SMITHSONIAN MISCELLANEOUS COLLECTIONS
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(End of Volume)

THE PYRAMIDELLID MOLLUSKS OF THE PLIOCENE DEPOSITS OF NORTH ST. PETERSBURG, FLORIDA

(With 18 Plates)

By
PAUL BARTSCH
Associate in Mollusks, U. S. National Museum

(Publication 4186)

CITY OF WASHINGTON
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THE PYRAMIDELLID MOLLUSKS OF THE PLIOCENE DEPOSITS OF NORTH ST. PETERSBURG, FLORIDA [1]

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INTRODUCTION

It is unfortunate that time does not permit me to make a complete survey of the Floridian Recent and Tertiary pyramidellid fauna, for this family embraces a larger number of species than does any other in that region. This fauna here has been almost completely neglected, owing evidently to the inconspicuous size of its members. Our past knowledge of it is paralleled by that of the West American species prior to the publication of United States National Museum Bulletin 68, "A Monograph of West American Pyramidellid Mollusks," by Dall and Bartsch, 1909.

Prior to that study it fell to my lot to determine material sent to our Museum, and I recall the genus *Turbonilla* had all the specimens arranged under six specific names. Some, it is true, were placed under the generic names of both *Turbonilla* and *Chemnitzia*. I remember that I facetiously suggested to Dr. Dall that we draw lots to decide which of the six names should be attached to a specimen when sent in for determination. It was that trite remark which started me on several years of study, resulting in Bulletin 68.

The Recent and fossil pyramidellids of East America are in an equally lamentable condition. Here, as on the west coast, prior to the publication of Bulletin 68, authors have attached names to species bearing a congeneric resemblance to some illustration, regardless of geographic or geologic distribution. Had the author had a specimen instead of a drawing for comparison, it would have prevented him from misapplying the name.

[1] This work has been published in part from a grant to the Smithsonian Institution from William G. Fargo and in part from the Charles D. and Mary Vaux Walcott Research Fund.

The United States National Museum now has a most magnificent collection of East American pyramidellids, which extend from the late Cretaceous to Recent times, and represents more than half a century of effort by geologists and marine investigators. My paper "Pyramidellidae of New England and the Adjacent Region," Proceedings of the Boston Society of Natural History, vol. 34, No. 4, 1909, cleared up the northern range. The rest is still awaiting attention.

The present paper is merely an effort to give a taxonomic status to the members of this family that the indefatigable painstaking labors of William G. Fargo and Charles R. Locklin have brought to light in their exploration of the Pliocene deposits of North St. Petersburg, Fla. The fact that so many new species and several new superspecific groups are here described is not surprising, for the entire southern pyramidellid fauna both Recent and fossil has been neglected by students and hence offers an unusually large rich field for investigation. It would be particularly interesting, for example, to find out how many of the forms here diagnosed extend to the Pleistocene and the Recent or to earlier strata, and also how far they extended along the coast in synchronous deposits. Equally interesting would it be to trace their affinities and relationships to the West Indian and Gulf and Caribbean mainland shore faunas.

The general geologic and physiographic relationships of the region are so well put forth in the main volume of which this should really be a part [2] that it is not necessary to repeat that information here. We may, however, quote a few lines from it (pp. 5-6) to give an explicit location of the place that has furnished the shells for the present report:

> The fossiliferous zone begins about 150 feet east of the southeast corner of 9th Street North and 70th Avenue North (or in the northwest corner of Sec. 31, T. 30 S., R. 17 E.), and extends in a southeasterly direction for about 600 feet. The elevation of the Ninth Street pavement at 70th Avenue is about five feet above mean tide level, according to records in the office of the City Engineer. This area forms a small part of an extensive real estate subdivision of the 1920's called "North St. Petersburg," in which some of the streets are open and others not.
>
> Along the North St. Petersburg fossil band, typical Caloosahatchee [Pliocene] shells are scattered over the surface of the ground or can be obtained in greater

[2] Pliocene Mollusca of southern Florida with special reference to those from North Saint Petersburg, by Axel A. Olsson and Anne Harbison, with special chapters on Turridae by William G. Fargo, and Vitrinellidae and Fresh-water Mollusks by Henry A. Pilsbry. Monogr. Acad. Nat. Sci. Philadelphia, No. 8, 457 pp., 65 pls., 1953.

