolor** *Adams Cerithium*

Plate 37, fig. 1

1850, C. to C. no. 7, p. 119.

Shell ovate conic, turritid: usually mottled irregularly with reddish black and white, white prevailing on the varices and on the upper whorls, and the black on the lower whorls and especially on the granules; sometimes mostly white; sometimes mostly black: with numerous transverse ridges, which are prominent on the upper whorls; with, on most of the whorls, three spiral ridges, the intersections being developed into very prominent subacute nodules; and a fourth smaller spiral ridge in the suture of the last whorl; with intermediate spiral striae; anteriorly with four additional smaller less strongly nodulous spiral ridges and intermediary striae; with rather less than two irregular varices to each whorl; apex very acute: spire with the outlines slightly curvilinear: whorls ten or eleven, a little convex, with a well impressed suture: aperture subovate, rather acuminate at both extremities: labrum rather sharp, very much thickened both externally and internally a little behind the edge, deeply striated within: labium with a small callus on the upper part: canal very short, rather wide, much deflected to the left.

Mean divergence about  $26^{\circ}$ ; length of spire .42 inch; total length .57 inch; breadth .2 inch.

Jamaica.

**vicina Adams Mangelia**

Plate 31, fig. 13

1850, C. to C. no. 4, pp. 66-67.

Shell fusiform, moderately elongated: dull brownish red, white along the upper part of the whorls and anteriorly: [67] with strong transverse ribs, smooth on the summits, about ten on each whorl; with unequal spiral microscopic striae: apex acute: spire with rather convex outlines: whorls about six, moderately convex, with a distinct suture: aperture rather narrow: labrum well thickened by the last rib: sinus rather large: canal very short. Similar to *M. brevis*.

Mean divergence about  $40^\circ$ ; length of spire .1 inch; total length .17 inch; breadth .08 inch.

Jamaica.

[*Mangelia vicina* C. B. Ad., very likely is *Pleurotoma badia* Rv.—Krebs 1866, p. 396.]

**vicinum Adams Cerithium**

Plate 37, fig. 10

1850, C. to C. no. 7, p. 122.

Shell similar to *C. rugulosum*, but in place of the spiral lines are spiral ridges, and in place of the transverse ridges are slender transverse elevated lines, the proportion of size being reversed; whorls about eight or nine; the canal is a little more developed.

Mean divergence about  $11^\circ$ ; length of spire .09 inch; total length .12 inch; breadth .04 inch.

Jamaica.

[*Cerithium vicinum* C. B. Ad., and *C. rugulosum* C. B. Ad., we take to be synonymes.—Krebs 1866, p. 394.]

**violacea Mighels and Adams Pleurotoma** Plate 31, figs. 4-6

1842, Boston Journal of Natural History 4, p. 51, pl. 4, fig. 21.

P. testa atro-purpurea, longitudinaliter sub-plicata, transverse striate; anfractibus sex, ultimo supra carinato, plicis in medio evanescentibus, alteris medio carinatis; spira acuta; apertura angustata; cauda brevi.

Shell small, of a blackish purple color, ovate, with a pale brown epidermis irregularly sub-plicate, with numerous faint revolving striae decussating by the incremental striae; whorls six; whorls of the spire carinate in the middle; last

whorl shouldered by a continuation of the same carina, with the plications terminating on its convexity; spire acute, conic; suture distinct; aperture narrow, rather less than half the length of the shell; labrum simple, sharp, regularly curved, with the sinus at the extremity; canal short, wide.

Length .3 inch; breadth .15 inch; divergence  $40^{\circ}$ .

*Cabinets* of Bost. Soc. Nat. Hist., G. B. Sowerby, J. W. Mighels, and C. B. Adams.

*Habitat.* Casco Bay; found without the animal, at low-water mark, in the summer of 1840, and subsequently in the stomachs of *haddock*.

REMARKS. This species is remotely allied to *P. decussata* Couth.; our shell, however, is always longer, aperture narrower, and the sculpture less regular and distinct; but it is especially characterized by having the spiral carina far below the suture.

### **vitrea** *Adams* **Rissoa**

Plate 33, fig. 1

1850, C. to C. no. 7, p. 115.

Shell ovate conic, turritid: with a scarcely perceptible bluish tinge, opaque white at the suture and in the thickening around the aperture; in the rest *transparent as glass*, and clearly exhibiting the internal structure: highly polished, with some scarcely perceptible microscopic striae of growth, and a fine impressed spiral line very near and next below the suture: apex very acute: spire with the outlines moderately curvilinear: whorls nearly ten, slightly convex, with a distinct but moderately impressed suture: aperture very effuse and angular anteriorly: labrum very much excurved and advanced, moderately thickened.

Mean divergence  $26^{\circ}$ ; length of spire .19 inch; total length .29 inch; breadth .105 inch.

Jamaica.

[Is a *Rissoina*--M. Desjardin 1949, *Jour. de Conch.* **89**, p. 207.]

### **Vitrinella** *Adams*

1850, Monograph of *Vitrinella*, pp. 3-4.

Testa turbiniformi, minima, vitrea; apertura maxima, orbiculari, subtus valde indentata, vel umbilicata.

Shell turbiniform, vitreous, minute, with a large orbicular aperture, either umbilicated or with the umbilical region deeply and widely indented.

The form of the aperture would place these shells in *Turbo* or *Margarita*. The want of an umbilicus excludes three of the species from the latter. The operculum is unknown; but as it is extremely improbable that thin vitreous almost transparent shells should have solid calcareous opercula, we may assume it to be horny, which will exclude the species from *Turbo*, regarding this genus as best characterized by the operculum. The most widely umbilicated species approximates in form to *Skenea*, and might be mistaken for a depressed umbilicated species of *Helix*. In texture, the nearest approach among the kindred genera is in *Margarita arctica* Leach. From all the Turbinidae known to us, they are however well distinguished by their vitreous texture and rapid enlargement of the whorls, which last character produces a large aperture. The variation [47] in respect of an umbilicus is parallel with the similar variation in *Turbo*. They are not the young of any larger species, for the first one or one and one-half whorls are distinguished from the following whorls by nuclear peculiarities, as want of sculpture, &c. We are acquainted with the young of all the larger species which inhabit the same localities, and none of them resemble these shells.

Most of the specimens were obtained from a pint of sand, which contained 110 species of shells, and which was taken from a surface of three or four square yards of sand beach in a little cove near Port Royal, Jamaica, on the outside of the peninsula. A few were found on the inside of the peninsula. Of *V. megastoma* and *V. interrupta* we obtained several specimens: of the other species,—one to four of each. Probably all the species are rare.

[Genotype, *Vitrinella helicoides* Adams. Subsequent designation, K. J. Bush 1897, (Trans. Connecticut Academy **10**, p. 106).]



The following is a list of the various species described by C. B. Adams. They are grouped under the genera to which they were originally assigned. Subsequent generic changes for a few of the species are indicated in the main body of this report.

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*Amphidesma*: jayanum.

*Arca*: tenera.

*Buccinum*: candidissimum; concinnum; obesum; pulchellum.

*Bulla*: occulta; puncto-striata.

*Cardita*: ovata.

*Cemoria*: princeps.

*Cerithium*: albovittatum; algicola; ambiguum; bicolor; dealbatum; decoratum; emersonii; exiguum; exile; flavum; fusiforme; gemmulosum; gibberulum; greenii; intermedium; iota; latum; megasoma; melanura; mirabile; modestum; mutabile; nanum; nigrocinctum; pulchellum; rugulosum; servile; terebellum; terebrale; variabile; versicolor; vicinum.

*Chemnitzia*: babylonia; exilis; flavocincta; latior; levis; multicostrata; obeliscus; puncta; pusilla; reticulata; substriata; subulata.

*Chiton*: costatus; erythronotus; mendicarius; multicostratus; papillosus; purpurascens; squalidus; squamulosus.

*Cingula*: arenaria; carinata; concinna; conica; latior; semicostrata; solida.

*Columbella*: costulata; decipiens; fenestrata; ovuloides; purpurascens; pygmaea; subcostulata.

*Conus*: armillatus.

*Corbula*: barrattiana; blandiana; chittyana; dietziana; fulva; kjoeriana; knoxiana; krebsiana; newtoniana; swiftiana.

*Erato*: cypraeoides.

*Eulima*: affinis; arcuata; conica; fulvo-cincta; gracilis; jamaicensis.

*Fasciolaria*: ligata.

*Fissurella*: elongata.

*Fusus*: cancellatus; muricoides; nitens.

*Gouldia*.

*Helix*: sulphurea.

*Jaminia*: producta; seminuda.

*Lima*: pellucida.

*Litiopa*: effusa; obesa.

*Littorina*: interrupta; jamaicensis.

*Lucina*: americana; granulosa; imbricatula; ornata; pectinata; pectinella; pilula; pulchella; soror; subglobosa.

*Mactra*: bilineata.

*Mangelia*: alba; biconica; brevis; crassicostata; densestriata; lanceolata; ligata; muricoides; vicina.

*Margarita*: varicosa.

*Marginella*: abbreviata; alba; albida; fluctuata; gracilis; nivea; rubella.

*Mitra*: albicostata; albo-cincta; exigua; monilifera.

*Monodonta*: angulata; livido-maculata; maculo-striata.

*Murex*: intermedius; pauperculus.

*Narica*: anomala.

*Natica*: gouldii; jamaicensis; nigrescens; proxima.

*Nerita*: praecognita.

*Neritina*: All species, originally described by C. B. Adams in this genus will be included under land and freshwater genera of Jamaica.

*Nucula*: antiqua; cascöensis; delphinodonta.

*Odostomia*: canaliculata; gemmulosa; ovuloides; solidula.

*Patella*: albicosta; tenera.

*Pecten*: tenuicostatus.

*Pedipes*: globulosus; ovalis.

*Perna*: bicolor.

*Phasianella*: affinis; brevis; concinna; concolor; tessellata.

*Pholas*: rosea.

*Plectrotrema*: inaequalis.

*Pleurotoma*: albella; albida; albo-cincta; albo-maculata; albivittata; augustae; candidissima; decorata; diminuta; dubia; elatior; flavocincta; fusca; fuscocincta; fusco-lineata; fusiformis; jayana; maculata; minor; monilifera; multilineata; nigrescens; nodata; plicata; plicosa; pygmaea; quadrilineata; reevii; solida; trilineata; violacea.

*Psammobia*: affinis; biradiata; cerina; purpureo-maculata.

*Purpura*: aberrans; nodulosa.

*Pyramis*: fusca.

*Rissoa*: aberrans; affinis; albida; crassicosta; dubiosa; eulimoides; laevigata; laevissima; melanura; minor; multicostata; princeps; pulchra; scalarella; scalaroides; striosa; subangulata; tervaricosa; vitrea.

*Scalaria*: ligata; modesta.

*Tellina*: decussatula; nitens.

*Terebra*: jamaicensis.

*Thetis*: cerina; parva.

*Thracia*: inequalis; truncata.

*Torinia*: canalifera.

*Tornatella*: puncto-striata.

*Triton*: parvus; pulchellus.

*Trochus*: occidentalis; pulcher.

*Truncatella*: cummingii; gouldii; modesta; scalariformis; succinea.

*Turbo*: pulchellus.

*Turritella*: costulata; reticulata.

*Vitrinella*: helicoidea; hyalina; interrupta; megastoma; tinctoria.

\* \* \* \*

#### ADDENDA

After the first portion of this paper had been printed, the following paper by Max Desjardin was received. This paper was based in part upon photographs made of the C. B. Adams types. References have been made to this work throughout our report under the various species except for *Rissoa affinis* which was printed at that time.

Desjardin, Max, 1949, Les Rissoina de l'île de Cuba. *Journal de Conchyliologie* **89**, pp. 193-208, pls. 9-10.

Under *Rissoa affinis*, p. 251 add:

Is *Rissoina striatocostata* d'Orbigny—M. Desjardin 1949, *Jour. de Conch.* **89**, p. 201.

## Plate 29

- Fig. 1. *Pleurotoma flavocincta* Adams. Holotype MCZ 155917 (10x).  
Fig. 2. " *albella* Adams. Holotype MCZ 186006 (10x).  
Fig. 3. " *maculata* Adams. Lectotype MCZ 177376 (10x).  
Fig. 4. " *decorata* Adams. Lectotype MCZ 177371 (4x).  
Fig. 5. " *albocincta* Adams. Lectotype MCZ 177356 (6x).  
Fig. 6. " *albomaculata* Adams. Holotype MCZ 186024 (3x).  
Fig. 7. " *clatior* Adams. Holotype MCZ 155923 (10x).  
Fig. 8. " *solida* Adams. Lectotype MCZ 186005 (3x).  
Fig. 9. " *fusca* Adams. Holotype MCZ 177044 (10x).  
Fig. 10. " *multilineata* Adams. Holotype MCZ 177030 (10x).  
Fig. 11. " *nigrescens* Adams. Lectotype MCZ 177354 (6x).  
Fig. 12. " *quadrilineata* Adams. Lectotype MCZ 186007 (10x).  
Fig. 13. " *pygmaea* Adams. Holotype MCZ 155918 (10x).  
Fig. 14. " *nodata* Adams. Holotype MCZ 186004 (6x).  
Fig. 15. " *trilineata* Adams. Lectotype MCZ 177361 (10x). (See also  
Plate 49, fig. 5.)

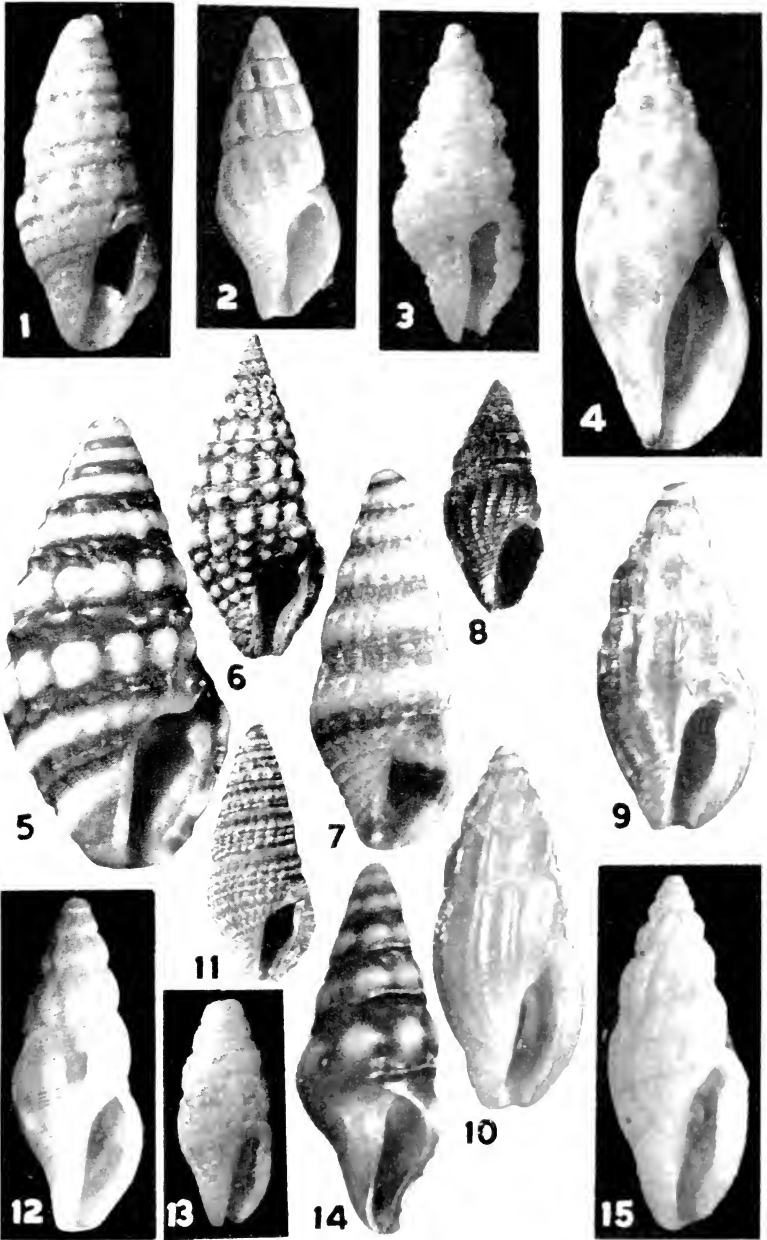


Plate 20

## Plate 30

- Fig. 1. *Pleurotoma augustae* Adams. Holotype MCZ 177375 (4x).  
Fig. 2. " *albida* Adams. Holotype MCZ 177360 (10x).  
Fig. 3. " *albovittata* Adams. Holotype MCZ 177358 (10x).  
Fig. 4. " *jayana* Adams. Holotype MCZ 156157 (4x).  
Fig. 5. " *candidissima* Adams. Holotype MCZ 186002 (10½x).  
Fig. 6. " *fuscocincta* Adams. Holotype MCZ 155958 (10x).  
Fig. 7-8. " *fusiformis* Adams. Holotype MCZ 177379 (Fig. 7, 8x; Fig. 8, about 10x).

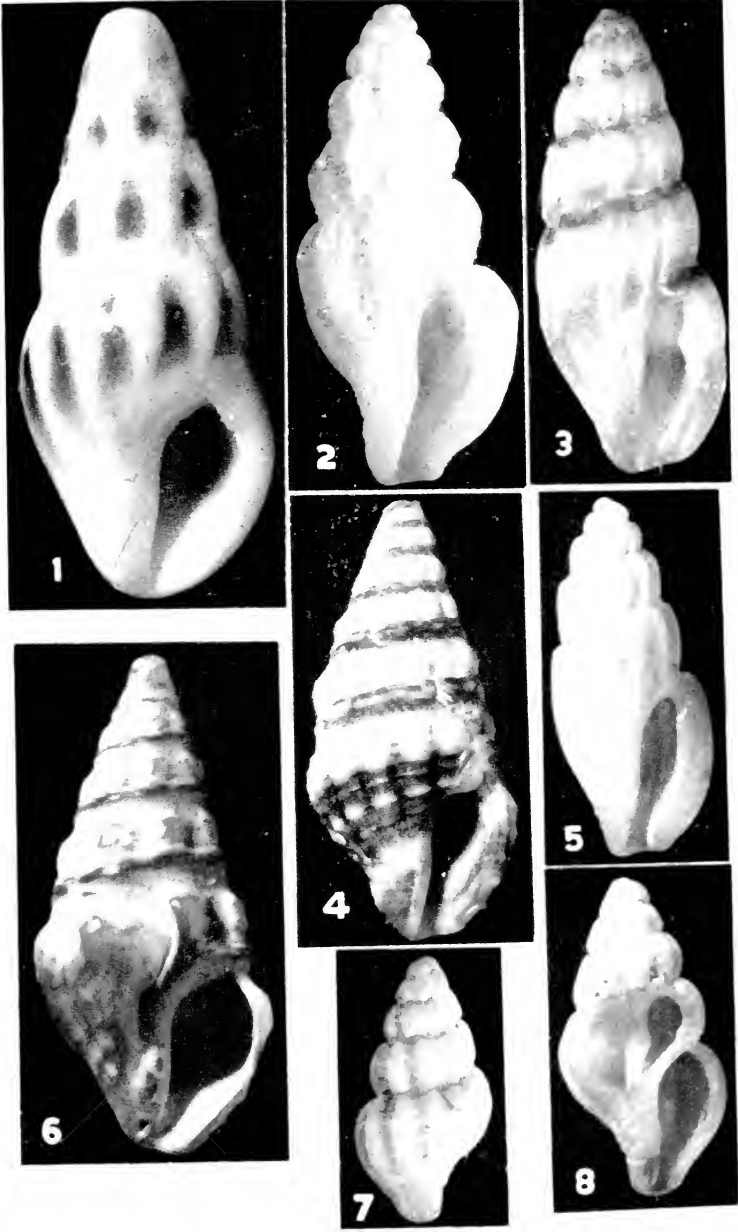


Plate 30

## Plate 31

- Fig. 1. *Pleurotoma plicata* Adams (= *P. plicosa* Adams). Lectotype MCZ 155921 (about 6x). (See also Plate 32, fig. 5-6.)
- Fig. 2. *Pleurotoma dubia* Adams. Lectotype MCZ 177031 (about 6x).
- Fig. 3. " *diminuta* Adams. Lectotype MCZ 186148 (about 6x).
- Fig. 4. " *violacea* Mighels and Adams. Lectotype MCZ 165594 (about 4x).
- Fig. 5-6. *Pleurotoma violacea* Mighels and Adams (enlarged from original figures).
- Fig. 7. *Pleurotoma minor* Adams. Lectotype MCZ 186122 (about 10x).
- Fig. 8. *Mangelia densestriata* Adams. Holotype MCZ 177027 (10x).
- Fig. 9. " *lanceolata* Adams. Lectotype MCZ 177380 (10x).
- Fig. 10. *Conus armillatus* Adams. Holotype MCZ 154005 (2x).
- Fig. 11. *Mangelia muricoides* Adams. Holotype MCZ 177378 (10x).
- Fig. 12. " *crassicostata* Adams. Holotype MCZ 155933 (10x).
- Fig. 13. " *vicina* Adams. Lectotype MCZ 177374 (10x).
- Fig. 14. " *brevis* Adams. Lectotype MCZ 155934 (10x).



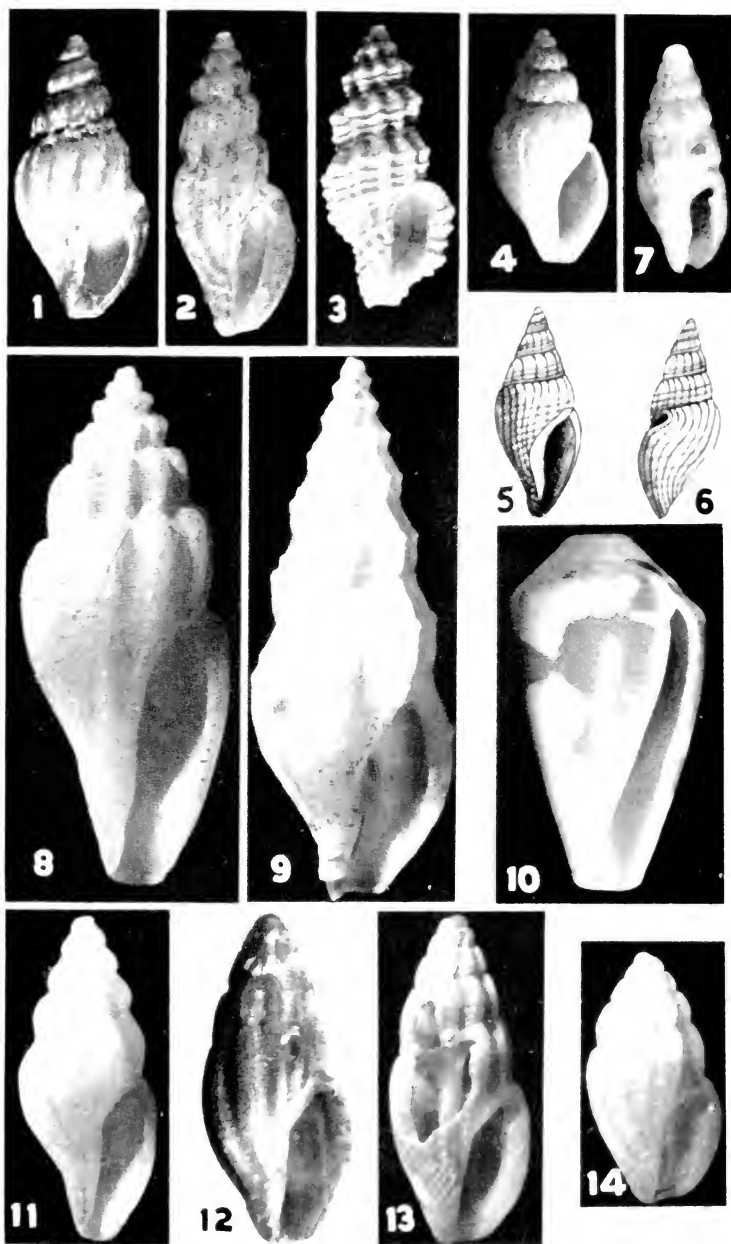


Plate 31

## Plate 32

- Fig. 1. *Mangelia biconica alba* Adams. Lectotype MCZ 186008 (10x).  
Fig. 2. " *biconica* Adams. Lectotype MCZ 177377 (10x).  
Fig. 3. *Marginella fluctuata* Adams. Holotype MCZ 186047 (10x).  
Fig. 4. " *rubella* Adams. Lectotype MCZ 186143 (3x).  
Fig. 5-6. *Pleurotoma plicata* Adams (enlarged from original figures). (See also Plate 31, fig. 1)  
Fig. 7. *Marginella alba* Adams. Lectotype MCZ 186032 (10x).  
Fig. 8. " *abbreviata* Adams. Holotype MCZ 186003 (6x).  
Fig. 9. *Purpura aberrans* Adams. Holotype MCZ 177956 (3x).  
Fig. 10. " *nodulosa* Adams. Lectotype MCZ 177045 (2 $\frac{2}{3}$ x).  
Fig. 11. *Buccinum obesum* Adams. Lectotype MCZ 156016 (7x).  
Fig. 12. " *pulchellum* Adams. Holotype MCZ 186110 (about 10x).  
Fig. 13. *Marginella nivea* Adams. Lectotype MCZ 186053 (4x).  
Fig. 14. " *gracilis* Adams. Lectotype MCZ 186119 (about 10x).  
Fig. 15. *Bulla occulta* Mighels and Adams. Lectotype MCZ 156452 (enlarged from original figures). \*  
Fig. 16. *Buccinum concinnum* Adams. Lectotype MCZ 186112 (4x).  
Fig. 17. *Bulla punctostriata* Mighels and Adams. Neoholotype MCZ 177003 (3x).  
Fig. 18. *Bulla punctostriata* Mighels and Adams (enlarged from original figures).

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\* This was given in error as fig. 13 in the text.

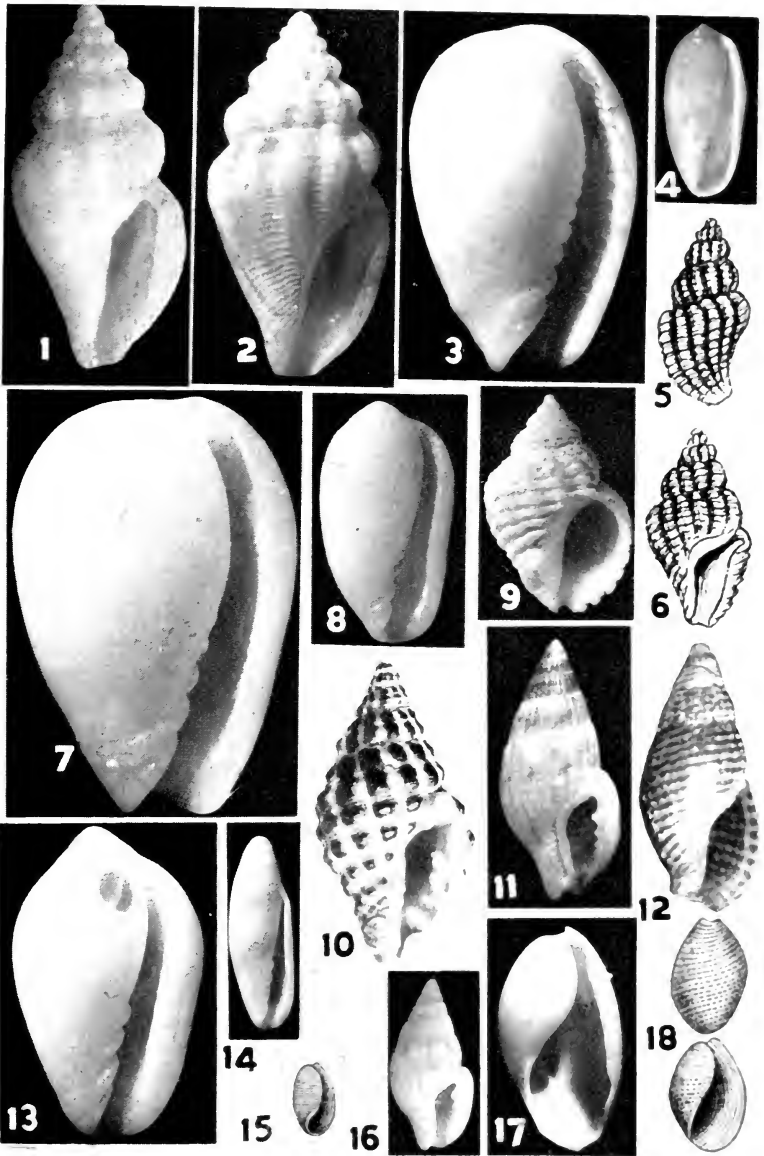


Plate 32

## Plate 33

- Fig. 1. *Rissoa vitrea* Adams. Holotype MCZ 156418 (15x).  
Fig. 2. " (?) *melanura* Adams. Holotype MCZ 156424 (10x).  
Fig. 3. " *scalarella* Adams. Lectotype MCZ 177102 (17x).  
Fig. 4. " *multicostata* Adams. Lectotype MCZ 177098 (10x).  
Fig. 5. " *dubiosa* Adams. Lectotype MCZ 177097 (10x).  
Fig. 6. " *scalaroides* Adams. Lectotype MCZ 177103 (10x).  
Fig. 7. " *laevissima* Adams. Lectotype MCZ 177094 (10x).  
Fig. 8. " *pulchra* Adams. Holotype MCZ 156423 (10x).  
Fig. 9. " *eulimoides* Adams. Holotype MCZ 156416 (10x).  
Fig. 10. " *aberrans* Adams. Holotype MCZ 156426 (10x).  
Fig. 11. *Erato* (?) *cypraeoides* Adams. Lectotype MCZ 186065 (4x).

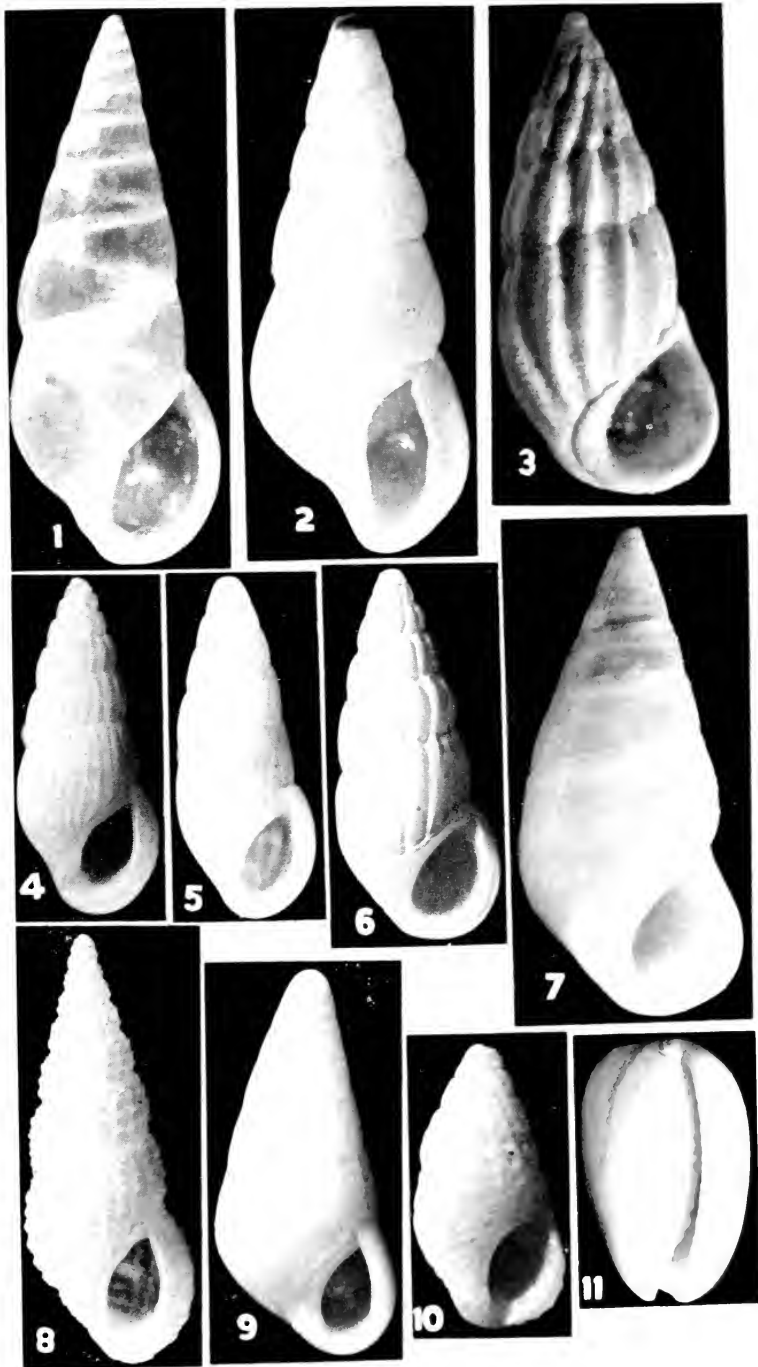


Plate 33

## Plate 34

- Fig. 1. *Rissoa princeps* Adams. Lectotype MCZ 177093 (10x).  
Fig. 2. " *albida* Adams. Lectotype MCZ 177099 (10x).  
Fig. 3. " *tervaricosa* Adams. Lectotype MCZ 177096 (10x).  
Fig. 4. " *scalaroides minor* Adams. Holotype MCZ 156425 (about  $8\frac{1}{2}$ x).  
Fig. 5. " *affinis* Adams. Holotype MCZ 156411 (10x).  
Fig. 6. " *crassicosta* Adams. Lectotype MCZ 186174 (about 4x).  
Fig. 7. " *laevigata* Adams. Holotype MCZ 156414 (10x).  
Fig. 8. " *striosa* Adams. Lectotype MCZ 156431 (10x).  
Fig. 9. " *subangulata* Adams. Lectotype MCZ 177095 (10x).

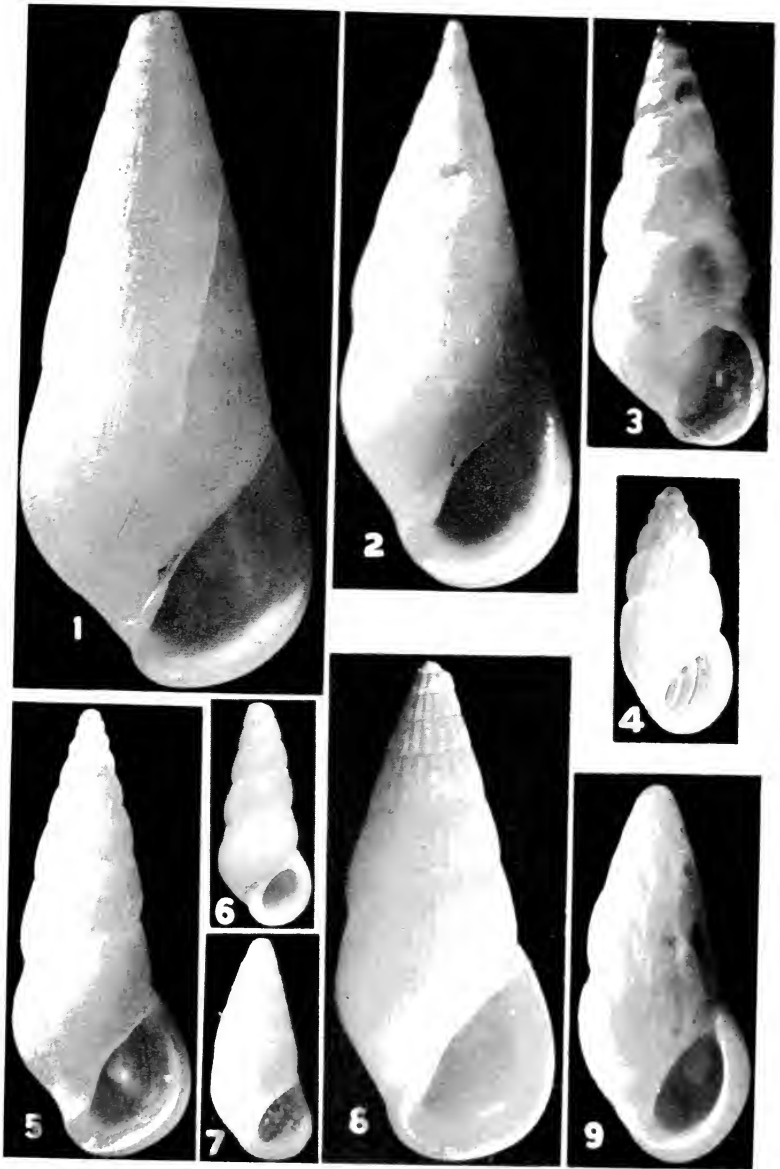


Plate 34

## Plate 35

- Fig. 1. *Vitrinella helicoidea* Adams. Lectotype MCZ 156271 (17½x).  
Fig. 2. " *megastoma* Adams. Lectotype MCZ 156269 (21x).  
Fig. 3, 6. " *tincta* Adams. Lectotype MCZ 156257 (25½x).  
Fig. 4, 5. " *interrupta* Adams. Holotype MCZ 156270 (25x).

We are indebted to Dr. H. A. Pilsbry for the loan of this plate. It appeared originally in *Notulae Naturae*, no. 162, January 18, 1946.



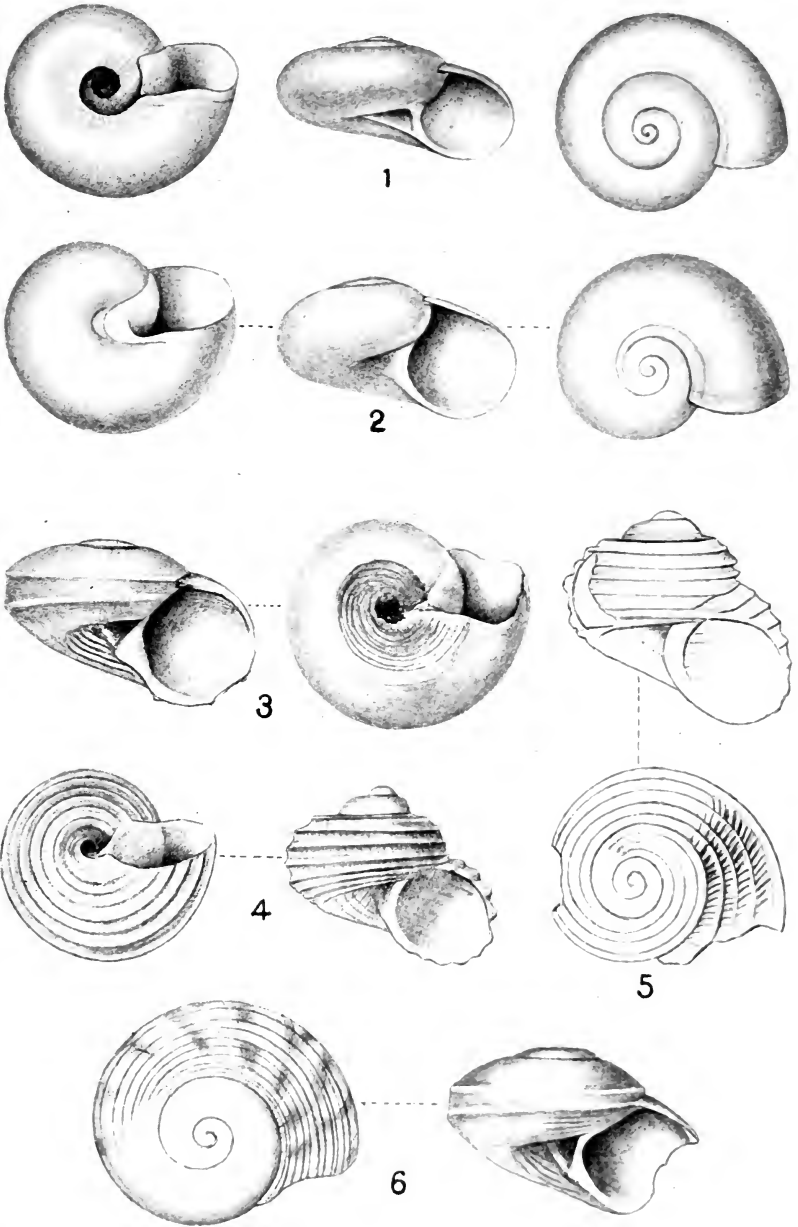


Plate 35

## Plate 36

- Fig. 1. *Patella albicosta* Adams. Lectotype MCZ 186033 (about 3x).  
Fig. 2. " *albicosta* Adams. Paratype MCZ 156462 (about 3x).  
Fig. 3. *Phasianella concolor* Adams. Lectotype MCZ 186022 (15x).  
Fig. 4. " *concinna* Adams. Lectotype USNM 54766 (4x).  
Fig. 5. *Eulima jamaicensis* Adams. Lectotype MCZ 156355 (about 8x).  
Fig. 6. *Phasianella affinis* Adams. Lectotype MCZ 186020 (8x).  
Fig. 7. *Eulima conica* Adams. Lectotype MCZ 186183 (12x).  
Fig. 8. *Margarita varicosa* Mighels and Adams. Types lost. (Enlarged from original drawing.)  
Fig. 9. *Mitra monilifera* Adams. Holotype MCZ 186093 (2½x).  
Fig. 10. " *albocincta* Adams. Holotype MCZ 177080 (3x).  
Fig. 11. " *albicostata* Adams. Holotype MCZ 177083 (3x).  
Fig. 12. *Phasianella tessellata* Adams. Lectotype MCZ 186067 (10x).

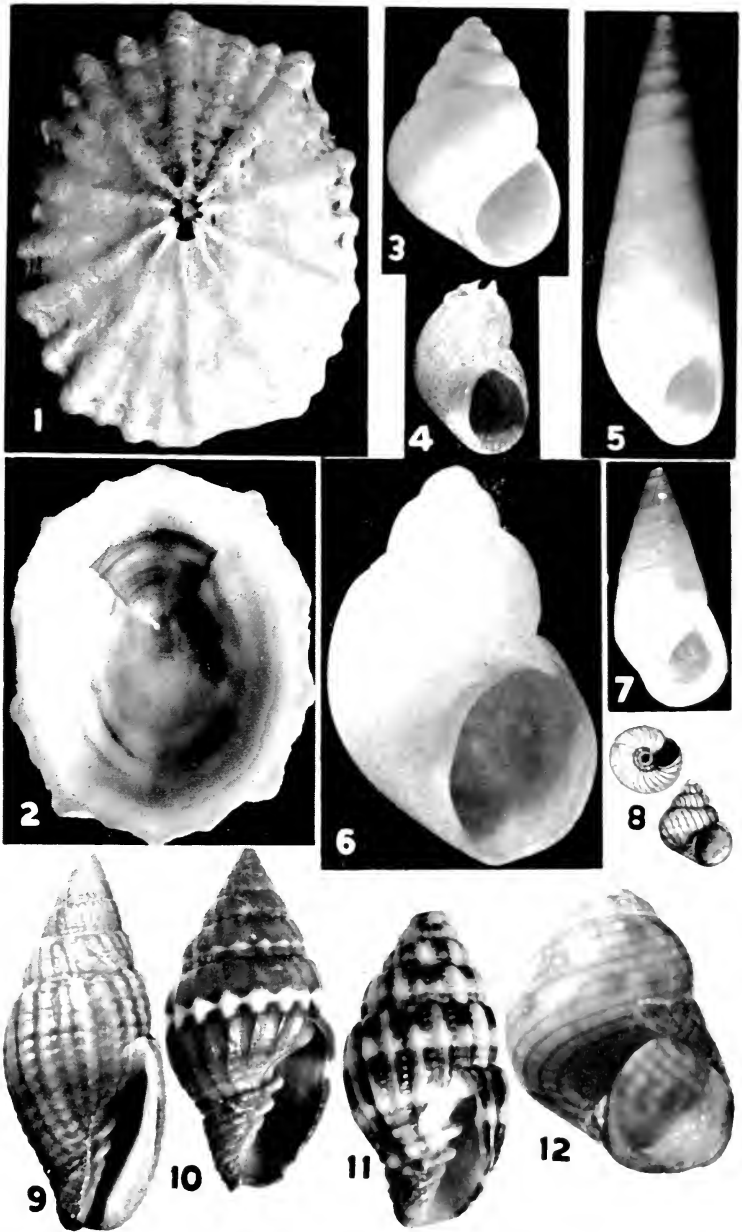


Plate 36

## Plate 37

- Fig. 1. *Cerithium versicolor* Adams. Lectotype MCZ 186054 (4x).  
 Fig. 2. " *variabile* Adams. Lectotype MCZ 186056 (4x).  
 Fig. 3. " *gibberulum* Adams. Lectotype MCZ 186078 (6x).  
 Fig. 4. " *algicola* Adams. Lectotype MCZ 186026 (3x).  
 Fig. 5. " *terebrale* Adams. Lectotype MCZ 156200 ( $2\frac{1}{2}$ x).  
 Fig. 6, 7. " " " (enlarged from original figures).  
 Fig. 8. " *mcgasoma* Adams. Lectotype MCZ 186096 ( $2\frac{1}{2}$ x).  
 Fig. 9. " *mutabile* Adams. Lectotype MCZ 186094 (3x).  
 Fig. 10. " *vicinum* Adams. Lectotype MCZ 186155 (about 3x).  
 Fig. 11. " *flavum* Adams. Holotype MCZ 186114 (about 10x).  
 Fig. 12. " *emersonii* Adams. Lectotype MCZ 156201 ( $3\frac{1}{2}$ x).  
 Fig. 13, 14. " " " (enlarged from original figures).  
 Fig. 15. " *bicolor* Adams. Lectotype MCZ 186057 (6x).  
 Fig. 16. " *iota* Adams. Lectotype MCZ 186115 (about 10x).  
 Fig. 17. " *greenii* Adams (enlarged from original figure).  
 Fig. 18. " *greenii* Adams. Lectotype MCZ 156202 (about 12x).