numbers and in more perfect condition by excavation and screening. The upper two feet is predominantly sandy, grading down into fairly pure marl below, but penetration by means of hand-dug pits could not be carried deeper than a few feet because of water encroachment. As reported by Mr. Locklin, some of the pits in the marginal zone encountered black silty mud below the fossil zone, closely resembling the recent swamp mucks of the vicinity. Because of its unusual setting and relatively small size, the nature of the St. Petersburg fossil formation was very baffling, and it could not be determined at once whether it represented a natural outcrop or merely a secondary reworked deposit. Investigations carried out largely by Mr. Fargo and Mr. Locklin, after the main part of this paper had been prepared, show conclusively that this fossil band is not a true bed, but fill and ballast material dredged or pumped from nearby pits during the land-boom days of the 1920's. As these pits, now filled with water, are relatively shallow, none exceeding 15 feet in depth, the Caloosahatchee marls must lie fairly close to the surface over a considerable area in North St. Petersburg and in the adjoining sections of Pinellas County. These Pliocene shells have generally a distinctive buff or pale reddish color which easily distinguishes them from stray Recent or Pleistocene forms which are white or cream-colored. Large shells are absent or represented by fragments, as these could pass through the pump and pipe lines easily. However, the smaller shells are often in an exquisite state of preservation and by their abundance show the extreme richness of the Caloosahatchee marls at this place. . . .

For a period of about ten years Mr. Fargo and Mr. Locklin have continued to collect fossils from this locality. Many tons of marl or sand were washed, screened and sorted, special attention being given to the smaller forms. Screens of 20-30 mesh were used to save the small species.

When one reviews the Pyramidellidae of that monumental work by Dr. William H. Dall entitled "Contributions to the Tertiary Fauna of Florida and the Pliocene Beds of the Caloosahatchee River" (Trans. Wagner Free Inst. Sci., vol. 3, pt. 2, 1892) one is astonished at the change of concept expressed there and in the present paper. These differences in interpretation are in reality an exposition of the advancement in sciences and technology that have taken place in the interval. When Dr. Dall produced that fundamental study our knowledge of the distribution of geological formations was quite limited and the collections from the various strata equally scanty. The underlying oceanographic principles, such as ocean currents, salinity, temperature, hydrogen-ion concentration, had scarcely been touched upon. These are the factors that determine the zoogeographic distribution of marine organisms, the boundaries of the territory occupied by various species. They are the foundation stones upon which the modern marine biologist bases his taxonomic studies.

Then we must also remember that science in 1892 had not yet produced the stereobinocular microscope and the useful incandescent illuminating devices by which we can greatly enlarge the image of a small object and hold it in steady focus and compare it side by side

in every detail with a related species. Dr. Dall's studies of small species, like those by his confreres, were made with a hand lens whose magnification and shifting focus at that time did not make the detailed comparative study possible.

It is therefore not surprising that in 1892 scientists did not use the discrimination employed today, and their specific names usually embraced groups rather than species. In this they also were aided by the type of illustrations then used, which were pen or pencil drawings whose accuracy depended upon the artist, which easily led the casual observer to believe that he recognized a specimen under observation as that described and named from the other side of the world. Today the camera lens and photogelatine reproduction give us figures that leave no doubt about what an author intends to cover by a specific name and helps to remove misunderstandings and confusion.

Then, too, in malacology we are adding year by year bits of information about the soft parts of living organisms which greatly help us understand relationships. But here, too, I may add a word of caution. In today's anatomic studies I find that great importance and values are placed upon the features of the reproductive organs. These studies practically always are based upon material taken at the same time. What is badly needed in Mollusca are anatomic studies covering all the different seasons, to note how constant and reliable the features may be upon which we base our classification.

Not infrequently *conchologists* are reviled by *soft anatomists.* To such I would say: Study pyramidellids; there you will find recorded in the nucleus—the nepionic shell—the early embryonic history, while the rest of the shell carries the story through its various subsequent stages to senescence and death. These are characters that the soft anatomy of no single individual records at one time. Both types of studies are equally important and much needed.