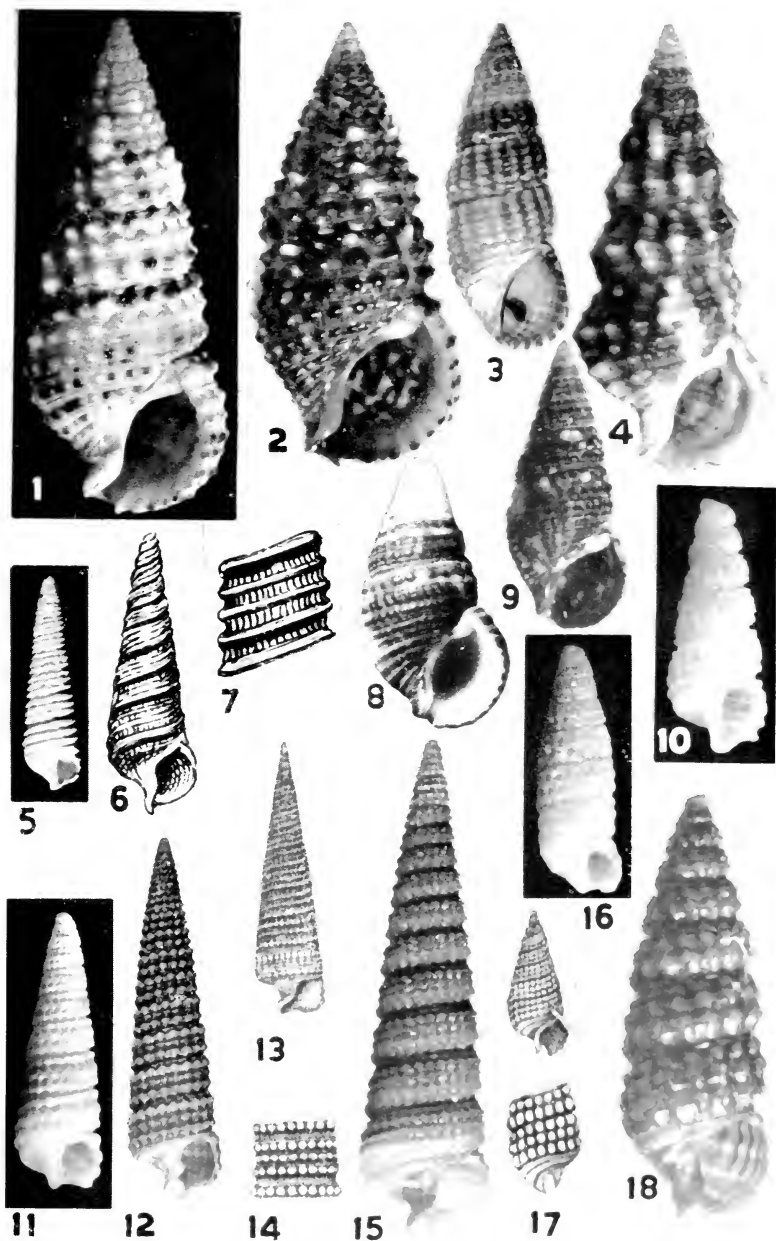


Plate 37

## Plate 38

- Fig. 1. *Cerithium mirabile* Adams. Lectotype MCZ 154353 (12x).  
 Fig. 2. " *decoratum* Adams. Lectotype MCZ 186178 (16x).  
 Fig. 3. " *dealbatum* Adams. Holotype MCZ 186179 (7x).  
 Fig. 4. " *fusifforme* Adams. Holotype MCZ 186127 (about 10x).  
 Fig. 5. " *latum* Adams. Holotype MCZ 186134 (about 10x).  
 Fig. 6. " *albovittatum* Adams. Holotype MCZ 156142 (10x).  
 Fig. 7. " *ambiguum* Adams. Lectotype MCZ 186025 (3x).  
 Fig. 8. " *exile* Adams. Holotype MCZ 177150 (10x).  
 Fig. 9. " *intermedium* Adams. Lectotype MCZ 186161 (7½x).  
 Fig. 10. " *melanura* Adams. Lectotype MCZ 186159 (7x).  
 Fig. 11. " *nigrocinctum* Adams. Lectotype MCZ 186157 (10x).  
 Fig. 12. " *intermedium* Adams. Heautotype MCZ 186162 (7½x).  
 Fig. 13. " *gemmulosum* Adams. Holotype MCZ 186075 (10x).  
 Fig. 14. " *nigrocinctum* Adams (enlarged from original figure).  
 Fig. 15. *Cemoria princeps* Mighels and Adams (enlarged from original figure).  
 Fig. 16. *Fasciolaria ligata* Mighels and Adams (enlarged from original figure).  
 Fig. 17. *Cerithium rugulosum* Adams. Lectotype MCZ 186153 (about 14x).  
 Fig. 18. *Littorina lineata* var. *interrupta* 'C. B. Adams' Philippi. Paratype  
 MCZ 186123 (about 2½x).  
 Fig. 19. *Littorina jamaicensis* Adams. Lectotype MCZ 186133 (2½x).  
 Fig. 20. *Pyramis fusca* C. B. Adams (enlarged from original figure).  
 Fig. 21. " " " " Lectotype MCZ 156006 (10x).  
 Fig. 22. *Terebra jamaicensis* C. B. Adams. Neoholotype MCZ 186151 (about  
 2½x).

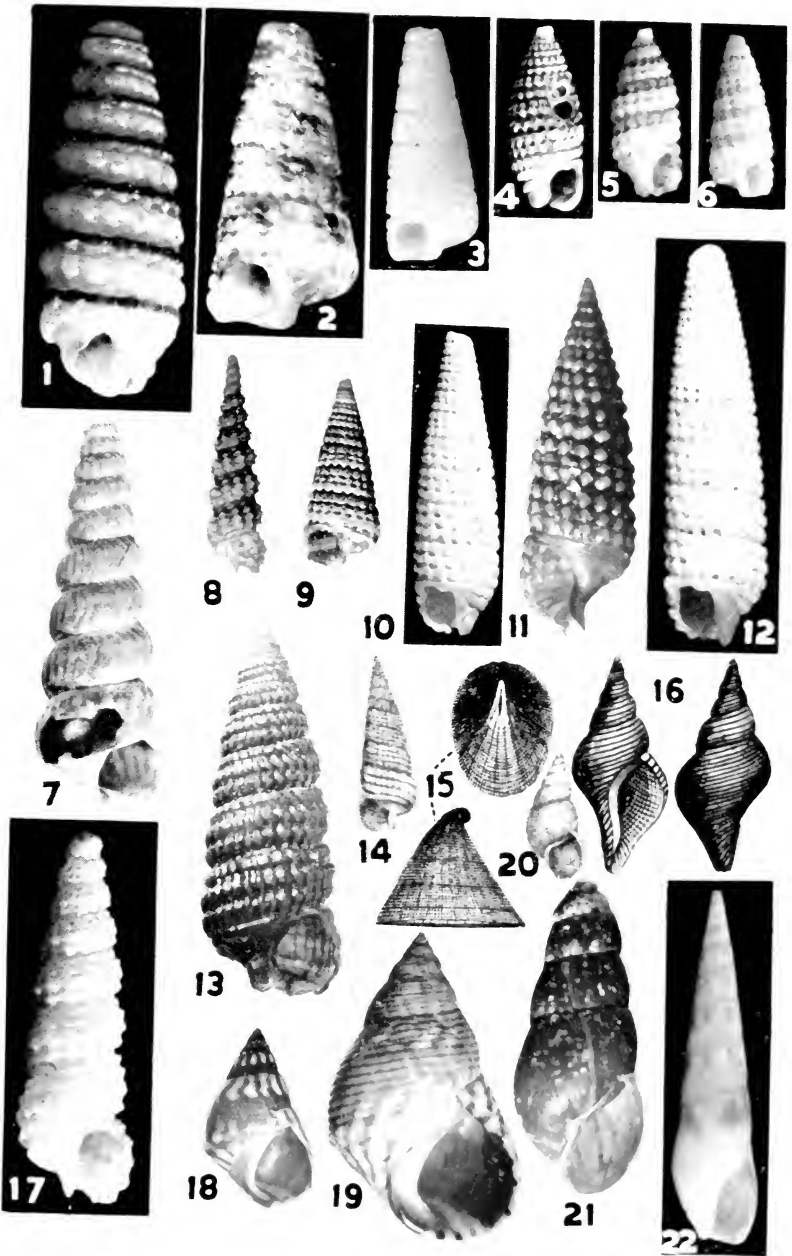


Plate 38

## Plate 39

- Fig. 1. Copy of Adams' symbol used in several descriptions.
- Fig. 2. *Cingula latior* Mighels and Adams. Type lost (enlarged from original figure).
- Fig. 3. *Cingula* (?) *solida* Adams. Holotype MCZ 186083 (15x).
- Fig. 4. " " *concinna* Adams. Lectotype MCZ 186084 (15x).
- Fig. 5. " " *conica* Adams. Holotype MCZ 186082 (15x).
- Fig. 6. " *arenaria* Adams. Type lost (enlarged from original figure).
- Fig. 7. " *semicostata* 'Montagu' Mighels and Adams. Type lost (enlarged from original figure).
- Fig. 8. *Cerithium modestum* Adams. Lectotype MCZ 186180 (13x).
- Fig. 9. *Fusus muricoides* Adams. Holotype MCZ 186092 (2½x).
- Fig. 10. " *cancellatus* Mighels and Adams. Type lost (enlarged from original figure).
- Fig. 11. *Monodonta lividomaculata* Adams. Lectotype MCZ 186061 (2x).
- Fig. 12. " *angulata* Adams. Lectotype MCZ 149300 (2½x).
- Fig. 13. " *maculostriata* Adams. Lectotype MCZ 186070 (2x).
- Fig. 14. *Narica* (?) *anomala* Adams. Lectotype MCZ 186034 (10x).
- Fig. 15. *Murex intermedius* Adams. Lectotype MCZ 156123 (about 2½x).
- Fig. 16. " *pauperculus* Adams. Lectotype MCZ 156124 (about 2½x).
- Fig. 17. *Fusus nitens* Adams. Holotype MCZ 186191 (about 2½x).
- Fig. 18. *Cingula carinata* Mighels and Adams. Lectotype MCZ 185255 (16x).



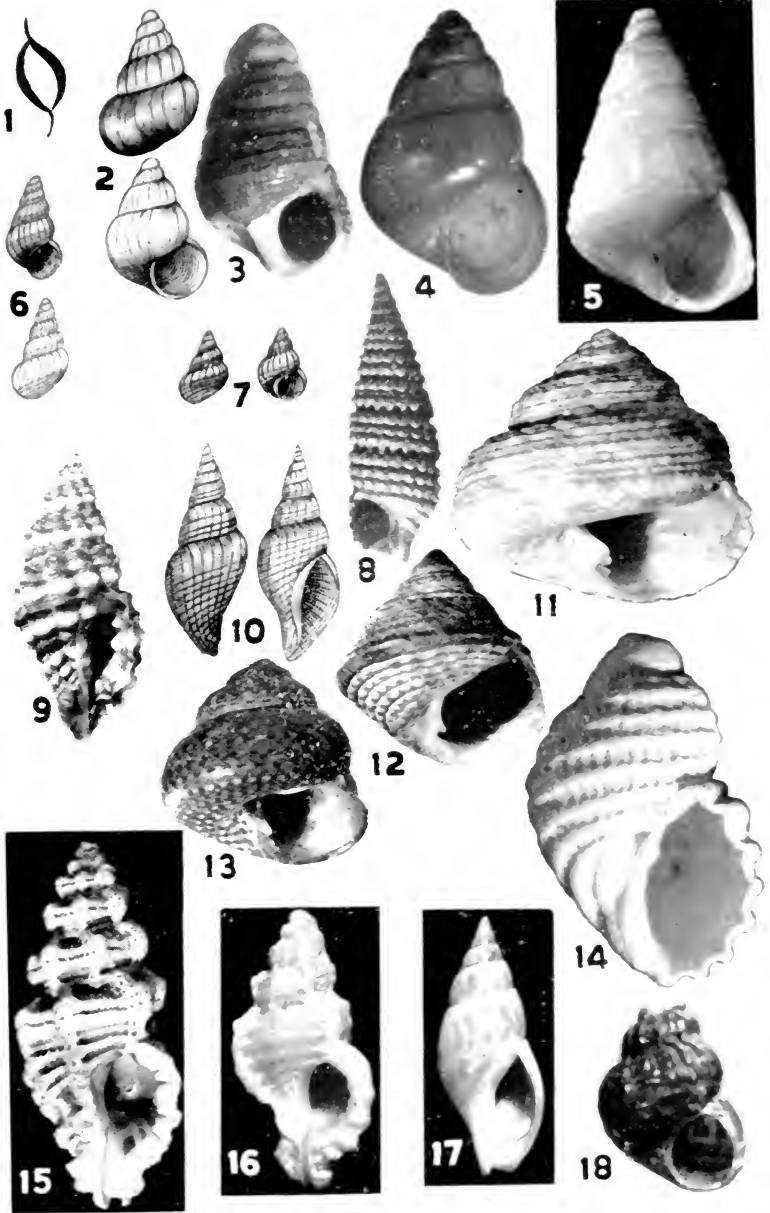


Plate 39

## Plate 40

- Fig. 1. *Odostomia gemmulosa* Adams. Lectotype MCZ 186076 (15x).  
Fig. 2. " *solidula* Adams. Lectotype MCZ 186037 (15x).  
Fig. 3. " *canaliculata* Adams. Lectotype MCZ 186101 (10x).  
Fig. 4. " *ovuloides* Adams. Lectotype MCZ 186130 (about 10x).  
Fig. 5. *Tornatella punctostriata* Adams. Holotype MCZ 155925 (7x).  
Fig. 6. " *punctostriata* Adams (enlarged from original figure).  
Fig. 7. *Trochus pulcher* Adams. Holotype MCZ 156356 (2½x).  
Fig. 8. *Triton pulchellus* Adams. Holotype MCZ 186135 (about 2½x).  
Fig. 9. *Turbo* (?) *pulchellus* Adams. Lectotype MCZ 156358 (about 10x).  
Fig. 10. *Truncatella cumingii* Adams. Lectotype MCZ 177155 (6x).  
Fig. 11. " *succinea* Adams. Lectotype MCZ 177154 (5x).  
Fig. 12. *Triton parvus* Adams. Lectotype MCZ 177283 (2½x).  
Fig. 13. *Trochus occidentalis* Mighels and Adams. Type lost (enlarged from original figure).  
Fig. 14. *Turritella reticulata* Mighels and Adams. Paratype MCZ 185254 (about 2½x).  
Fig. 15. *Turritella reticulata* Mighels and Adams (enlarged from original figure).  
Fig. 16. *Turritella costulata* Mighels and Adams (enlarged from original figure). Idiotype MCZ 165598.  
Fig. 17. *Truncatella modesta* Adams. Holotype MCZ 177152 (13x).

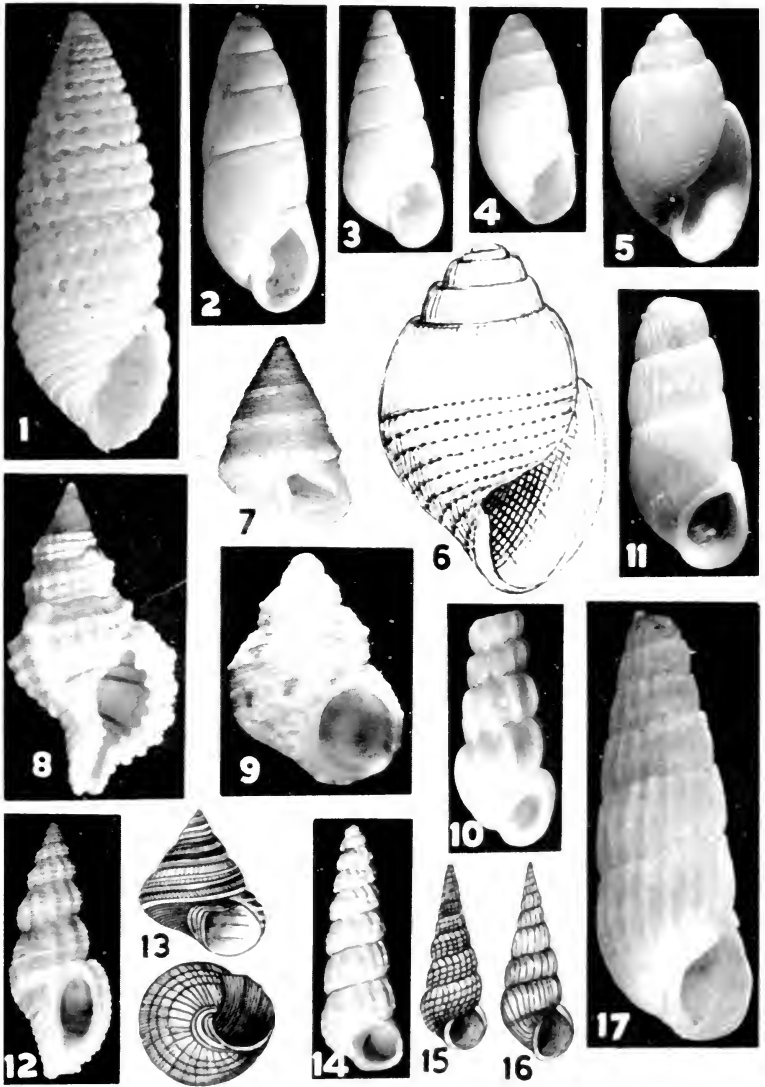


Plate 40

## Plate 41

- Fig. 1. *Columbella subcostulata* Adams. Lectotype MCZ 186039 (6x).  
Fig. 2. " *fenestrata* Adams. Holotype MCZ 186009 (7x).  
Fig. 3. " *costulata* Adams. Holotype MCZ 186108 (4x).  
Fig. 4. " *ovuloides* Adams. Lectotype MCZ 177372 (about 2½x).  
Fig. 5. *Jaminia seminuda* Adams. Lectotype MCZ 186052 (10x).  
Fig. 6. " " " (enlarged from original figure).  
Fig. 7. *Fissurella elongata* Adams. Lectotype MCZ 155533 (4x).  
Fig. 8. *Jaminia producta* Adams. Lectotype MCZ 156158 (7x).  
Fig. 9. " " " (enlarged from original figure).  
Fig. 10. *Nerita praeognita* Adams. Lectotype MCZ 186194 (slightly enlarged).  
Fig. 11. *Natica jamaicensis* Adams. Lectotype MCZ 156166 (3x).  
Fig. 12. " *gouldii* Adams. Lectotype MCZ 151080 (about 1½x).  
Fig. 13. " *proxima* Adams. Lectotype MCZ 155931 (about 2x).  
Fig. 14. *Pedipes ovalis* Adams. Lectotype MCZ 177349 (8x).

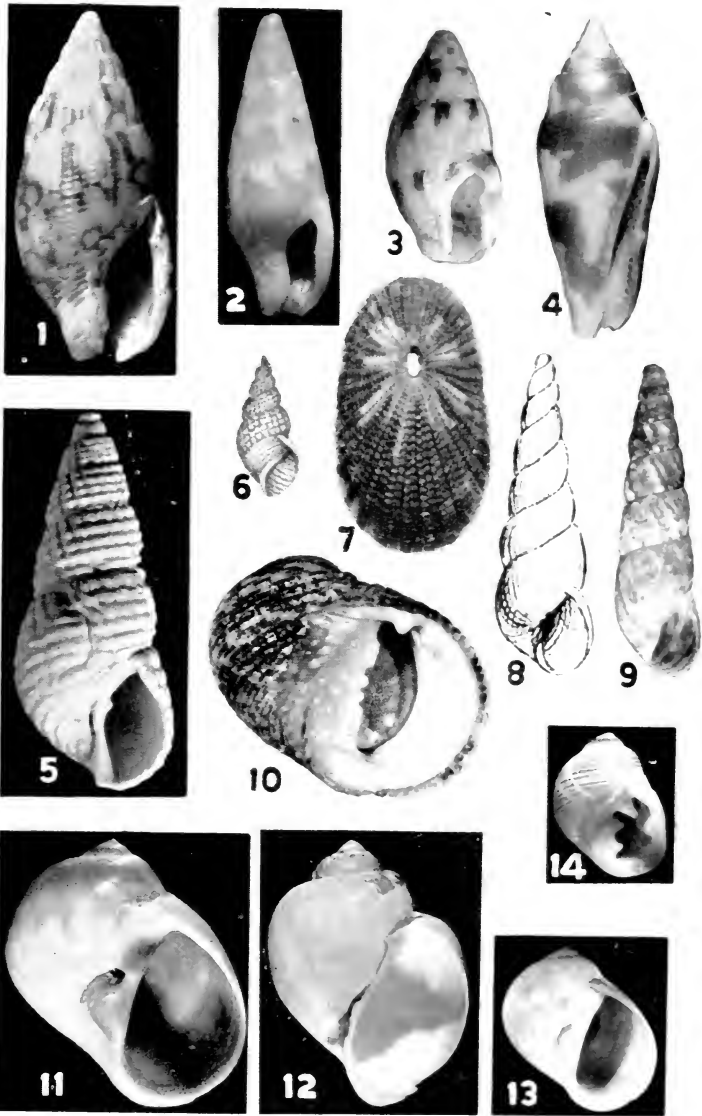


Plate 41

## Plate 42

- Fig. 1. *Chiton squamulosus* Adams. Lectotype MCZ 186080 (2x).  
Fig. 2. " *purpurascens* Adams. Holotype MCZ 155962 (3x).  
Fig. 3. " *multicostatus* Adams. Lectotype USNM 64425 (2x).  
Fig. 4. " *papillosus* Adams. Lectotype MCZ 186100 (5x).  
Fig. 5. " *erythronotus* Adams. Holotype MCZ 155960 (about 2½x).  
Fig. 6. *Chiton mendicarius* Mighels and Adams. Type lost (enlarged from original figure).  
Fig. 7. *Chiton squalidus* Adams. Lectotype MCZ 186099 (natural size).  
Fig. 8. " *costatus* Adams. Holotype MCZ 156026 (about natural size).

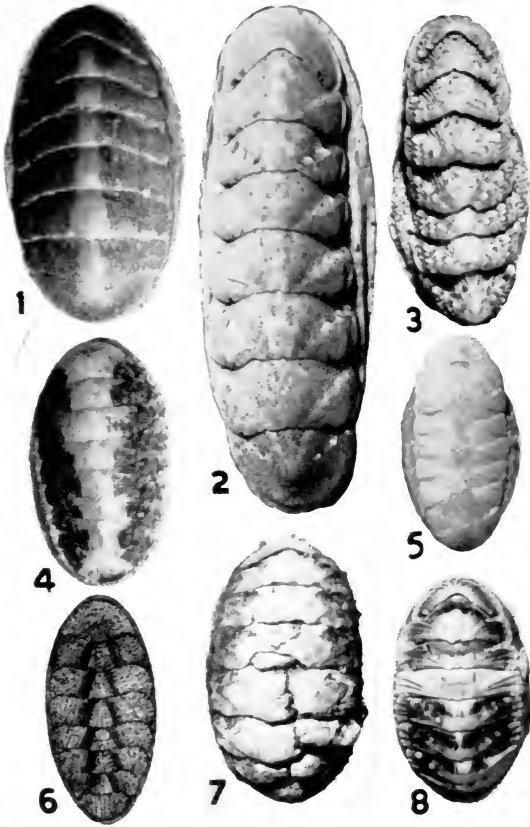


Plate 42

## Plate 43

- Fig. 1-2. *Arca tenera* Adams. Lectotype MCZ 177060 ( $2\frac{1}{2}x$ ).
- Fig. 3-4. *Amphidesma jayanum* Adams. Lectotype MCZ 186109 (slightly enlarged).
- Fig. 5. *Thracia truncata* Mighels and Adams (enlarged from original figure).
- Fig. 6-7. *Thracia truncata* Mighels and Adams. Lectotype MCZ 165595 (3x).
- Fig. 8-9. *Lima pellucida* Adams. Lectotype MCZ 155585 (3x).



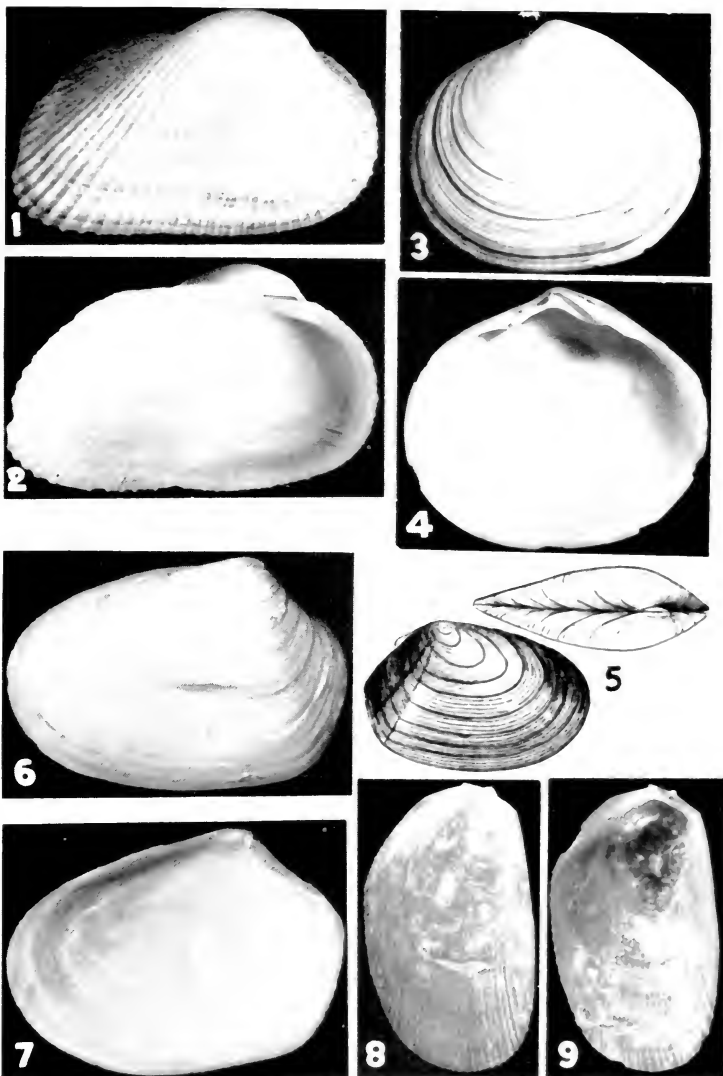


Plate 43

## Plate 44

Fig. 1-2. *Tellina decussatula* Adams. Lectotype MCZ 156459 (2½x).

Fig. 3-4. " *nitens* Adams. Holotype MCZ 155606 (3x).

Fig. 5-6. *Thetis parva* Adams. Paratype USNM 64072 (8½x).

[Lectotype MCZ 186267. The original lot of C. B. Adams was misfiled and was not located until after the plate had been made up so we give only the MCZ number here].

Fig. 7-8. *Thetis cerina* Adams. Lectotype MCZ 155584 (2½x).

Fig. 9. *Pecten tenuicostatus* Mighels and Adams. Type lost (enlarged from original figure).

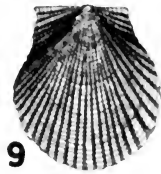
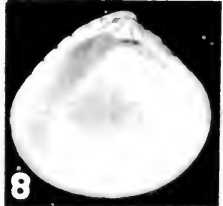
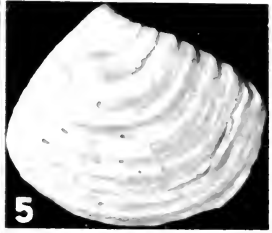


Plate 11

## Plate 45

- Fig. 1-2. *Psammobia purpurco-maculata* Adams. Lectotype MCZ 186069 (2x).  
Fig. 3-4. " *cerina* Adams. Holotype MCZ 177057 (3x).  
Fig. 5-6. " *biradiata* Adams. Holotype MCZ 177056 (2x).  
Fig. 7. " *affinis* Adams. Holotype MCZ 186074 (2x).  
Fig. 8. *Nucula delphinodonta* Mighels and Adams (enlarged from original figure).  
Fig. 9. *Nucula delphinodonta* Mighels and Adams. Lectotype MCZ 176984 (8x).  
Fig. 10. *Nucula antiqua* Mighels and Adams. Type lost (enlarged from original figure).  
Fig. 11-12. *Lucina soror* Adams. Lectotype MCZ 177059 (2x).  
Fig. 13. *Nucula cascoensis* Mighels and Adams. Type lost (enlarged from original figure).  
Fig. 14. *Thracia inequalis* Adams. Type lost (enlarged from original figure).

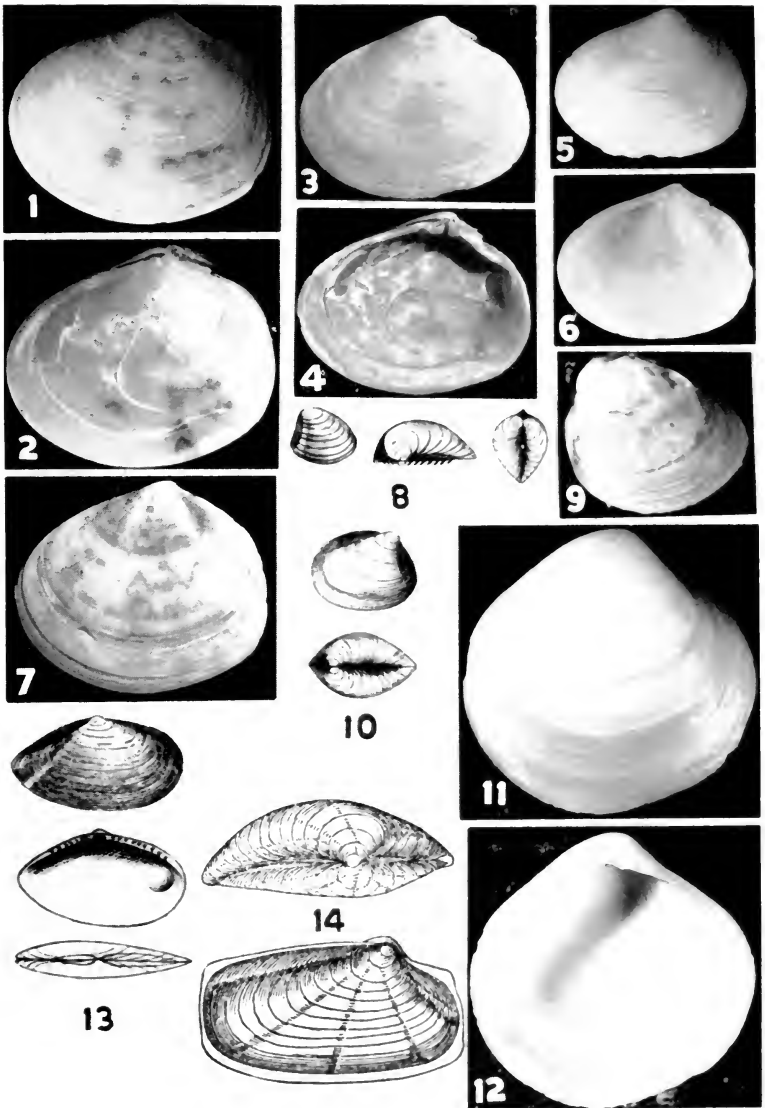


Plate 45

## Plate 46

- Fig. 1-2. *Lucina americana* Adams. Holotype MCZ 177064 (2x).  
Fig. 3-4. " *granulosa* Adams. Lectotype MCZ 155587 (2½x).  
Fig. 5-6. " *pectinata* Adams. Lectotype MCZ 155996 (2x).  
Fig. 7-8. " *imbricatula* Adams. Idiotype MCZ 177018 (slightly enlarged)  
from St. Johns, Virgin Islands.  
Fig. 9-10. *Lucina pectinella* Adams. Lectotype MCZ 155597 (about 3½x).  
Fig. 11-12. " *pilula* Adams. Lectotype MCZ 177058 (about 2x).

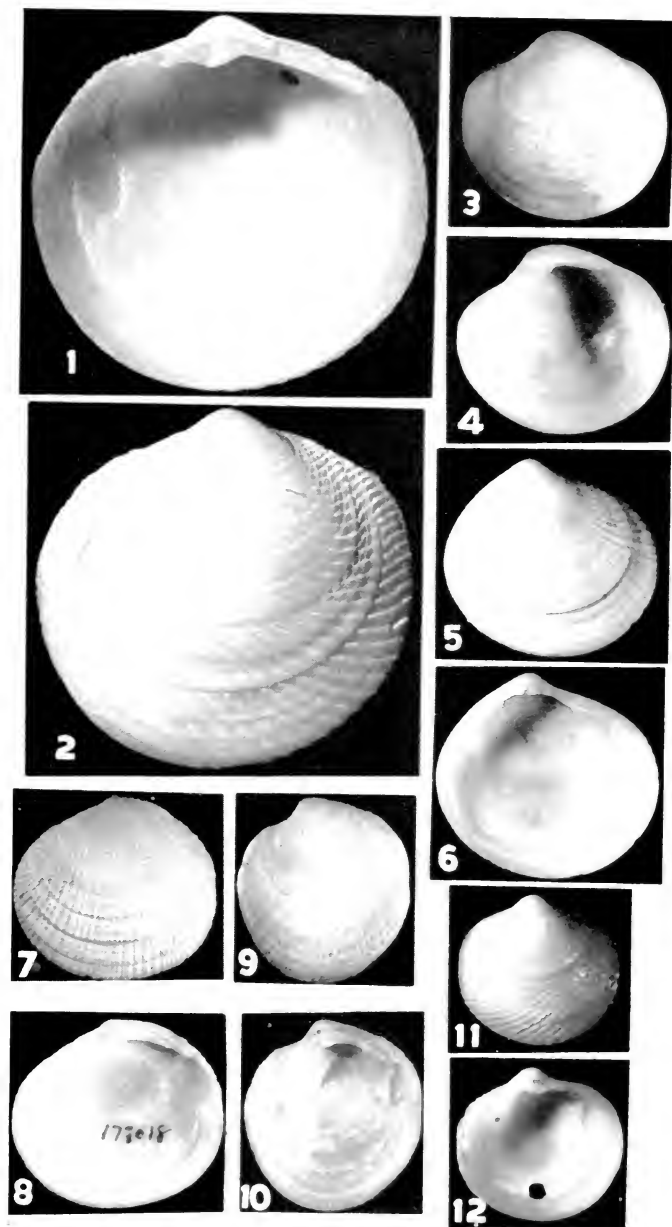


Plate 46

## Plate 47

- Fig. 1. *Corbula kjocriana* Adams. Lectotype MCZ 186105 (3x).  
Fig. 2. " " " Paratype MCZ 155603 (3x).  
Fig. 3-4. " *blandiana* Adams. Lectotype MCZ 177062 (3x).  
Fig. 5-6. " *dietziana* Adams. Lectotype MCZ 155604 (3x).  
Fig. 7. " *barrattiana* Adams. Lectotype MCZ 186107 (3x).  
Fig. 8. " " " Paratype MCZ 155605 (3x).  
Fig. 9. " *newtoniana* Adams. Lectotype MCZ 177063 (2½x).  
Fig. 10. " " " Paratype MCZ 155607 (2½x).  
Fig. 11. " *knoxiana* Adams. Lectotype MCZ 186106 (2½x).  
Fig. 12. " " " Paratype MCZ 155608 (2½x).  
Fig. 13. " *fulva* Adams. Holotype MCZ 155609 (3x).



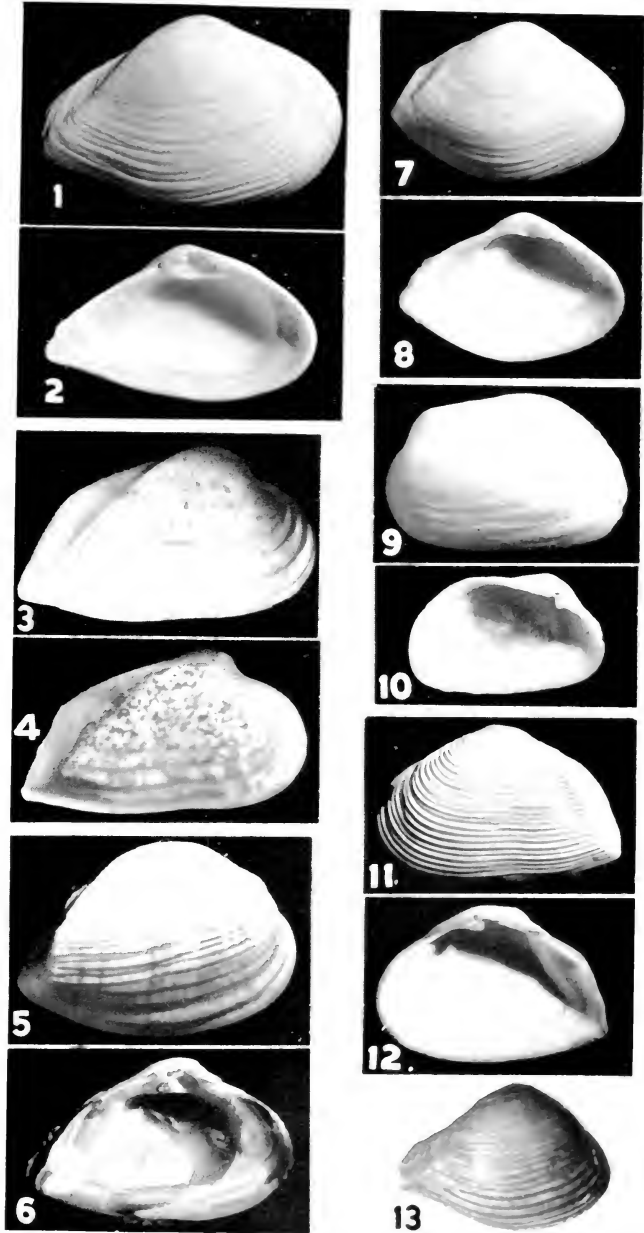


Plate 17

## Plate 48

- Fig. 1. *Corbula swiftiana* Adams. Lectotype MCZ 186103 (3x).  
Fig. 2. " " " Paratype MCZ 155602 (3x).  
Fig. 3. " *krebsiana* Adams. Lectotype MCZ 155611 (4x).  
Fig. 4-5. " *chittyana* Adams. Lectotype MCZ 177065 (3x).  
Fig. 6-7. *Perna bicolor* Adams. Lectotype MCZ 186081 (2x).  
Fig. 8-9. *Cardita ovata* Adams. Holotype MCZ 155984 (2x).

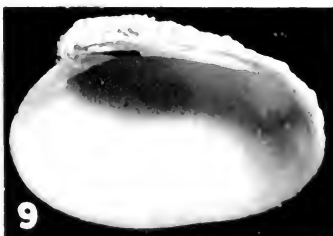
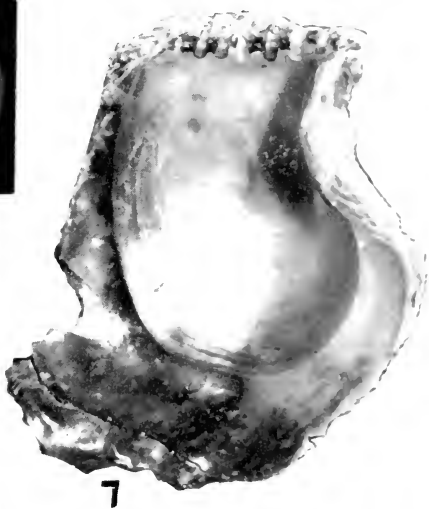
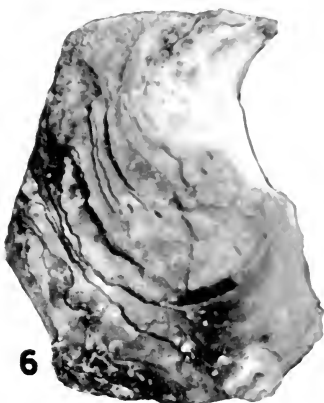
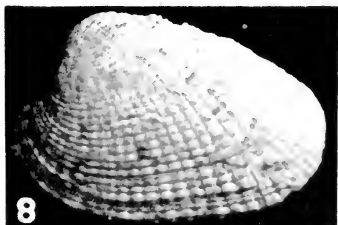
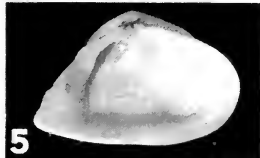
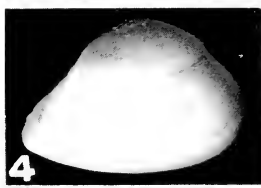
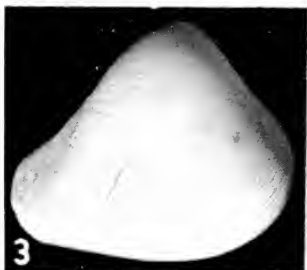
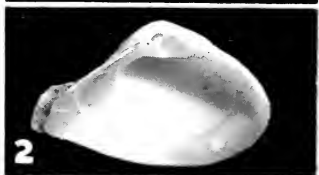


Plate 48

## Plate 49

- Fig. 1. *Pleurotoma candidissima* Adams (greatly enlarged to show sculpture).  
(See also Plate 30, fig. 2.)
- Fig. 2. *Pleurotoma albida* Adams (greatly enlarged to show sculpture). (See  
also Plate 30, fig. 5.)
- Fig. 3. *Chemnitzia levis* Adams. Lectotype USNM 94806 (about 8½x).
- Fig. 4. “ “ “ Paratype USNM 90614 (13x).
- Fig. 5. *Pleurotoma trilineata* (greatly enlarged to show sculpture). (See also  
Plate 29, fig. 15.)
- Fig. 6. *Scalaria modesta* Adams. Lectotype MCZ 186168 (about 8x).
- Fig. 7. *Chemnitzia multicosata* Adams. Lectotype USNM 90612 (13x).
- Fig. 8. “ *flavocincta* Adams. Lectotype USNM 90613 (13x).
- Fig. 9. *Pedipes globulosus* Adams. Lectotype MCZ 177347 (5x).
- Fig. 10. *Truncatella gouldii* 'Adams' Pfeiffer. Cotype MCZ 177113 (5x).

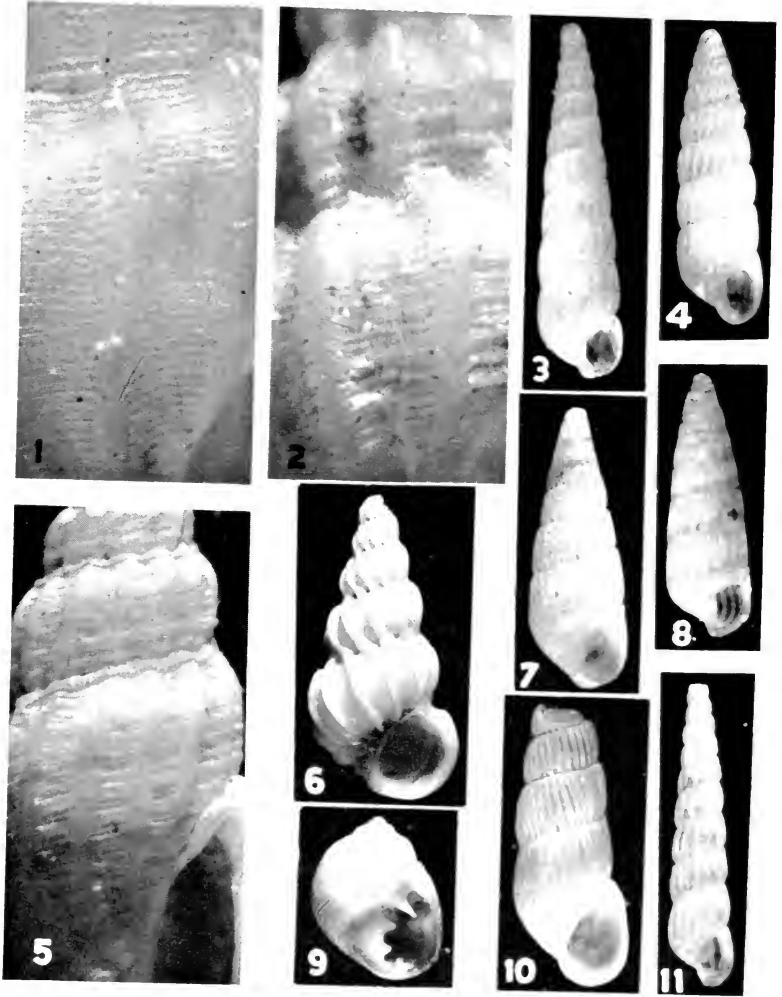


Plate 49

## BOOK REVIEW

Baba, Kikutaro 1949: *Opisthobranchia of Sagami Bay Collected by His Majesty the Emperor of Japan*. Published by Iwanami Shoten, Tokyo, Japan. Japanese text 117 pages; English translation 68 pages; 50 plates and 161 text figures. The text figures are included in the Japanese text. Indexed in both Japanese and English.

This is an excellent piece of work. The species are beautifully illustrated in color from paintings by Sanada and Kato. The text figures consist of many detailed drawings of the radulae, jaws and portions of the soft anatomy. These line drawings are captioned in both Japanese and English. A total of 155 species of Opisthobranchia are considered, and of this number 55 are described as new by Baba.