The nomenclature adopted in 1909 by Dall and Bartsch in Bulletin 68, as far as superspecific designations were concerned, was ultraconservative. At that time we recognized four genera in the family. Under all but one, *Murchisonella,* a monotypic genus, we placed a host of subgenera and sections. Under the genus *Pyramidella* we listed 24 subgenera and sections. Under the genus *Turbonilla* we likewise recognized 24 subgenera and sections, while under the genus *Odostomia* 41 subgenera and sections are named. To these, others have since been added from various parts of the world. It would have been better, I think, if we had recognized many of our subgeneric

groups as genera, and thereby enticed students to undertake a study of pyramidellids.

This ultraconservative attitude of ours would seem to have been at that time, or even today, of little importance. Additional studies of material from many parts of the world made it necessary to make an exhaustive study of the literature and prepare a card catalog of all described species in order to discover all the names that had been used in the past so as to prevent us from creating homonyms and synonyms. This study produced startling results. First of all, it revealed that several thousand species had been described in this family, a fact probably responsible for scaring off modern research men in systematic zoology and paleontology. These are the chief underlying facts, I believe, that have left the members of this family practically a virgin field in East America, in not only the Recent but also the Tertiary faunas. How absolutely necessary such a catalog as the one in our possession is, is demonstrated by the name *Turbonilla elegans,* which has been applied by different authors to no less than 17 distinct species. Sixteen of these have to be discarded as homonyms.

Since it is my belief that it will be easier for students to become acquainted with the members of smaller genera, I shall herein elevate some of the subgenera used by Dall and Bartsch to generic rank.

Special attention is called to the introduction to pseudogenus *Striopyrgus,* which discusses hybridization among pyramidellids and other mollusks, page 53.

The types of the new species and the first series of duplicates have been donated by the collectors to the United States National Museum and bear the U.S.N.M. catalog numbers on the labels and in our register. The remaining duplicates have been sent to the Academy of Natural Sciences of Philadelphia for intercalation in the Fargo-Locklin collection.

Acknowledgments.—I am not only indebted to the Fargo-Locklin partnership for the opportunity of working up this splendid collection of pyramidellids that they have extracted by many years of effort from the Pliocene deposits of North St. Petersburg, Fla., but also for funds to cover the making of detailed sketches where they were found desirable and the translation of my penciled manuscript into typed form.

The Photographic Laboratory of the Smithsonian Institution deserves credit for the making of the greatly enlarged photographs, which are reproduced unretouched.

The detailed spiral-sculpture drawings were made by John Parker, of Washington, D. C., who prepared the studies under my supervision in my laboratory.

Family PYRAMIDELLIDAE

Gastropods with the radula absent or obsolete; the operculum ovoid paucispiral, with the apex anterior, a threadlike arcuate ridge on the proximal side, the inner margin notched in harmony with the plaits of the pillar when prominent; foot short, moderately pointed behind, with a small operculigerous lobe above and sometimes a small tentacular appendix on each side, in front feebly auriculate or undulate; mantle feebly canaliferous on the right upper margin; a single branchia; verge subcylindric, elongate; head with two flattened subtriangular or elongate tentacles, connate, grooved, or auriform in the larger forms, the funicles with a ciliated area; eyes behind or between the bases of the tentacles; below the tentacles an oral orifice from which extends a long retractile subcylindric proboscis, but there is no muzzle like that of *Scala;* below the oral orifice is an organ named by Lovén the mentum, which is usually more or less medially grooved or fissured, and hence, at its anterior end, more or less bilobate, and extensile or retractile before or behind the front margin of the foot. The shell is turrited, with a plicate axis; the outer lip frequently internally lirate; in the larger forms the aperture is obscurely channeled in front; the larval shell is sinistral, the adult dextral, the former frequently set at an angle to the adult axis, or more or less immersed in the adult apical whorls; it is usually helicoid and smooth; the sculpture varies from nothing to ribbed, spirally sulcate or reticulate; the coloration when present usually reddish, brownish, or yellow. The eggs are numerous and deposited in a lenticular mass. The distribution is worldwide, but the larger forms are mostly tropical.

The pyramidellids, numerically speaking, are the dominant family of marine mollusks in modern seas. In superspecific groups they are excelled only by the turrids.

KEY TO THE SUPERSPECIFIC GROUPS OF THE FAMILY PYRAMIDELLIDAE REPRESENTED IN THE PLIOCENE FAUNA OF NORTH ST. PETERSBURG, FLA.[3]

Columellar folds 3.
- Axial ribs present.
  - Spiral cords present ..... *Triptychus*
  - Spiral cords absent ..... (*Pharcidella*)
- Axial ribs absent ..... *Longchaeus*

Columellar folds not 3.
Columellar folds 2.
Outer lip reinforced by internal spiral cords..... *Locklinia*
Outer lip not reinforced by internal spiral cords.
Aperture subquadrate ..... *Eulimella*
Aperture oval ..... (*Cossmannica*)
Columellar folds 1.
Shell umbilicated.
Peripheral sulcus present..... (*Sulcorinella*)
Peripheral sulcus absent..... *Orinella*
Shell not umbilicated.
Parietal wall with a spiral cord.
Spiral cords present on the whorls..... *Peristichia*
Spiral cords absent on the whorls..... *Ugartea*
Parietal wall without spiral cord.
Shell elongate-turrited.
Sculpture confined to axial ribs..... (*Chemnitzia*)
Sculpture consisting of axial ribs and spiral cords.
Varices present ..... *Mormula*
Varices absent.
Whorls strongly shouldered..... *Bartschella*
Whorls not strongly shouldered.
Spiral sculpture consisting of cords ..... *Pyrgiscus*
Spiral sculpture consisting of cords and incised lines.... *Striopyrgus*
Shell not elongate-turrited—pupoid, ovate, or elongate-ovate.
Axial ribs present.
Axial ribs only present.
Varices present ..... *Salassia*
Varices absent ..... (*Salassiella*)
Axial ribs and spiral cords present.
Base umbilicated ..... *Iolaea*
Base not umbilicated.
Sculpture uniformly nodulose ..... *Chrysallida*
Sculpture not uniformly nodulose.
Supraperipheral cord with nodules ..... (*Miraldella*)
Supraperipheral cord without nodules ..... *Fargoa*
Axial ribs absent.
Periphery keeled ..... *Eulimastoma*
Periphery not keeled.
Shell with spirally incised lines... (*Evalea*)
Shell without spirally incised lines ..... *Odostomia*

[3] Names in parentheses are subgenera.

KEY TO THE PYRAMIDELLIDAE WITH TRIPLICATE COLUMELLA

Axial ribs present.
Spiral cords present.....*Triptychus*
Spiral cords absent.....(*Pharcidella*)
Axial ribs absent.....*Longchaeus*

Genus **TRIPTYCHUS** Mörch

1875. *Triptychus* Mörch, Malak. Blätter, vol. 22, p. 158.

Shell elongate-conic, not umbilicate, having three columellar folds, with axial ribs which are rendered nodulose by the spiral cord on each whorl and a peripheral cord. Base provided with a strong median spiral cord and a lesser, more oblique fold anterior to this; the basal cords are rendered nodulose by the continuation of the axial ribs; outer lip with internal spiral folds.

Type: *Triptychus niveus* Mörch.

TRIPTYCHUS PLIOCENA, new species

Plate 1, figure 1

Shell elongate-conic, rather stout. The nucleus consists of about 2½ inflated, strongly rounded whorls, which form a rather elevated spire, whose axis is at right angles to that of the postnuclear turns, in the first of which the nucleus is about one-third immersed. The postnuclear whorls are well rounded and provided with strong spiral cords, of which two are present on the first whorl and three on the rest. The first of these cords is at the summit, and the other two divide the space between this and the peripheral cord in equal spaces. In addition to these spiral cords the whorls are marked by axial ribs, which equal the spiral cords in strength and render these nodulose at their junction. The axial ribs extend over the periphery of the last whorl and the base, becoming somewhat weaker on the base. Of the axial ribs 18 are present on the last whorl. Suture strongly constricted. Periphery provided with a spiral cord equaling those posterior to it. Base slightly concave, provided with a strong median spiral cord and a weak, more oblique, anterior cord, both of which are nodulose. Aperture obliquely oval, columella provided with three weak folds, of which the posterior is the stronger; outer lip reinforced by four spiral cords within.