The present work has far greater value than would be indicated by the limited area covered. Sagami Bay is located on the east coast of south central Japan, just south of Tokyo. The bay is very wide and open to the south and greatly influenced by the warm Japanese current. Consequently many of the species occurring here have a wide distribution in the tropical portions of the western Pacific and therefore this report may well serve as a handbook to workers throughout that region.

Unfortunately only a few original citations are given though there is a bibliography included, and most of the species covered in the text are to be found in the various works cited.—  
W. J. CLENCH

JUL 11 1951

HARVARD

# Occasional Papers On Mollusks

Published by

THE DEPARTMENT OF MOLLUSKS

Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

VOLUME 1

JULY 11, 1951

NUMBER 16

## ***Busycon coarctatum* Sowerby**

By WILLIAM J. CLENCH

For the past 100 years *Busycon coarctatum* Sowerby has been considered a "lost" or even an extinct species. This in spite of a very excellent colored figure of a live specimen by Petit de la Saussaye.

Through the kindness of Mrs. Hugh Branham of Fort Myers Beach, Florida, we have received two fine specimens of this species. These specimens, and others in the National Museum, were obtained by the shrimp fishermen off the coast of Yucatan, Mexico, on the Campeche Bank which extends north into the Gulf of Mexico from the Yucatan peninsula.

In the year 1825, George B. Sowerby published a catalogue of the shells contained in the collection of the Earl of Tankerville. This was a list of all the species, some 2500, which were to be sold to settle the estate of the late Earl. In addition to the list of known species, Sowerby described nearly 100 new species, only a few of which were figured. Unfortunately *Busycon coarctatum* was one of the unfigured species. Just how the Earl of Tankerville obtained this rare shell is not known. No locality was given.

In 1852, Petit de la Saussaye published a note on two additional specimens, one in his own collection which he figured and one contained in the collection of Largilliert. It is quite possible that both specimens came originally from Largilliert, as he was in Central America about 1842 and made extensive collections during his trip which included the Peninsula of Yucatan.

It is quite apparent from their notes that neither Tryon nor Dall ever saw specimens of this species and Johnson believed it to be extinct.

During the past winter there has been extensive fishing for shrimp on the Campeche Bank in the Gulf of Mexico by American fishermen. These boats put into Gulf coast ports to sell their cargo and replenish supplies. Interest on the part of enthusiastic shell collectors has stimulated these fishermen to bring in and sell the shells that come up in their trawls. Thus, this present species was obtained along with many other rare and interesting specimens.

The Tankerville Catalogue is a very rare publication, and as a consequence we include a copy of the original description of Sowerby at the end of this report.

### ***Busycon coarctatum* Sowerby**

#### Plate 50

*Pyrula coarctata* Sowerby 1825, Catalogue of the Shells Contained in the Collection of the Late Earl of Tankerville, London, appendix p. XVII (locality not given).

*Pyrula coarctata* Sowerby, Petit de la Saussaye 1852, Journal de Conchyliologie **3**, pp. 145; 155-157, pl. 7, fig. 3 (Les Côtes de la Florida?).

*Pyrula coarctata* Sowerby 1880, Thesaurus Conchyliorum **4**, *Pyrula*, p. 106, pl. 5, fig. 40 (Gulf of Mexico).

*Fulgur coarctatus* Sowerby, Tryon 1881, Manual of Conchology (1) **3**, p. 142, pl. 57, fig. 393 [copied from Petit de la Saussaye] (said to occur in Florida).

*Fulgur perversa coarctata* Sowerby, Dall 1889, Bulletin 37, United States National Museum, p. 112 (? West Florida).

*Busycon coarctatum* Sowerby, Johnson 1934, Proc. Boston Society Nat. Hist. **40**, no. 1, p. 126 (Gulf of Mexico "Sowerby").

*Description.* Shell dextral, imperforate, reaching at least 138 mm. ( $7\frac{1}{2}$  inches), rather solid, globose but with a much extended siphonal canal. Color consisting of axial stripes of dark mahogany-brown, irregular in both intensity of color and width of stripes. Whorls 6 to  $6\frac{1}{4}$ , strongly convex and having a supra-peripheral ridge which supports a series of low blunt spines. Spire sub-depressed, obtuse, forming an angle of  $125^\circ$ . Aperture subovate, lengthened below into the long siphonal canal, colored a yellowish-brown within and ridged within with numerous and well developed spiral cords or ridges on the palatal side. These cords end a little below the sharp edge of the



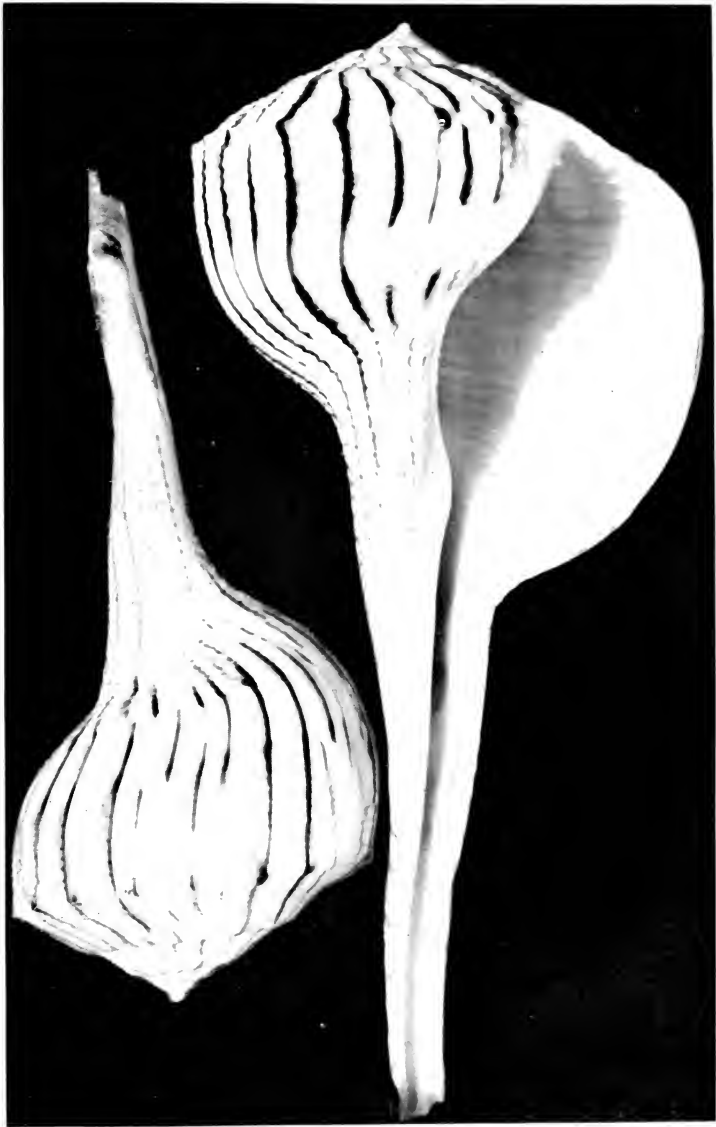


Plate 50

*Busycon coarctatum* Sowerby (natural size).  
Campeche Bank, Yucatan, Mexico.

outer lip. Parietal area thinly glazed. Columella twisted within, arched, thickened near the base of the aperture and extending below forming the parietal margin of the siphonal canal. Sculpture consisting of numerous and somewhat wavy spiral threads crossed by fine axial growth lines. There is a subperipheral area where the spiral threads and the axial color stripes are both weak. These spiral threads extend down on the siphonal canal where they appear to be somewhat stronger. Microsculpture consisting of exceedingly fine spiral threads. Nuclear whorls mammilliform, white and rather small. Operculum corneous, thickened and unguiculate.

Length	Width	Whorls	
138	71 mm.	6 $\frac{1}{2}$	MCZ
117	53	6	MCZ
120	56	6 $\frac{1}{2}$	USNM
115	55	6	Branham Collection

*Types.* So far as now known, the original specimen described by Sowerby is lost. We suggest that the figure of Petit de la Saussaye (Jour. de Conchy. **3**, pl. 7, fig. 3) be accepted as the type figure to represent this species, and the type locality to be Campeche Bank, Yucatan, Mexico. One of three specimens in the National Museum possesses the specific data as follows: North Lat. 21°30'; West Long. 90°20' in 16 fathoms, received from Mrs. Gladys Sennott.

*Remarks.* This species shows distant relationships to both *Busycon perversum* Linné and *B. pyrum* Dillwyn. To *B. perversum*, its relationship is indicated by a similar type of axial coloration, the possession of the fine spiral ridges, the subperipheral band and the internal ridges on the outer lip. The coloration and the outer and inner ridges are usually lost in adult specimens of *B. perversum*. *Busycon coarctatum* differs from *B. perversum* by being dextral and by having the whorls very globose and possessing the long and exceedingly narrow siphonal canal. In addition, the shoulder spines or knobs in *coarctatum* are usually much smaller. *B. pyrum* and *B. coarctatum* are related by the presence of the outer and inner ridges, and a somewhat similar type of axial coloration. They differ mainly in the area of the siphonal canal which is generally very broad in *B. pyrum* and very narrow in *coarctatum*.

The following is the original description of *Busycon coarctatum* Sowerby (A Catalogue of the Shells Contained in the Collection of the Late Earl of Tankerville, London, 1825, appendix, p. 17).

"1629. PYRULA COARCTATA.

"P. testa pyriformi, transversè striata, albida, longitudinaliter strigis aurantiaco-brunneis ornata; anfractu ultimo ventricosus, ad basim subito coarctato, in canalem longam decurrente, supernè noduloso-carinato; spira depressiuscula, apice mammillari; apertura intus sulcata; columella obliquissimè uniplicata; long. 3.70 unc. lat. 1.85 unc.

"Obs. This elegant shell very nearly resembles the *Pyrula Spirillus*, Lam. in general form, the fold at the base of its columella is, however, much more oblique, and its mammillary point much smaller; it is, moreover, differently marked. A reverse specimen of the same species is numbered 1630."

## BOOK REVIEWS

Yonge, C. M., 1949. *The Sea Shore*. Collins, London, 311 pages, 88 text figures, 40 colored plates and 32 black and white plates.

This is probably the most important general book on the ecology of the sea shore that has appeared in recent years. Though restricted in its scope to the shores of Great Britain, the principles discussed and illustrated apply throughout the world. C. M. Yonge, with his wide field experience and his great interest in physiology has given a breadth of interpretation to conditions existing along the British shores which makes the book of first importance to all students of marine ecology.

The introductory chapters discuss briefly the history of marine ecology in the British Isles, the plants and animals which inhabit the sea shore, the ocean as a background to life along the shore and the physical nature and formation of the shore.

The remainder of the book is devoted to a study of the plants and animals of various ecological habitats, their methods of feeding, survival and reproduction. The selective effect of the environment on the species which can exist within a given locality and the inter-relationships of these species are the dominant themes throughout the book. This may be illustrated by quoting a few of the chapter titles: "Zonation on Rocky Shores; The Intimate Fauna of Weed and Rock; Sandy Shores; Muddy Shores; Borers into Rock and Wood; Life in Estuaries; and Barnacles and Molluscs of Rocky Shore." Mollusks being one of the dominant groups of marine animals, much of the book is devoted to this phylum.

The illustrations in this book are unsurpassed, the forty full page colored plates are beautifully produced. The many black and white plates, text figures, graphs and diagrams are a constant aid in readily understanding the material in the text.

Although this is not a book for the beginner in zoology, he would glean much from its pages. The factual data, though briefly stated, represent years of study by biologists in all portions of the world. Dr. Yonge gives constant reference to the researches of others and has an interesting way of presenting personalities concerned in this research in the history and development of the natural sciences and the growth of the science of Oceanography and Ecology, particularly in the British Isles.—RUTH D. TURNER.

MacGinitie, G. E. and Nettie MacGinitie 1949, *Natural History of Marine Animals*, McGraw-Hill Book Company Inc., New York, 473 pages, 282 figures.

For one seeking acquaintance with the varied fauna of the sea shore this book should be a real help. It is essentially an introductory text book surveying the phyla from a natural history point of view, stressing the habits and relationships of the animals rather than their anatomy. As much of the book is based on the personal observations of the authors it is written with a stimulating enthusiasm. Though most of the animals considered are from the Pacific coast of North America, the habitats and habits of closely related forms may be sufficiently close so that the book can serve as a guide elsewhere. The many hints regarding methods and techniques of observation are also helpful.

The first twelve chapters are devoted to generalized discussions of such subjects as Food, Sense Organs, Luminescence, Marine Animal Habitats, Variation and Succession, and Relationships. The remaining chapters are devoted to a survey of the phyla, the length of each chapter depending on the size of the group, its importance and interest.

The illustrations in the book though of excellent choice as to subject matter are often rather poorly executed, especially some of the half-tones. The line cuts as a whole are good.

The chapter on mollusks in which we were particularly interested covers 74 pages and in general is a good survey of the group from the limited point of view of the littoral marine habitat. It gives an excellent picture of their general structure, function and mode of life, without being burdened by an enormous number of details and complicated terms. There are, however, several rather basic errors which we believe should be noted. In discussing the structure of the shell the authors speak of a "middle lusterless thick limey layer and an inner pearly lustrous layer of nacre." Both the middle and inner layers are of calcium. The middle layer should be referred to as the prismatic layer as in this layer the calcium is laid down in prismatic crystals. The inner layer should be referred to as the laminated layer because here the lime is laid down in thin layers and may or may not be nacreous. This explains why most shells lacking luster, cannot produce valuable pearls. They also state that "cowries and related species dissolve the columella or central column of the shell and thus leave a single large cavity without spirals." No group of mollusks completely dissolves the internal whorls: the columella must remain for the attachment of the columella muscle. So far as we know, most if not all members of the Conidae possess opercula. We wonder where the figures on weights for the Giant Squid were obtained; they seem to be tremendously over-estimated. From the specimens of the Teredinidae which we have examined, the siphons are not long proportionately as they extend out only a short distance from the base of the pallets.

The authors state that they have purposely left out references to the papers of other research workers from which they have drawn information. This is to be regretted. The bibliography at the end of the book is exceedingly brief and general and it would be a most difficult task to locate the original work if one was interested in so doing.

—RUTH D. TURNER.

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# Occasional Papers On Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts

VOLUME 1

MARCH 27, 1952

NUMBER 17

## The *Scalarinum* Species Complex (*Umbonis*) in the Genus *Cerion*

By WILLIAM J. CLENCH AND C. G. AGUAYO

The present study covers only a few species in this remarkable genus. Members of this complex constitute the subgenus *Umbonis* Maynard and represent a divergent element, rather strikingly different from other members of the genus *Cerion*. So far as now known, they occur on the north coast of Cuba and on a few of the islands composing the Bahama Archipelago.

The origin of the species in this subgenus was probably the coastal area of Oriente in eastern Cuba. From here they spread west to Pinar del Rio and north into the Bahamas. Their distribution is sporadic and in many cases there are wide areas between species. The habitat they occupy is a precarious one, the upper strand line in the scrub growth, particularly among sea grapes and other associated plants. Their distribution is probably entirely by hurricanes or other severe storms, either by drift or even possibly on wind-blown debris. Similarly to other mollusks that live in this general environment, when established they may flourish for a shorter or longer period of time and subsequently be destroyed by storms. Debris from such a storm may move many miles along a coast or even out to sea, later to be cast ashore elsewhere. *Cerion*, drifting with this debris, may become established in a new area.

We are indebted to Dr. H. A. Rehder for the loan of material from Great and Little Inagua Islands, Bahama Islands.

### Genus *Cerion* Röding

*Cerion* Röding 1798, Museum Boltenianum, p. 90.

Subgenus **Umbonis** *Maynard*

*Umbonis* Maynard 1896, Contributions to Science, Newtonville, Massachusetts **3**, no. 1, p. 28.

Subgenotype, *Strophia scalarina* Pfeiffer and Gundlach, monotypic.

Shells usually more or less tapering from the fourth whorl above the aperture to the apex. Umbilicus rimately formed and usually very shallow. Sculpture consisting of rather irregular, strong to weak, axial costae with spiral sculpture of numerous incised lines which cut into the shell in many cases even over the axial costae. Many members of this complex agglutinate small grains of calcareous sand to areas on the outside of the shell, especially in the umbilical region. Live specimens in many of the species possess exceedingly fine powdery or scale-like sculpture which is most apparent on the later whorls and along the margins of the incised lines.

**Cerion (Umbonis) scalarinum** *Pfeiffer and Gundlach*  
Plate 51, fig. 3-4

*Pupa scalarina* Pfeiffer and Gundlach 1860, Malakozologische Blätter **7**, p. 19 (Gibara, Cuba); Pfeiffer 1867, Novitates Conchologicae **3**, p. 367, pl. 84, fig. 16-17.

*Cerion scalarinum* Pfeiffer and Gundlach, Pilsbry 1902, Manual of Conchology (2) **14**, p. 223, pl. 29, fig. 65-66.

*Description.* Shell about 25 mm. in length (1 inch), rimately perforate, attenuate, with a tapering spire, rather light in structure and very strongly sculptured. Color a dull gray, the axial costae being the same color. Whorls 10, moderately convex, the nuclear whorls opaque, somewhat glass-like in appearance and very faintly axially costate. Spire extended, forming an angle of 20° to 25°, usually tapering slightly from the body whorl to the summit. Occasional specimens not tapering before the fourth whorl above the aperture. Aperture subquadrate to subovate. Outer lip reflected and slightly thickened. Parietal ridge strongly developed, making the aperture holostomatous. Parietal tooth small, short and centrally located. Columellar tooth small, centered and extending within for a full whorl. Columella short and slightly arched into the parietal area and the base of the aperture. Umbilicus rimate, small



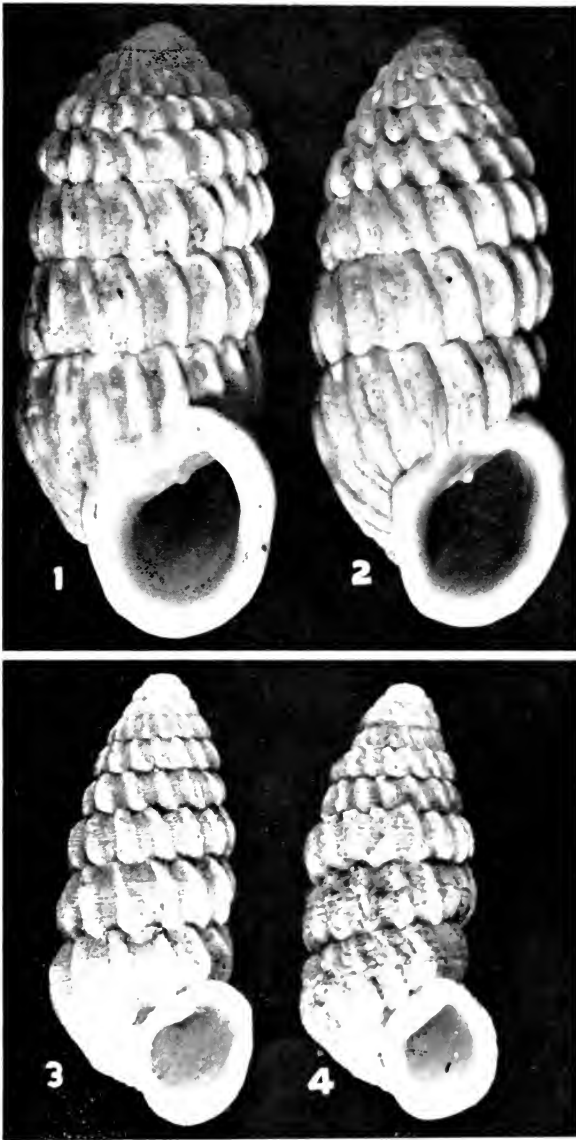


Plate 51

Fig. 1-2. *Cerion scalarinum suzyasi* Pilsbry and Vanatta, west side of Bahía de Samá, Banes, Cuba (3½x). Fig. 3-4. *Cerion scalarinum* Gundlach. Punta Barril, Gibara, Cuba (3½x).

and very shallow. Suture moderately impressed. Sculpture consisting of numerous, somewhat irregular, robust, axial costae which number 12 to 15 on the body whorl. Spiral sculpture consisting of numerous deeply incised lines or threads which are cut into the shell, even over the axial costae. On live shells the surface is usually powdered with an exceedingly fine element of shell structure which lines up along the incised lines. In addition there are numerous, fine grains of shell sand which are cemented to the shell. Dead and worn shells are generally destitute of the agglutinated grains of sand.

length	width	whorls	
24.6	9.4 mm.	11½	Gibara, Cuba
25	11	10½	“ “
24	9.9	12	“ “

*Types.* At this writing the whereabouts of Pfeiffer's types is unknown. They were presumed to be in Stetten, Germany until the war in 1945. The type locality is Gibara, Oriente, Cuba.

*Remarks.* This species was fairly abundant near Gibara during the early days of Gundlach's trip but it has since become very rare at this locality. Probably much of the vegetation near the town had been destroyed rather early.

The spire tapers from the body whorl to form a rather acute apex.

*Records.* Gibara; N.W. of Gibara; Punta Barril, 1 km. N. of Gibara and Punta Goicuria, 8½ km. N.W. of Gibara.

### ***Cerion scalarinum sueyrasi* Pilsbry and Vanatta**

Plate 51, fig. 1-2

*Cerion sueyrasi* 'Blanes' Pilsbry and Vanatta 1898 [1899], Proc. Acad. Nat. Sciences, Philadelphia, p. 477, text fig. 6 (Port of Vita, Cuba); Pilsbry 1902, Manual of Conchology (2) 14, p. 222, pl. 29, fig. 68.

*Description.* Shell reaching about 26 mm. (1 inch) in length, rather solid, rimately perforate and strongly sculptured. Color a dull gray including the axial costae, occasional specimens blotched with brown. Whorls 10 to 10½, slightly convex, Nuclear whorls very finely costate. Spire extended, the cone tapering from the fourth whorl above the aperture, the angle pro-

duced at about  $65^\circ$ . Aperture subovate. Outer lip well-reflected and thickened. Parietal ridge well-developed, making the aperture holostomatous. Parietal tooth centered and well-developed. Columellar tooth small and extending within for nearly a whorl. Columella short. Umbilicus rimately produced and generally quite shallow. Suture moderately impressed. Sculpture consisting of numerous somewhat irregular, strongly developed axial costae with 15 to 18 on the body whorl. Spiral sculpture consisting of numerous and fine incised lines which cut into the shell even over the costae.

length	width	whorls	
26.3	10 mm.	$10\frac{1}{2}$	Bahía de Samá, Cuba
23.5	12	10	" " " "
23.6	10.8	10	" " " "

*Types.* Holotype in the Academy of Natural Sciences, Philadelphia from the Port of Vita, Cuba, collected originally by F. E. Blanes.

*Remarks.* This species is stouter than *scalarinum*, the summit tapering from 4 to 5 whorls above the aperture.

At Bahía de Samá we found this species rather rare. They ascend the trees to a height of about 8 feet, seldom more than 4 to 5 specimens on any one tree.

*Records.* CUBA: Port of Vita (Pilsbry); Puerto de Samá; west side of Bahía de Samá (both C. G. Aguayo, W. J. Clench and A. Quiñones); La Caletica, Puerto Samá; Punta de Manglito, Península del Ramon, Antilla (both Quiñones).

### ***Cerion (Umbonis) victor* Torre**

Plate 52, fig. 1-2

*Cerion victor* Torre 1929, *Nautilus* **42**, no. 3, pl. 4, fig. 12-13 [no description] (Caleta de Ovando, Oriente, Cuba).

*Description.* Shell extended, reaching 30 mm. (about  $1\frac{1}{4}$  inch) in length, rimately umbilicate and coarsely sculptured. Color a dull gray. Whorls 10 to  $12\frac{1}{2}$  and moderately convex. Spire attenuate and tapering from the body whorl to form an acute cone. The spire is produced at an angle of  $22^\circ$  to  $25^\circ$ . Aperture subcircular. Lip expanded and reflected but not turned back. It is attached on the parietal area but generally built

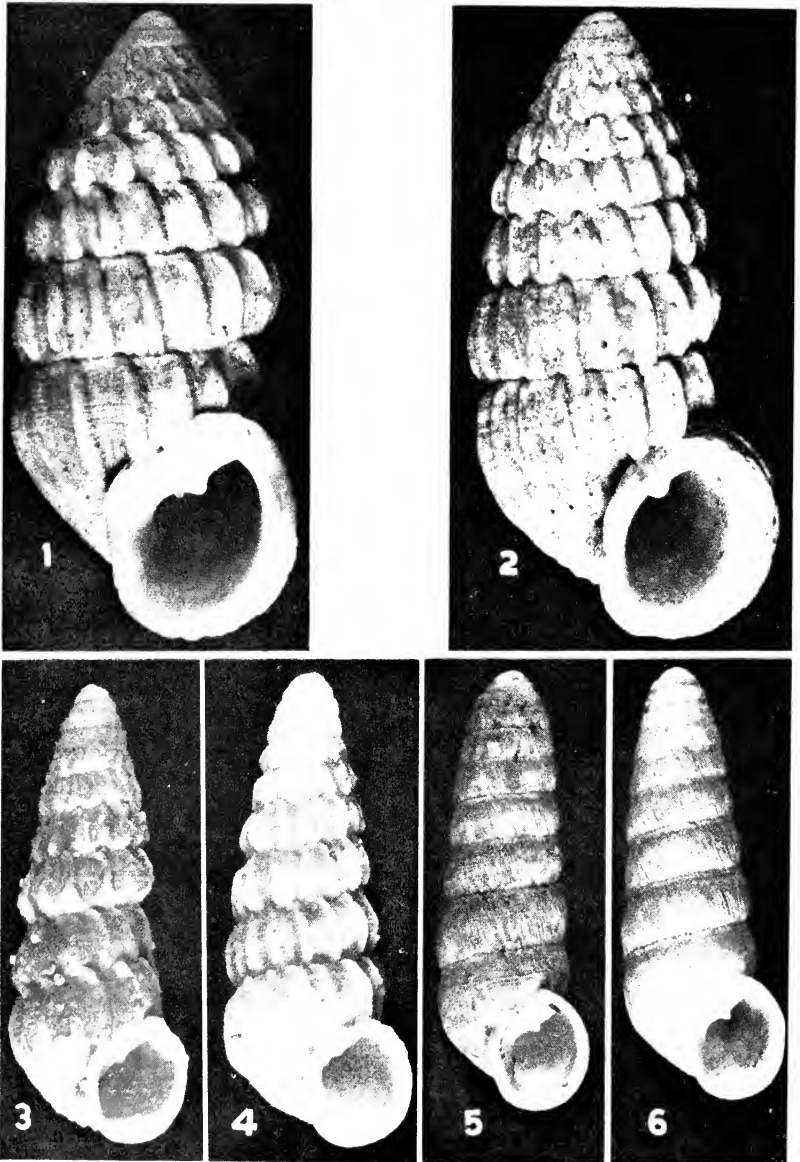


Plate 52

Fig. 1-2. *Cerion victor* Torre, Caleta de Ovando, Baracoa, Cuba, paratypes (3½x). Fig. 3-4. *Cerion acuticostatum* Sanchez Roig, north coast of Cayo Méjano Grande, Camagüey, Cuba, paratypes (3½x). Fig. 5-6. *Cerion palmeri* Sanchez Roig, Cayo Romano, Camagüey, Cuba, paratypes (3½x).

forward enough to make the aperture holostomatous. Columella short. Parietal tooth centered, rather prominent and extending back for less than  $\frac{1}{4}$  whorl. Columellar tooth small and weak, extending back for nearly  $\frac{1}{2}$  whorl. Columella short and somewhat arched. Umbilicus rimately formed and shallow, extending within hardly more than  $\frac{1}{2}$  whorl. Suture well defined but only slightly indented. Sculpture consisting of numerous and well-developed axial costae numbering 10 to 13 on the body whorl. Spiral sculpture consisting of numerous incised lines which pass over the axial costae. Surface with the peculiar powder-like element. Agglutinated sand grains rare.

length	width	whorls	
30	11 mm.	12	Paratype
28.2	10.3	12 $\frac{1}{2}$	"
27.2	10.5	11 $\frac{1}{2}$	"

*Types.* Paratype specimens are in the Museo Poey, Museum of Comparative Zoölogy no. 128975 and 181757, and in the Academy of Natural Sciences, Philadelphia from Caleta de Ovando, Maisí, Baracoa, Cuba. Additional paratypes are in the Museo Poey and the Museum of Comparative Zoölogy from La Gata, Punta Negra, Maisí and Los Indios, Maisí, all in the immediate vicinity of the Caleta de Ovando, from the C. de la Torre collection.

The holotype was not indicated by de la Torre but is here selected to be the specimen figured as no. 13, plate 4, *Nautilus* **42**, 1929, now in the collection of the Academy of Natural Sciences, Philadelphia.

*Remarks.* This species is closely related to *C. scalarinum*, differing mainly in being larger and tapering more acutely.

### **Cerion (Umbonis) johnsoni** Pilsbry and Vanatta Plate 55, fig. 1-2

*Cerion (Maynardia) johnsoni* Pilsbry and Vanatta 1895, Proc. Acad. Natural Sciences, Philadelphia **47**, p. 207 (locality unknown).

*Cerion faxoni* Maynard 1896, Contributions to Science, Newtonville, Massachusetts **3**, p. 32, pl. 7, fig. 1-2 (Cuba).

*Cerion johnsoni* Pilsbry and Vanatta 1896, Proc. Acad. Natural Sciences, Philadelphia **48**, p. 322, pl. 11, fig. 30 (Cuba); Pilsbry 1902, Manual of Conchology (2) **14**, p. 223, pl. 29, fig. 69-70.

*Description.* Shell attenuate, acute, reaching 38 mm. ( $1\frac{1}{2}$  inches) in length, rather strong, rimately perforate and heavily sculptured. Color a dull grayish-white. Whorls 12 to 13, strongly convex. First two nuclear whorls smooth, third whorl finely costate, the costae being far more numerous than on the later whorls. Spire attenuate and acute, forming an angle of  $30^\circ$  to  $40^\circ$ . Aperture subovate. Parietal wall with a well-developed and well-formed tooth. Columellar tooth very small and weakly defined. Palatal lip expanded and slightly reflected. Columella short and nearly straight. Umbilicus rimate with but an exceedingly small perforation. Suture deeply indented. Sculpture consisting of well-developed axial costae numbering 11 to 12 on the body whorl. In addition, there are numerous fine, spiral, incised lines that are irregularly spaced. On fresh specimens, these lines may be filled with a fine shelly scale or powdery element, a character commonly observed in this species complex.

length	width	whorls	
29	14 mm.	12	Cueva del Chivo, Mariel, Cuba
37.2	16	12	" " " " "
39	14	$12\frac{1}{2}$	" " " " "
33	12.5	13	$1\frac{1}{2}$ miles E. of the lighthouse, Mariel, Cuba
31	10.9	$12\frac{1}{2}$	" " " " " " " "
30.5	11.5	$12\frac{1}{2}$	" " " " " " " "
32	11	$11\frac{1}{2}$	Holotype of <i>johnsoni</i>
29	11.5	11	Holotype of <i>faxoni</i>

*Types.* The holotype of *Cerion johnsoni* Pilsbry and Vanatta is in the Academy of Natural Sciences, Philadelphia. A series of three specimens was received by the Museum of Comparative Zoölogy several years ago from the Boston Society of Natural History, originally from Mr. Johnson and probably from the original lot. The holotype of *Cerion faxoni* Maynard is in the Museum of Comparative Zoölogy, no. 184649, and a single paratype, no. 10363. The original locality for *johnsoni* was unknown, then later it was given as Cuba. We here limit the type locality to the coastal area  $1\frac{1}{2}$  miles east of the lighthouse at Mariel, Cuba. Specimens from this locality approximate the size and shape of the original specimens of *johnsoni* and *faxoni*.

*Remarks.* There seems to be little question that *johnsoni* Pilsbry and *faxoni* Maynard are the same species and very probably from the same original lot of material.

This species lives mainly in open and rather exposed places on the low vegetation growing among rocks just above and beyond the high tide area. Occasionally a few specimens work back into the higher scrub growth and the sea grape area.

It is very possible that the type specimens were collected in Habana from sand originally from the Mariel region. Sand for building purposes is a rare commodity in Cuba and much of it is gleaned from the upper strand line along the Cuban coast. Consequently, much *Cerion* territory is being destroyed in the vicinity of small towns and at a considerable distance from the large coastal cities of Cuba. Areas much nearer the lighthouse from which we collected *C. johnsoni* 20 years ago are now destroyed and this form has nearly disappeared from this region. However, a rather vigorous colony still occurs on the west side of the Rio Mosquito, in an area of fair extent, sea grape covered and with much coral rock.

### ***Cerion (Umbonis) acuticostatum* Sanchez Roig**

Plate 52, fig. 3-4

*Cerion scalarinum acuticostatum* Sanchez Roig 1948, Revista de la Sociedad Malacologica "Carlos de la Torre" **6**, p. 68, pl. 1, fig. 5. (North coast of Cayo Mégano Grande, north of Camagüey, Cuba).

*Description.* Shell reaching about 23 mm. (about 1 inch) in length, rather light in structure, nearly imperforate and strongly sculptured. Color a dull gray. Whorls 11 slightly convex. Nuclear whorls glass-like and very faintly costate. Spire extended forming a cone which extends to the summit from the body whorl. It is produced at an angle of 18° to 20°. Aperture subcircular to subovate. Outer lip thin and reflected. Parietal ridge very weak and not elevated but rather flattened on the parietal wall. Parietal tooth centered and rather small and extending back for nearly a full whorl. Columellar tooth rather small and extending back for at least a full whorl. Columella short. Umbilicus rimately formed but exceedingly shallow. Suture moderately indented. Axial sculpture consisting of numerous and irregular costae which number 12 to 14

on the body whorl. Spiral sculpture consisting of numerous incised lines which cut into the shell. This is somewhat variable, certain specimens are lacking these incised lines. Surface powdered with a fine shell material which usually lines up along the incised lines. Agglutinated sand grains present on live shells.

length	width	whorls					
22.8	7.5 mm.	11	Cayo	Mégano	Grande,	Camagüey,	Cuba
22.5	8.0	10½	"	"	"	"	"

*Types.* The holotype of this species is in the collection of Dr. Sanchez Roig, no. 1001 from the north coast of Cayo Mégano Grande, Camagüey, Cuba. Paratypes are in the Museo Poey and the Museum of Comparative Zoölogy, no. 187375.

### **Cerion (Umbonis) rehderi**, new species

Plate 57, fig. 2

*Description.* Shell cylindrical, rather small, reaching 16 mm. (a little over  $\frac{1}{2}$  inch) in length, rimately perforate and finely costate. Color a dull uniform gray, interior of aperture being a dull, creamy-brown. Whorls 9 to 10 and slightly convex. Spire extended, last 4 whorls nearly straight-sided, early 5 whorls forming a slight convex cone, the conic portion forming an angle of about  $45^\circ$ . Aperture subquadrate. Outer lip reflected but not turned backward. Columella short and straight. Parietal tooth centered, low and short. Columellar tooth low and extending back for nearly a full whorl. Umbilicus rimate, small and shallow. Sculpture: first 2 whorls glass-like and smooth, remaining whorls finely and axially costate, the costae numbering 20 to 25 on the body whorl. Spiral sculpture consisting of numerous and fine incised lines which do not cut into the crests of the axial costae. These spiral lines are generally finely powdered. There are a few agglutinated sand grains.

length	width	whorls	
26.3	5.9 mm.	10	Holotype
24.7	6.1	9	Paratype
23.5	5.9	9	Paratype

*Types.* Holotype, Museum of Comparative Zoölogy, no. 189032, from Jackline, 1 mile west of Conch Shell Point, Great Inagua, Bahama Islands. Paratypes, Museum of Comparative



Zoölogy, no. 189033; Museo Poey, Universidad de la Habana; United States National Museum; and the Academy of Natural Sciences, Philadelphia, from the same locality.

*Remarks.* In relationship, this species is nearest to *C. acuticostatum* Sanchez Roig from Cayo Mégano Grande, Camagüey, on the north coast of Cuba. It differs from this species in being far less conic (from the body whorl), and by possessing more numerous costae. It does not appear to be closely related to *C. turnerae* Clench and Aguayo from the north coast of Great Inagua. This last species is a little smaller, has more globose whorls and much fewer costae.

*C. rehderi*, so far as now known, is limited to this single locality on the south shore of Great Inagua. It was found associated with *C. dalli* Maynard, with no indication of any hybridization between the two species. In fact, this is one of the few known cases in which two separate elements of *Cerion* are known to exist in the same area without crossing.

This species is named for H. A. Rehder, Curator of Mollusks in the United States National Museum.

### ***Cerion* (*Umbonis*) *turnerae*, new species**

Plate 53, fig. 4-7

*Description.* Shell small, reaching about 15 mm. (about 3 5 inch) in length, solid, minutely perforate or rimate, strongly axially ribbed and finely threaded with spiral ridges. Whorls  $8\frac{1}{2}$  to 9 slightly shouldered and moderately convex. Nuclear whorls smooth and then finely ribbed and with a little trace of spiral sculpture. General color a dull gray to faintly purplish, both axial ribs and minute spiral ridges whitish. Early three whorls forming an angle of  $44^\circ$ , later whorls nearly straight-sided. Aperture subcircular, holostomatous and more or less evenly flaring and slightly projecting beyond the body whorl. Mid-parietal wall supporting a well-defined tooth, columellar tooth absent. Lip flaring, simple and not developed into a collar. Suture indented but not well-defined. Axial sculpture consisting of strong costae, about 10 to 11 on the body whorl. Spiral sculpture consisting of 25 to 30 fine, blade-like ridges that are best developed on the forward side of the axial costae.

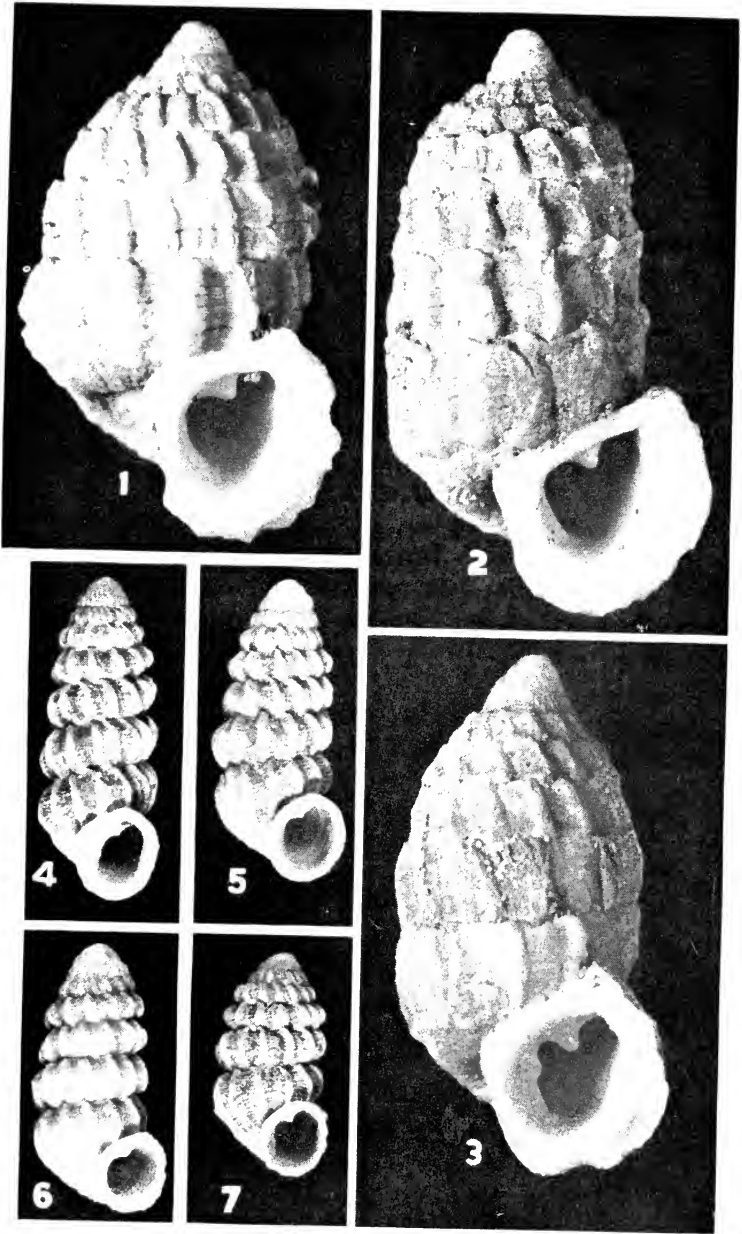


Plate 53

Fig. 1-3. *Cerion stervensoni* Dall, Wemyss, southeast of Simms, Long Island, Bahama Islands (about 3x). Fig. 4-7. *Cerion turnerae* Clench and Aguayo, Lydia Point, Great Inagua, Bahama Islands, holotype, fig. 5 (all about 2½x).

length	width	whorls	
14	6 mm.	9	Holotype
14.5	5.9	9½	Paratype
15	6.5	9½	Paratype
12.5	5.9	8	Paratype

*Types.* Holotype, Museum of Comparative Zoölogy, no. 184623 from Lydia Point, Great Inagua Island, Bahama Islands. R. A. McLean and B. Shreve collectors, July 1938. Paratypes in the Museum of Comparative Zoölogy, United States National Museum and the Museo Poey from the same locality and from Calm Cove and Canfield Bay collected by McLean and Shreve and a large series from south of North East Point and east of Salt Lagoon at deserted house collected by P. Bartsch, August 1930.

*Remarks.* This is the smallest species so far known in this group. It was very abundant at Lydia Point and at Ocean Bight near the Salt Lagoon. McLean, Shreve and Bartsch found it along about a 12 mile stretch of coast from Canfield Bay to near North East Point.

In general structure it appears to be nearest in relationship to *C. scalarinum* Pfeiffer from Gibara, Cuba. It does not appear to be at all closely related to *C. rehderi* Clench and Aguayo, the only other member of the subgenus *Umbonis* on Great Inagua.

This species is named for Ruth D. Turner, Research Assistant, Department of Mollusks, Museum of Comparative Zoölogy.

### ***Cerion (Umbonis) paucisculptum*, new species**

Plate 54, fig. 1 2

*Description.* Shell rimately perforate, strong, but rather light in structure, elongate, sculptured and reaching about 25 mm. (1 inch) in length. Whorls 10 to 10½, and only moderately convex. Color a dull gray to flat white. Spire conic and acutely convex, variable and produced at an angle of about 75°. Aperture subcircular. Parietal tooth small, centered and positioned well within the aperture. Columellar tooth small and also positioned well within the aperture. Outer lip reflected though not carried back as a collar. Parietal lip or ridge straight and well-developed in adult specimens. Suture but slightly in-

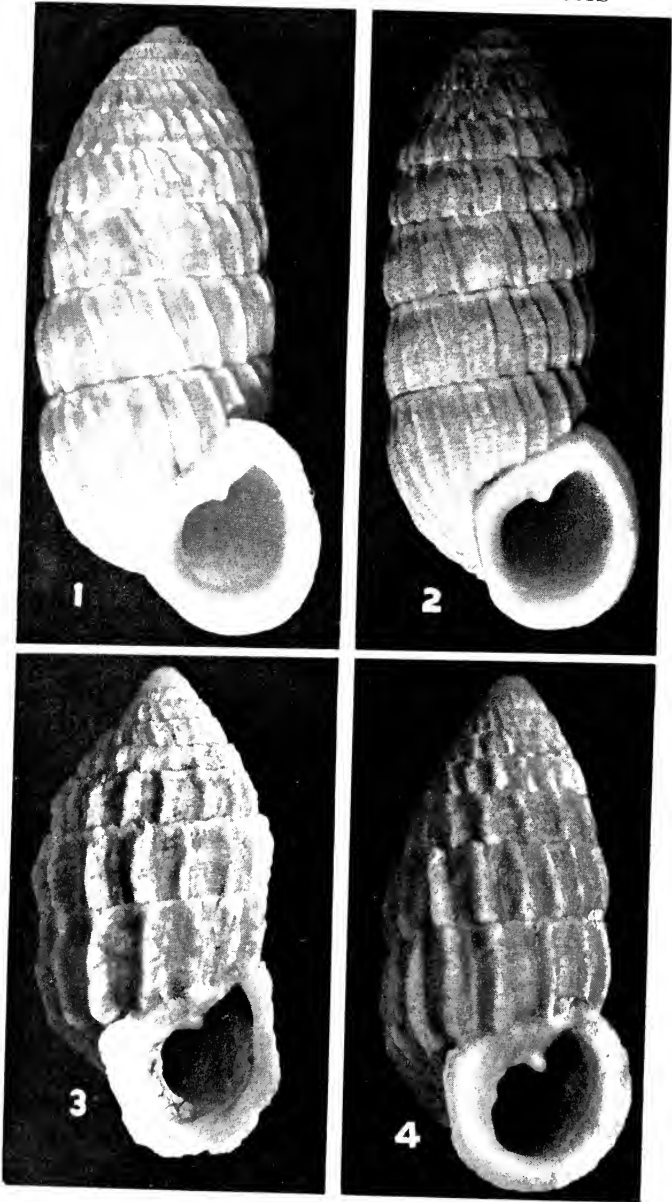


Plate 54

Fig. 1-2. *Cerion paucisculptum* Clench and Aguayo, Punta de Musica, Bahía de Samá, Banes, Cuba. Fig. 1. Holotype. Fig. 2. Paratype (both  $3\frac{1}{2}x$ ). Fig. 3-4. *Cerion felix* Pilsbry and Vanatta, Turtle Cove, Cat Island, Bahama Islands ( $3x$ ).

dented. Sculpture consisting of numerous axial costae, variable as to height and number. There are 20 costae on the body whorl of the holotype. On certain specimens these costae are nearly obsolete on the last or body whorl. Spiral sculpture consisting of numerous fine and incised spiral grooves. Early  $2\frac{1}{2}$  whorls very finely and axially costate.

length	width	whorls	
24.8	11.5 mm.	$10\frac{1}{2}$	Holotype
25	9.5	$10\frac{1}{2}$	Paratype
24	8.5	$10\frac{1}{2}$	"
23	9.0	10	"
22.3	9.0	10	"

*Types.* Holotype, Museum of Comparative Zoölogy, no. 192204, from Punta de Musica, Bahía de Samá, Banes, Oriente, Cuba, A. R. Quiñones, collector, 1947. Additional paratypes in the Museum of Comparative Zoölogy, the Museo Poey, no. 12905, the United States National Museum and the Museum of Zoology, University of Michigan and the collection of A. R. Quiñones.

*Remarks.* This species is related to both *scalarinum* and *scalarinum sueyrasi*. It differs from *scalarinum* in being far less conic and from both by having a material reduction in size and coarseness of the axial costae.

It is known only from the type locality.

### **Cerion (Umbonis) sisal**, new species

Plate 57, fig. 3

*Description.* Shell about 32 mm. ( $1\frac{1}{4}$  inches) in length, cylindrical, with a short tapering spire, rather heavy in structure and strongly sculptured. Color a dull light-gray, the costae being the same color. Whorls 11, slightly convex, the nuclear whorls opaque, somewhat glass-like in appearance and faintly axially costate. Spire extended, parallel-sided for about four whorls above the aperture, then conic to the summit. It is produced at an angle of about  $80^\circ$ . Aperture subquadrate in outline and somewhat flaring. Outer lip reflected. Parietal ridge well-developed making the aperture holostomatous. Parietal tooth centered, small and short. Columellar tooth small and relatively inconspicuous. It extends backwards for about one

whorl. Columella short and nearly straight. Umbilicus rimate and rather shallow. Suture moderately impressed. Sculpture consisting of numerous, somewhat irregular, robust, axial costae which number 13 to 17 on the body whorl. Spiral sculpture consisting of numerous deeply incised lines or threads which are cut into the shell even over the axial costae. In the present series which were collected alive, there is no trace of the powdered element nor the tendency to agglutinate minute sand grains to the shell.

length	width	whorls	
32	14 mm.	11	Holotype
32.5	14	11	Paratype
31.5	13.6	11	"
29.5	14	11	"

*Types.* Holotype, Museum of Comparative Zoölogy, no. 181992, from east side Boca de Mosquito, Mariel, Pinar del Rio, Cuba. Aguayo, Clench, Howell and Turner collectors, June 1949 and again in July 1950. Paratypes in the Museum of Comparative Zoölogy, Museo Poey, United States National Museum and the Museum of Zoölogy, University of Michigan.

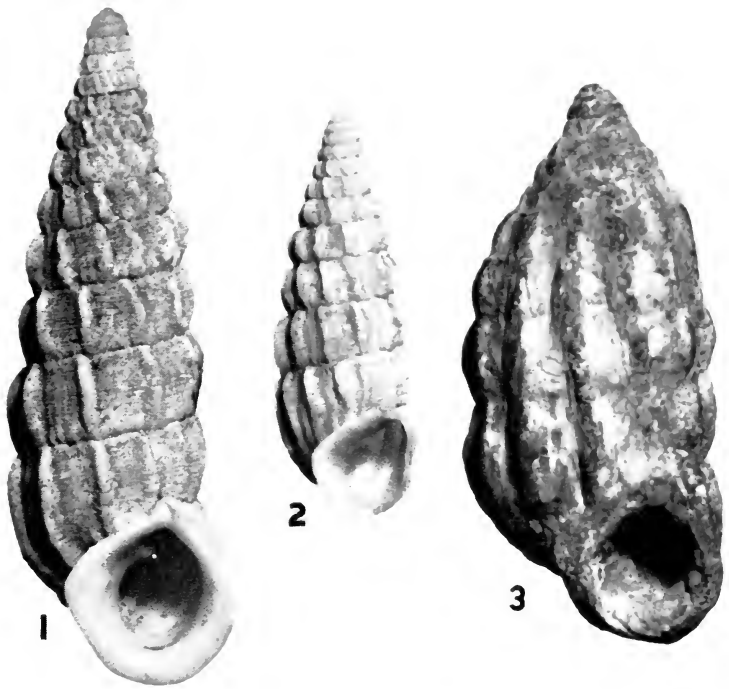
*Remarks.* This species is remarkably uniform in both shape and size. It is very possible that it is a hybrid element which has reached some sort of stability in both form and structure. The differences are rather marked between this form and *johnsoni* which exists on the opposite side of Boca de Mosquito. It is possible that repeated introductions of *johnsoni* have brought about profound changes in the original *Cerion* stock at this limited locality. To the east of Boca de Mosquito the *johnsoni* characters become less and less pronounced, particularly in the reduction and extent of the incised lines and the less straight-sided appearance of the early whorls.

### ***Cerion (Umbonis) asperum* Maynard and Clapp**

Plate 56, fig. 1-2

*Strophioops aspera* Maynard and Clapp 1920, Appendix to Records of Walks and Talks with Nature, West Newton, Massachusetts, **10**, p. 116, pl. 1, fig. 9-10 (southern end of Great Guana Cay [Exuma Group] Bahama Islands).

*Strophioops scalariformis* Maynard and Clapp 1920, Appendix to Records of Walks and Talks with Nature, West Newton, Massachusetts, **10**, p. 116, pl. 1, fig. 5-6 (south end of Great Guana Cay [Exuma Group] Bahama Islands).



## Plate 55

Fig. 1. *Cerion johnsoni* Pilsbry,  $1\frac{1}{2}$  miles east of the lighthouse, Mariel, Cuba (about 2.4x). Fig. 2. *Cerion faxoni* Maynard, Cuba (= *C. johnsoni* Pilsbry) paratype (about 1.8x). Fig. 3. *Cerion perantiquum* Maynard and Clapp, south end of Great Guana Cay, Exuma Group, Bahama Islands, holotype (about 2.3x).

*Description.* Shell about 30 mm. (about  $1\frac{1}{4}$  inches) in length, attenuated with a tapering spire, rather light in structure and strongly sculptured. Color a uniform dull grayish-white. Whorls 12, moderately convex, nuclear whorls opaque, glass-like; first  $1\frac{1}{2}$  smooth, the next  $1\frac{1}{2}$  with fine and numerous axial costae. Spire extended and tapering from the body whorl. It forms an angle of about  $27^\circ$ . Aperture subcircular to subquadrate. Parietal lip nearly straight and appressed to the body whorl, occasionally built forward making the aperture holostomatous. Parietal tooth centered and rather large, though not extending within the aperture. Columellar tooth very inconspicuous but extending within for nearly a full whorl. Palatal lip reflected and usually duplex. Columella short and arched. Umbilicus subcircular and open for a short distance within. Suture rather well-defined. Sculpture consisting of numerous and coarse axial costae, numbering 10-12 on the body whorl. Spiral sculpture consisting of numerous fine, incised striae or lines which in addition possess the fine powdered appearance. Nuclear whorls opaque, smooth and glass-like.

length	width	whorls	
25	11 mm.	12	Holotype of <i>asperum</i>
28.5	11	13	Paratype of <i>asperum</i>
30	12.3	12	Holotype of <i>scalariforme</i>
27	11.5	12	Paratype of <i>scalariforme</i>

*Types.* Holotype of *C. asperum* Maynard and Clapp, Museum of Comparative Zoölogy, no. 76176 and the holotype of *C. scalariforme* Maynard and Clapp, Museum of Comparative Zoölogy, no. 76180, both from the south end of Great Guana Cay, Exuma Group, Bahama Islands, C. J. Maynard, collector.

*Remarks.* Both *asperum* and *scalariforme* are but separate colonies of the same species. Maynard (loc. cit.) described several species of *Cerion* from the southern end of the Great Guana Cay, Exuma Group, Bahama Islands. Many of these show hybrid elements and completely intergrade.

In relationship this present form is nearest to *Cerion victor* Torre, a species occurring at the extreme eastern end of Cuba near Cabo Maisí. They differ in that *C. victor* is somewhat larger and lacks the duplex character of the palatal lip which is usually present in *asperum*.



**Cerion asperum processum** *Maynard and Clapp*

Plate 56, fig. 3-4

*Strophioops processa* Maynard and Clapp 1920, Appendix to Records of Walks and Talks with Nature, West Newton, Massachusetts, **10**, p. 116, pl. 1, fig. 7-8 (south end of Great Guana Cay, Bahama Islands).

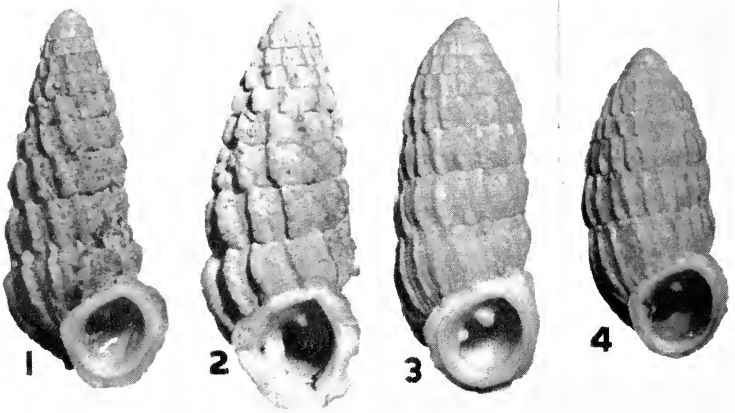
*Strophioops intentata* Maynard and Clapp 1920, Appendix to Records of Walks and Talks with Nature, West Newton, Massachusetts, **10**, p. 118, pl. 2, fig. 6-7 (south end of Great Guana Cay, Bahama Islands).

*Description.* Shell reaching about 24 mm. (1 inch) in length, rather solid, strongly sculptured and umbilicate. Color probably a dull white. Whorls  $10\frac{1}{2}$  to 11, moderately convex, the first 8 whorls forming a convex summit. Spire extended, the convex summit forming an angle of about  $55^\circ$ . Aperture subquadrate to subcircular. Outer lip reflected, thickened and slightly duplex. Inner lip nearly straight and built forward to form a ridge. Columella short and arched. Columellar tooth small but well-developed and extending back for a full whorl. Parietal tooth centered and large but rather short. Suture slightly indented. Sculpture consisting of rather coarse axial costae which number 14 to 18 on the body whorl. Spiral sculpture of exceedingly fine incised lines. Agglutinated sand grains present, though rare. Nuclear whorls glass-like and smooth for the first  $1\frac{1}{2}$  whorls then finely costate for the next whorl.

length	width	whorls	
20	8.8 mm.	$10\frac{1}{2}$	Holotype, <i>intentatum</i>
24.2	9.8	$10\frac{1}{4}$	Holotype, <i>processum</i>
22	9.2	$10\frac{1}{2}$	Paratype, <i>intentatum</i>
19.5	8.8	10	Paratype, <i>processum</i>

*Types.* Holotype of *C. intentatum*, Museum of Comparative Zoölogy, no. 76305; holotype of *processum*, Museum of Comparative Zoölogy, no. 76148. The type locality is the south end of Great Guana Cay, Exuma Group, Bahama Islands. Additional paratypes in the Museum of Comparative Zoölogy and the United States National Museum.

*Remarks.* Both these forms were found in closely adjoining territory. They appear to be a hybrid element exhibiting well-developed characters of the *scalarinum* complex. All specimens contained in these two colonies were collected dead.



## Plate 56

Fig. 1. *Cerion asperum* Maynard and Clapp, south end of Great Guana Cay, Exuma Group, Bahama Islands, holotype (2x). Fig. 2. *Cerion scalariforme* Maynard and Clapp, south end of Great Guana Cay, Exuma Group, Bahama Islands, holotype (1.8x). Fig. 3. *Cerion processum* Maynard and Clapp, south end of Great Guana Cay, Exuma Group, Bahama Islands, holotype (2x). Fig. 4. *Cerion intentatum* Maynard and Clapp, south end of Great Guana Cay, Exuma Group, Bahama Islands, holotype (2x).

**Cerion (Umbonis) mutatorium** *Maynard and Clapp*  
Plate 57, fig. 1

*Strophioops mutatoria* Maynard and Clapp 1920, Appendix to Records of Walks and Talks with Nature, West Newton, Massachusetts, **10**, p. 116, pl. 1, fig. 3-4 (south end of Great Guana Cay [Exuma Group] Bahama Islands).

*Description.* Shell rather solid, reaching about 26 mm. (1 inch) in length, rimately perforate and rather weakly costate. Color probably a dull white or gray (all specimens were dead when collected). Whorls  $10\frac{1}{2}$  to 12, slightly convex and slightly offset. Spire extended, the last three whorls being nearly straight-sided, the early whorls forming a somewhat convex cone which is produced at about  $39^\circ$ . Aperture subcircular. Outer lip reflected and slightly turned backward. Parietal lip straight, thickened, but not built forward materially. Columella short and arched. Parietal tooth centered, fairly large but short. Columellar tooth small and very short. Umbilicus rimately formed, short and shallow. Suture well-defined but shallow. Sculpture: first  $1\frac{1}{2}$  to 2 whorls glass-like and smooth, remaining whorls faintly and irregularly costate with a few specimens showing fairly strong costae on the body whorl. These number about 17 on the last whorl, though in many specimens they are very irregular and number far less. Spiral incised lines numerous. Nuclear whorls  $2\frac{1}{2}$ , smooth and glass-like.

length	width	whorls	
25.5	9.2 mm.	12	Holotype
24.9	8.4	$10\frac{1}{2}$	Paratype
25.2	9.4	$11\frac{1}{2}$	"
22.5	8.5	11	"

*Types.* Holotype, Museum of Comparative Zoölogy, no. 76234 from the south end of Great Guana Cay, Exuma Group, Bahama Islands. Paratypes from the same locality in the Museum of Comparative Zoölogy, the Museo Poey and the United States National Museum. C. J. Maynard, collector.

*Remarks.* In this form there has been a material reduction in the axial costae, certain specimens being nearly smooth. In a measure this species simulates *C. palmeri* Sanchez Roig from the north coast of Cayo Romano, Camagüey, Cuba, which has no axial costae at all and yet is probably a derivative of

*C. scalarinum* Pfeiffer and Gundlach from the Cuban coast, as *mutatorium* Maynard and Clapp is from *asperum* Maynard and Clapp from Great Guana Cay.

**Cerion (Umbonis) felis Pilsbry and Vanatta**

Plate 54, fig. 3-4

*Cerion (Maynardia) felis* Pilsbry and Vanatta 1895, Proc. Acad. Nat. Sciences, Philadelphia, p. 206 (Cat Island, Bahama Islands).

*Cerion (Strophiops) felis* Pilsbry and Vanatta 1896, Proc. Acad. Nat. Sciences, Philadelphia, p. 322, pl. 11, fig. 29.

*Cerion felis* Pilsbry and Vanatta 1902, Manual of Conchology (2), **14**, p. 221, pl. 44, fig. 72-73.

*Description.* Shell reaching 30 mm. (about 1¼ inches) in length, rather solid, rimately perforate and strongly sculptured. Color a rather dark gray, the axial costae being somewhat lighter. Whorls 11, moderately convex. Spire extended, cylindrical to about the fourth whorl above the aperture, then convexly conic to the apex and produced at an angle of about 55°. Aperture subquadrate. Outer lip reflected, somewhat expanded and rather thin. Parietal ridge strong and nearly straight making the aperture holostomatous. Parietal tooth centered and extending back for a very short distance. Columellar tooth small, relatively inconspicuous and extending back for nearly a full whorl. Columella short and nearly straight. Umbilicus rimately formed and shallow. Suture moderately impressed. Sculpture consisting of numerous, irregular axial costae numbering 14 to 18 on the body whorl. Spiral sculpture consisting of numerous incised lines which cut into the shell, even over the axial costae. Nuclear whorls very finely costate. Powdered element light and seen best along the edges of the incised lines. Agglutinated sand grains present though mainly restricted to the umbilical area.

length	width	whorls				
30	12.5 mm.	11	Turtle Cove,	Cat Island		
29.5	12.7	10½	"	"	"	"
27	13.1	10¼	"	"	"	"
23.2	10.8	10	"	"	"	"

*Types.* The type series of this species is in the Academy of Natural Sciences, Philadelphia from Cat Island, Bahama Islands.

*Remarks.* *Cerion felis* appears to be nearest in its relationship to *C. stevensoni* Dall from Long Island. See remarks under this latter species.

*Cerion felis* is probably a hybrid element that has retained most of the general characters of the *scalarinum* complex and yet shows certain characters of *C. glans*, many colonies of which exist on Cat Island.

*Records.* BAHAMA ISLANDS: Turtle Cove, 4 miles N.N.E. of The Bight, Cat Island, Bahama Islands (MCZ).

### ***Cerion (Umbonis) stevensoni* Dall**

Plate 53, fig. 1-3

*Cerion stevensoni* Dall 1900, *Nautilus* **14**, p. 65 (Long or Berry Island, Bahama Islands); Pilsbry 1902, *Manual of Conchology* (2) **14**, p. 220, pl. 44, fig. 70-71; Dall 1905 [in] *The Bahama Islands*, Geographic Society Baltimore, p. 40 (Rum Cay not Long Island); Clench 1934, *Proc. Boston Soc. Nat. Hist.* **40**, p. 209; Clench 1937, *Nautilus* **51**, p. 23, pl. 3, fig. 8-10; Clench 1940, *Memorias Soc. Cubana Hist. Nat.* **14**, p. 12.

*Description.* Shell rather short and stout, reaching about 29 mm. (about 1 inch) in length, umbilicate and coarsely sculptured. Color a dull somber gray. Whorls  $9\frac{1}{2}$  to 10, nearly straight-sided and irregular. Spire extended, the last 4 whorls of nearly equal width, the earlier whorls abruptly tapering to form an irregular cone, the conic portion produced at an angle of about  $90^\circ$ . Aperture subquadrate and holostomatous. Outer lip thin and reflected but not turned back. Parietal area nearly straight and continuous as a thin reflected lip, not thickened as a parietal ridge. Columella short and arched. Parietal tooth centered, well-developed and short, columellar tooth inconspicuous; neither follows back for more than one-fourth of a whorl. Umbilicus fairly large and deep. Suture very shallow and not well-defined. Sculpture: nuclear whorls smooth, white and opaque, next 3 to 4 whorls finely costate, remaining whorls strongly costate, the costae numbering 12 to 13 on the body whorl. Spiral sculpture consisting of numerous and rather fine incised lines that cut in even over the crests of the costae. Surface powdered, particularly along the edge of the incised lines. Agglutinated sand grains numerous and occasionally incorporated into the body of the shell.

length	width	whorls					
29	15 mm.	10	Wemyss, Long Island, Bahama Islands				
25.1	15.4	9	" " " " "				
24.7	15.5	10	" " " " "				

*Types.* Holotype, United States National Museum, no. 107833, from Long Island, Bahama Islands. Type locality selected (Clench 1940, p. 12) Wemyss, Long Island, Bahama Islands. In the references above (1905, p. 40) Dall changed the locality from Long Island to Rum Cay but this was in error.

*Remarks.* This is a rather short and stout species possessing very coarse sculpture. In relationship it appears nearest to *C. felis* Pilsbry and *Vanatta* from the central area of Cat Island. From *felis*, this present form differs by being proportionately wider, having coarser sculpture and being openly umbilicate.

*Records.* BAHAMA ISLANDS: Wemyss, 7 miles S.E. of Simms, Long Island (MCZ).

### ***Cerion (Umbonis) shrevei*, new species**

Plate 57, fig. 4

*Description.* Shell rimately perforate, solid, elongate, sculptured and reaching about 33 mm. ( $1\frac{1}{4}$  inches) in length. Whorls 10 to 11, moderately convex and slightly angled. Color a dull gray. Spire broadly conic, moderately convex at the summit, variable, and produced at an angle of about  $70^\circ$ . Aperture sub-circular to subovate. Parietal tooth rather large and centrally located. Columellar tooth small and positioned well within the aperture. Outer lip reflected backwards, though only shortly so. Parietal or inner lip consisting of a strongly developed straight ridge. Suture but slightly indented. Sculpture consisting of numerous and fine axial costae, variable as to their development and number. There are 65 on the body whorl of the holotype. Spiral sculpture consisting of numerous and fine incised lines; though variable they generally cut through the axial costae. First whorl smooth, the next finely axially costate, the following whorls more strongly axially costate.

length	width	whorls	
28	12.8 mm.	$10\frac{1}{2}$	Holotype
31	12	$10\frac{1}{2}$	Paratype
33.2	13.5	11	"
27.1	12.5	$10\frac{1}{2}$	"
25.5	12	10	"

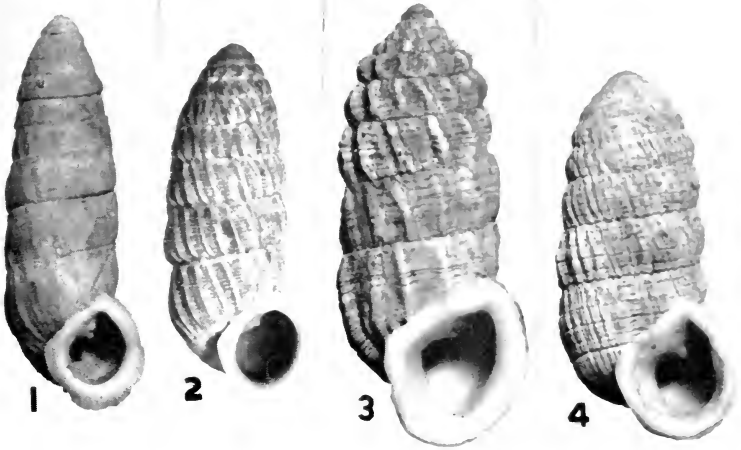


Plate 57

Fig. 1. *Cerion mutatorium* Maynard and Clapp, south end of Great Guana Cay, Exuma Group, Bahama Islands, holotype (2x). Fig. 2. *Cerion rehderi* Clench and Aguayo, 1 mile west of Conch Shell Point, Great Inagua, Bahama Islands, holotype (2.8x). Fig. 3. *Cerion sisal* Clench and Aguayo, east side of Boca de Mosquito, Mariel, Cuba, holotype (1.8x). Fig. 4. *Cerion shrevei* Clench and Aguayo, Northwest Point, Little Inagua, Bahama Islands, holotype (1.8x).

*Types.* Holotype, Museum of Comparative Zoölogy, no. 192287, from near Northwest Point, Little Inagua Island, Bahama Islands. R. A. McLean and B. Shreve, collectors, 1938. Additional paratypes in the Museum of Comparative Zoölogy, the Museo Poey, the United States National Museum and the Museum of Zoölogy, University of Michigan.

*Remarks.* This species does not seem to be closely related to any other in the *scalarinum* complex. The axial costae are fine and numerous, the spiral incised lines are coarse and rather deeply cut into the shell. It is, perhaps nearest to *C. palmeri* Sanchez Roig, at least in its shell characters. It differs in being less attenuate and in having both the axial costae and incised lines much stronger.

*Records.* BAHAMA ISLANDS: near Northwest Point, Little Inagua (MCZ); Northwest Point and halfway between West and South Points, Little Inagua (both USNM).

### ***Cerion (Umbonis) palmeri* Sanchez Roig**

Plate 52, fig. 5-6

*Cerion palmeri* Sanchez Roig 1948, Revista de la Soc. Malacologica "Carlos de la Torre" **6**, p. 69, pl. 1, fig. 6 (Cayo Romano (22°24' N.; 76°6' W.) [Cama-güey] Cuba).

*Description.* Shell rather small and narrow, reaching 19.3 mm. (about  $\frac{3}{4}$  inch) in length, rimately perforate, rather light in structure and finely sculptured. Color a dull and uniform grayish-white to a light straw-yellow, sometimes mottled or marbled. Whorls  $10\frac{1}{2}$  and slightly convex. Spire extended, tapering moderately from the body whorl to the first three whorls, these latter forming a rather rounded summit. Aperture subquadrate. Outer lip slightly expanded. Inner or parietal lip straight and thickened slightly to form a very low ridge. Columella short and straight. Parietal tooth centered, low and short. Columellar tooth small and rather inconspicuous, extending within for a full whorl. Umbilicus rimately formed and very small. Suture slightly indented. Sculpture: first  $1\frac{1}{2}$  whorls smooth, remaining whorls with numerous, exceedingly fine and slightly oblique costae which become rather obscure on the body whorl. Spiral sculpture consisting



of numerous, fine, incised lines. Live specimens show the fine powdered element to be present but not abundant.

length	width	whorls	
16.3	5.4 mm.	—	Holotype
19.3	6.5	—	Paratype
18	5.8	10½	"

*Types.* Holotype, collection of M. Sanchez Roig, no. 1002. Paratypes in the Museo Poey and the Museum of Comparative Zoölogy, no. 128779 and 192167 from Cayo Romano, Camagüey, Cuba (N. Lat. 22°24'; W. Long. 76°6'); collected by R.H. Palmer.

*Remarks.* This is the most diminutive species in *Umbonis* on the Cuban coast. It represents a reduction in size and in all sculptural characters.

In relationship it is probably closely allied to *C. acuticostatum* Sanchez Roig, the relationship being more real than apparent. *Cerion acuticostatum* is a strongly and axially costate shell while *palmeri* is nearly smooth.

\* \* \* \*

### Notes

The two following species are not members of the subgenus *Umbonis* but are included here as both possess the spiral incised lines. This may have resulted from hybridization with elements in the *scalarinum* complex at some time in the past.

### *Cerion glans scalarinoides* Plate

*Cerion glans scalarinoides* Plate 1907, Archiv für Rassen-und Gesell. Biologie 4, p. 595, pl. 4, fig. f (Green Cay, Tongue of the Ocean, Bahama Islands [N. Lat. 24°2'; W. Long. 77°11']).

*Remarks.* This species is in the *glans* complex but does possess a series of rather deeply incised spiral lines. In this case it may mean that there has been an introduction of some

*scalarinum* element, possibly from Great Exuma Island, which has completely integrated with the original *Cerion* on Green Key, the evidence remaining being these incised lines. This same possibility has apparently produced the occurrence of incised lines on two Cuban species which exist in the vicinity of *scalarinum* elements.

***Cerion perantiquum* Maynard and Clapp**

Plate 55, fig. 3

*Strophioops perantiqua* Maynard and Clapp 1920, Records of Walks and Talks with Nature, West Newton, Massachusetts, **10**, appendix p. 115, pl. 1, fig. 1-2 (south end of Great Guana Cay, Bahama Islands).

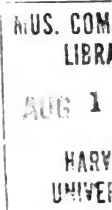
*Remarks.* This species was based upon a series of "fossil" shells. According to Maynard, he collected these in the red earth of a cultivated field and all may be quite recent. Two specimens show traces of spiral lines. Very probably these are the remnant of a hybrid colony, possibly a cross between the *scalarinum* element and a member of the *glans* complex. All of the specimens are in very poor condition.

length	width	whorls	
31.8	15 mm.	11	Holotype

*Types.* Holotype, Museum of Comparative Zoölogy, no. 187537, from the south end of Great Guana Cay, Exuma Group, Bahama Islands. Additional paratypes (all broken or worn) in the Museum of Comparative Zoölogy and the United States National Museum.

# Occasional Papers On Mollusks

Published by  
THE DEPARTMENT OF MOLLUSKS  
Museum of Comparative Zoölogy, Harvard University  
Cambridge, Massachusetts



VOLUME 1

AUGUST 14, 1954

NUMBER 18

## Review Number and Index

The following pages contain additional information for several of the numbers in this volume. Certain of these data had been overlooked at the time the original studies were made. Other data, however, such as the many names in *Liguus* have been published since our catalogue on this genus appeared.

### Supplement to Joseph Pitty Couthouy

(*Occasional Papers*, no. 5)

By RICHARD I. JOHNSON

Since the publication of the above paper, the following names employed by Couthouy have been uncovered. All except the one described by Gould appear to be nomina nuda. The initials, PBSNH, refer to the Proceedings of the Boston Society of Natural History.

**erosa, Littorina:** 1844, PBSNH 1, p. 52 (Terra\* del Fuego) [nomen nudum].

**fucicola, Gaimardia:** 1844, PBSNH 1, p. 26 [nomen nudum].

**keraudrenii, Cyrena:** 1844, PBSNH 1, p. 26 [nomen nudum].

**lirata, Helix:** 1844, PBSNH 1, p. 52 (Terra del Fuego) [nomen nudum].

**pileiformis, Siphonaria:** 1844, PBSNH 1, p. 26 (Terra del Fuego) [nomen nudum].

**ruivensis 'Couthouy' Gould Vitrina:** 1846, PBSNH 2, p. 80.

**rupium, Helix:** 1844, PBSNH 1, p. 52 (Terra del Fuego) [nomen nudum].

**variabilis, Chiton:** 1844, PBSNH 1, p. 26 (Terra del Fuego) [nomen nudum].

We have located an original oil painting of J. P. Couthouy

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\*Tierra del Fuego.

which hangs in the Boston Athenaeum, 10½ Beacon Street, Boston, Massachusetts.

### Supplement to John Gould Anthony

(*Occasional Papers*, no. 8)

By RUTH D. TURNER

Anthony sent shells in exchange to people all over the world and often these were labeled only with manuscript names, many of which he never published. Unfortunately several of these names, credited to Anthony, have appeared in various catalogues by other authors. The following are such nomina nuda that have come to our attention since the publication of the paper on Anthony.

**altilis** 'Anthony' Tryon **Gyrotoma**: 1873, Land and Freshwater Shells of North America, Part 4, Strepomatidae. Smithsonian Miscellaneous Collections, no. 253, p. xv [nomen nudum].

**concolor** 'Anthony' Jay **Melania**: 1850, Catalogue of the Shells Contained in the Collection of John C. Jay, New York, 4th ed., p. 276 [nomen nudum]. In Occasional Papers, no. 8, this was given as 'Anthony' Brot 1862, but it was actually published much earlier by Jay.

**crassa** 'Anthony' Tryon **Io**: 1873, Land and Freshwater Shells of North America, Part 4, Strepomatidae. Smithsonian Miscellaneous Collections, no. 253, p. 3 [nomen nudum, listed as a variety of *Io spinosa* Lea].

**heterostropha** 'Anthony' Jay **Paludina**: 1850, Catalogue of the Shells Contained in the Collection of John C. Jay, New York, 4th ed., p. 280. [This is probably an error for *Paludina heterostropha* Kirtland.]

**monilifera** 'Anthony' Tryon **Melania**: 1873, Land and Freshwater Shells of North America, Part 4, Strepomatidae. Smithsonian Miscellaneous Collections, no. 253, p. 157 [Tryon refers this name to the Jay Catalogue, 4th ed., but we have been unable to locate it].

**sayanum** 'Anthony' Jay **Cyclostoma**: 1850, Catalogue of the Shells Contained in the Collection of John C. Jay, New York, 4th ed., p. 259 [nomen nudum].

### Supplement to the Catalogue of the Genus *Liguus*

(*Occasional Papers*, no. 10)

By WILLIAM J. CLENCH

Since the publication in this series of the Catalogue on *Liguus* in 1946, several more descriptions have appeared. Most of these deal with new color races that occur in Cuba.

The abbreviation Rev. Soc. Mala. refers to Revista de la

Sociedad Malacológica 'Carlos de la Torre,' Museo Poey, Universidad de la Habana, Cuba.

- achatinus** Clench, **Liguus fasciatus**: 1934, Occasional Papers, Boston Society of Natural History **8**, p. 107, pl. 7, fig. 1 (Los Arroyos, Holguín, Oriente, Cuba). Holotype no. 58803, Museum of Comparative Zoölogy.
- alcaldei** Sanchez Roig, **Liguus fasciatus**: 1951, Rev. Soc. Mala. **8**, p. 23, pl. 4, fig. 1 (Gallo, Jagüey Grande) [Matanzas] Cuba). Holotype, collection of Sanchez Roig.
- añei** Sanchez Roig, **Liguus fasciatus**: 1951, Rev. Soc. Mala. **8**, p. 34, pl. 5, fig. 7 (finca Las Vueltas, Alonso Rojas, Pinar del Río, Cuba). Holotype, collection of Sanchez Roig; paratypes in the Museo Poey.
- arenarius** Sanchez Roig, **Liguus fasciatus**: 1948, Rev. Soc. Mala. **6**, p. 69, pl. 1, fig. 1 (Monte Macuto, Camagüey, Cuba). Holotype, collection of Sanchez Roig; paratypes in the Museo Poey.
- barretoii** Sanchez Roig, **Liguus fasciatus**: 1951, Rev. Soc. Mala. **8**, p. 32, pl. 4, fig. 6 (Monte de Barreto, Miramar, Marianao [Habana] Cuba). Holotype, Sanchez Roig collection.
- candelariae** Sanchez Roig, **Liguus fasciatus**: 1951, Rev. Soc. Mala. **8**, p. 33, pl. 5, fig. 8 (Salto de Manantiales, Candelaria, Pinar del Río, Cuba). Holotype, collection of Sanchez Roig.
- cayajaboense** Sanchez Roig, **Liguus fasciatus**: 1946, Rev. Soc. Mala. **6**, p. 71, pl. 1, fig. 3 ("Mercedes" farm, Cayajabos, Pinar del Río, Cuba). Holotype, collection of Sanchez Roig; paratypes in the Museo Poey.
- doanensis** Sanchez Roig, **Liguus fasciatus**: 1951, Rev. Soc. Mala. **8**, p. 28, pl. 5, fig. 4 (Cayo Doan, opposite Cayo Chalupa, Cardenas, Matanzas, Cuba). Holotype, Sanchez Roig collection.
- floridus** Sanchez Roig, **Liguus fasciatus**: 1951, Rev. Soc. Mala. **8**, p. 29, pl. 4, fig. 3 (Campo Florido, Habana, Cuba). Holotype, Sanchez Roig collection.
- giganteus** Sanchez Roig, **Liguus murreus**: 1951, Rev. Soc. Mala. **8**, p. 30, pl. 4, fig. 5 (finca Sotolongo, Guira de Melena; La Habana, Cuba). Holotype, Sanchez Roig collection.
- helenae** Sanchez Roig, **Liguus fasciatus**: 1951, Rev. Soc. Mala. **8**, p. 27, pl. 4, fig. 1 (finca Santa Elena, Zaza del Medio [Las Villas] Cuba). Holotype, Sanchez Roig collection.
- howelli** Clench, **Liguus nobilis**: 1951, Rev. Soc. Mala. **7**, p. 93, text figs. 1-4 (Río Dominica, about 10 miles west of Mariel, Pinar del Río, Cuba). Holotype, Museum of Comparative Zoölogy, no. 187133; paratypes in the Museo Poey and the United States National Museum.
- hussilloensis** Sanchez Roig, **Liguus murreus**: 1951, Rev. Soc. Mala. **8**, p. 32 [nomen nudum].

- letranensis** Sanchez Roig, *Liguus fasciatus*: 1951, Rev. Soc. Mala. **8**, p. 23, pl. 15, fig. 2 (around the baths, San Juan de Letran, Trinidad [Las Villas] Cuba). Holotype, Sanchez Roig collection.
- martii** Sanchez Roig, *Liguus fasciatus*: 1948, Rev. Mala. Soc. **6**, p. 71, pl. 1, fig. 4 (El Jobo de Marti, Jiguaní, Oriente, Cuba). Holotype, Sanchez Roig collection; paratypes, Museo Poey.
- minutus** Sanchez Roig, *Liguus murreus*: 1951, Rev. Soc. Mala. **8**, p. 32 [nomen nudum].
- paredonis** Sanchez Roig, *Liguus fasciatus*: 1948, Rev. Soc. Mala. **6**, p. 69, pl. 1, fig. 2 (North coast of Cayo Paredón Grande [Camagüey] Cuba). Holotype, Sanchez Roig collection; paratypes, Museo Poey.
- pazensis** Sanchez Roig, *Liguus fasciatus*: 1951, Rev. Soc. Mala. **8**, p. 29, pl. 4, fig. 2 (Vegas, Nueva Paz, Habana, Cuba). Holotype, Sanchez Roig collection.
- picturatus** Sanchez Roig, *Liguus murreus*: 1951, Rev. Soc. Mala. **8**, p. 32 [nomen nudum].
- poncianus** Sanchez Roig, *Liguus fasciatus*: 1951, Rev. Soc. Mala. **8**, p. 26, pl. 5, fig. 3 (Ciego Ponciano, between Banao and Trinidad, Las Villas, Cuba). Holotype, Sanchez Roig collection.
- regina** 'Ferussac' Bowdich *Helix*: 1822, Elements of Conchology, Paris, pl. 8, fig. 26.  
This was a curious error by Bowdich. He had copied one of Férussac's figures of [*Liguus*] *virginea* but applied the name of *Helix regina* Férussac, a name which was on the previous plate in Férussac.
- roseoviridis** Sanchez Roig, *Liguus fasciatus*: 1951, Rev. Soc. Mala. **8**, p. 35, pl. 5, fig. 1 (Central Jaronú, Camagüey, Cuba). Holotype, Sanchez Roig collection.
- sanctamariae** Sanchez Roig, *Liguus fasciatus*: 1951, Rev. Soc. Mala. **8**, p. 23, pl. 5, fig. 5 (South coast of Cayo Santa María, Caibarién, Las Villas, Cuba). Holotype, Sanchez Roig collection.
- scissilabre** Nodal, *Liguus fasciatus*: 1947, Rev. Soc. Mala. **5**, p. 84, text figure (near Nuevitas, Camagüey, Cuba). Holotype, Nodal collection; paratypes, Museo Poey.
- victoriae** Sanchez Roig, *Liguus fasciatus*: 1951, Rev. Soc. Mala. **8**, p. 36, pl. 5, fig. 6 (Victoria de las Tunas [Oriente] Cuba). Holotype, Sanchez Roig collection.
- waltoni** 'Torre' Pilsbry, *Liguus fasciatus*: 1946, Land Mollusca of North America, Monographs, no. 3, Academy of Natural Sciences Philadelphia **2**, pt. 1, p. 84 [nomen nudum].
- wintei** Humes, *Liguus fasciatus*, form: 1954, Gastropodia **1**, no. 2, p. 10, text figs. 1-2 (hammock north of Long Pine Key, Dade Co., Florida. [This form appears to be an absolute synonym of *L. f. castaneus* Simpson.]

**Supplement to the Catalogue of the  
Family Truncatellidae**

(*Occasional Papers*, no. 13)

By WILLIAM J. CLENCH AND RUTH D. TURNER

**hammerschmidtiana** 'Charpentier' Mousson **Truncatella**: 1854, Mittheilungen Naturforschenden Gesellschaft in Zurich **2**, p. 398 (near Saide, Syria) [nomen nudum].

Apparently this was a manuscript name until 1855 when the species was formally described by Küster as *hammerschmidti* (see page 200).

**insularis** Clench and Turner, **Truncatella thaanumi**: 1948, Occasional Papers On Mollusks **1**, no. 13, p. 166 (Houma, Tongatabu, Tonga Islands).

We here figure this subspecies (Plate 58, fig. 3) as the illustration was omitted in our original description; Holotype B. P. Bishop Museum, Honolulu. Paratypes, Museum of Comparative Zoölogy, no. 183889.

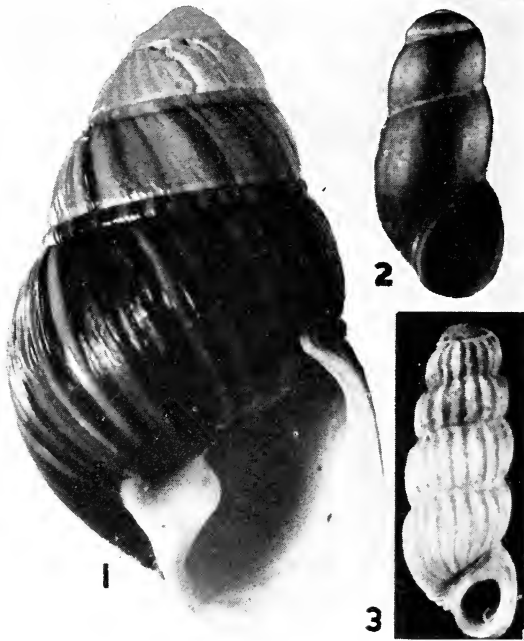
**manchurica** A. Adams **Cecina**: 1861, Annals and Magazine Natural History (3) **8**, p. 308; Sykes, E. R. 1901, Journal of Malacology **8**, p. 60, fig. 2.

We figure this species (Plate 58, fig. 2) because a synonym of it, *T. tatarica* Schrenck, was considered originally a *Truncatella*. Sykes, as noted above, made a small pen drawing of this species but we are able to figure a cotype specimen from A. Adams. It is certainly not a *Truncatella* or even a member of the family, but is probably in the family Hydrobiidae.

**microglypta** Pilsbry and Brown **Geomelania (Scalatella)**: 1910, Proceedings Academy of Natural Sciences Philadelphia, p. 532, text fig. 13 (near Mandeville, Jamaica).

**parvula** Pilsbry and Brown **Geomelania**: 1911 [1912], Proceedings Academy Natural Sciences Philadelphia, p. 587 [new name for *Geomelania parva* Chitty, non *G. gracilis parva* C. B. Adams].

We overlooked this change of name by Pilsbry and Brown which appeared in a footnote. This will replace *parvulina* Clench and Turner which was proposed to replace the same homonym.



## Plate 58

Fig. 1. *Achatinella viridans* Mighels. Lectotype, Oahu, Hawaiian Islands (about 4x). Fig. 2. *Cecina manchurica* A. Adams. Cotype (7x). Fig. 3. *Truncatella thaenumi insularis* Clench and Turner. Holotype from Houma, Tongatabu, Tonga Islands (7x).



**Supplement to Jesse Wedgwood Mighels***(Occasional Papers, no. 14)*

By RICHARD I. JOHNSON

Since the publication of the above paper we have been fortunate in obtaining a cotype of *Achatinella viridans* Mighels from the lot in the J. C. Jay collection in the American Museum of Natural History. This specimen, MCZ 188052, is here selected as lectotype and is figured on pl. 58, fig. 1 (see p. 230).

**Supplement to Western Atlantic Marine Mollusks  
Described by C. B. Adams***(Occasional Papers, no. 15)*

By WILLIAM J. CLENCH AND RUTH D. TURNER

**krebsii** 'C. B. Adams' Krebs **Pholas**: 1864, *The West Indian Marine Shells with Some Remarks*, Nykjobing, Denmark, p. 113 [nomen nudum].

A manuscript name of C. B. Adams which was never published by him.

**nivea** 'C. B. Adams' Arango **Crepidula**: 1879, *Contribucion a la Fauna Malacologica Cubana*, Habana, p. 227 [nomen nudum].

A manuscript name of C. B. Adams which was never published by him.

## BOOK REVIEWS

DAKIN, WILLIAM J. 1952, assisted by Isobel Bennett and Elizabeth C. Pope: *Australian Seashores; A Guide for the Beach-lover, the Naturalist, the Shore Fisherman and the Student*. Angus and Robertson, Sydney and London. 1st edition, 1952; reprinted 1953. 372 pp., 99 pls., 23 text figures.

This book is the first of its kind to be written about Australian seashores, although a number of earlier works have similarly described the shores of North America and England. It is the product of many years of work on marine animals, and particularly those of the seashore, by the late W. J. Dakin, Emeritus Professor of Zoology at the University of Sydney. In this work he was ably assisted for many years by his colleagues, Isobel Bennett and Elizabeth Pope, upon whom fell much of the burden of producing the completed volume, and to whom full credit must be given for its excellence.

Although the subject matter is designed to meet the needs of the many people whose interests draw them to the seashore, students of Australian malacology will find much to reward them in this book. Mollusks were Professor Dakin's first love, and of the last section of the book which describes the animals and plants of the seashore, no less than 96 pages and 29 plates are devoted to the common species of mollusks. Those of the Victorian and New South Wales coasts are emphasized, and most are illustrated by superb photographs, together with detailed and accurate information on their distinguishing characters, distribution, and habits.

The second printing corrects the few errors which were found in the first edition. Malacologists may consider it unfortunate that the authorities are not given for species names. However, adequate references are given and the book is not meant to be a systematic handbook. The wealth of detail about the ecology, habits and importance of the Australian mollusks makes it a valuable reference for students, both amateur and

professional; all will find much pleasure and knowledge in Dakin's delightful descriptions of the seashores which he knew and loved so well.

DONALD F. McMICHAEL  
The Australian Museum,  
Sydney

LANGE DE MORRETES, FREDERICO, 1949, *Ensaio de Catálogo dos Moluscos do Brasil*. Arquivos do Museu Paranaense, Curitiba, Parana 7, pp. 5-216.

This report is particularly important in that it is the first attempt to bring together in a single catalogue the entire mollusk fauna of Brasil. The catalogue is arranged systematically, giving the date of publication for each species and the known distribution. No references are given under the species but the date following the author's name allows one to find the original description by referring to the excellent bibliography. The author appears not to have seen most of the recent papers as the date of the latest paper listed is 1940. This, of course, means that many additions and corrections are necessary on the basis of more recent work. However, this is usually the case when a work of such scope is undertaken for the first time.—R. D. TURNER.

## INDEX

The index that follows does not include all of the names covered in this volume. All such names are easily found in the various numbers which are in alphabetical arrangement and are thus self-indexed. These numbers are:

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