The type, U.S.N.M. No. 561595 (Locklin No. 1419 C/D), comes from the Pliocene deposits of North St. Petersburg, Fla. It has the nucleus and 6.1 postnuclear whorls and measures: length 4.5 mm.; diameter 1.5 mm. U.S.N.M. No. 561596 contains three additional

specimens (Locklin No. 2757) from the same source. In addition to these the following specimens were sent to the Academy of Natural Sciences of Philadelphia (hereinafter abbreviated, A.N.S.P.): No. 1419 C/D:2; 2618:1; 1419:1; 2686:2.

Genus **LONGCHAEUS** Mörch

1875. *Longchaeus* Mörch, Malak. Blätter, vol. 22, p. 158.

Shell elongate-turrited, not umbilicate, having three columellar folds, a basal fasciole and peripheral sulcus, with axial ribs in subgenus *Pharcidella* and without them in *Longchaeus* s.s., both have microscopic lines of growth and spiral striations.

KEY TO THE SUBGENERA OF LONGCHAEUS

Axial ribs present..... *Pharcidella*
Axial ribs absent..... *Longchaeus*

Subgenus Pharcidella Dall

1889. *Pharcidella* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 333.

Shell elongate-turrited, not umbilicate, having three columellar folds, a basal fasciole, and peripheral sulcus. The whorls are rendered crenulated at the summit by axial ribs which extend down over most of the whorls; microscopic spiral striations and lines of growth are present.

Type: *Pharcidella folinii* Dall.

LONGCHAEUS (PHARCIDELLA) CALESI, new species

Plate 1, figure 4

Shell elongate-turrited, cream-yellow. Nuclear whorls about 1.5, small, obliquely immersed in the first postnuclear turn. The postnuclear whorls increase very regularly in size and are separated by a deeply channeled suture. They are flattened; the first two are smooth; beginning with the third turn the whorls are marked by stout axial ribs, which are much wider than the spaces that separate them; these ribs are strongest at the summit, which they crenulate, and gradually become weaker toward the peripheral sulcus, vanishing shortly before reaching this. The deep peripheral sulcus is crossed by fine irregularly closely spaced raised lines of growth. Base semiglobular, marked by lines of growth. Aperture obliquely oval; columella with three folds, of which the posterior is much stronger

and less oblique than the other two; outer lip reinforced at irregular intervals by short internal lirations.

The type, U.S.N.M. No. 561593, comes from the Pliocene deposit of North St. Petersburg, Fla. It has 7.5 whorls remaining, having lost about the 6 first postnuclear turns, and measures: Length, 10 mm.; diameter 4.5 mm. U.S.N.M. No. 561594 contains a tip, having the nucleus and 8.5 postnuclear whorls, which measures: Length 6 mm.; diameter 2.2 mm. Two additional specimens from the same source are in the A.N.S.P. collection.

The species is named for Archie Pogue Cales, the discoverer of the North St. Petersburg Pliocene deposits.

Subgenus LONGCHAEUS Mörch

Shell elongate-turrited, not umbilicate, having three columellar folds, a basal fasciole, and peripheral sulcus. The entire surface is marked by fine lines of growth and microscopic spiral striations.

Type: *Pyramidella punctata* Schubert and Wagner.

LONGCHAEUS (LONGCHAEUS) MARIONAE, new species

Plate 1, figures 2, 3

Shell elongate-conic, turrited, cream-yellow. The nucleus consists of about 2 depressed helicoid whorls whose axis is at right angles to that of the succeeding turns, in the first of which it is about half immersed. The postnuclear whorls are flattened and increased regularly in size. They have the summit feebly minutely crenulated and the periphery deeply sulcate, the posterior edge of the sulcus being slightly thickened. The suture of the whorls is rendered decidedly channeled, since the summit of succeeding whorls falls anterior to the peripheral sulcus of the preceding turn and not infrequently lets the anterior edge of the sulcus appear as a spiral thread in the suture. The surface of the whorls is marked by fine lines of growth, which are a little more strongly developed in the sulcus than in the rest of the surface. Base semiglobular in shape, with a weak fasciole at the insertion of the stout columella, marked like the spire. Aperture subovate, outer lip fractured in all the specimens seen, provided with three strong spiral lamellae within. Columella with three spiral lamellae, of which the posterior near the insertion of the columella is very broad, while the anterior two are much more oblique and less strong.

The type, U.S.N.M. No. 561591, and a cotype tip were collected by Mr. Fargo at the Pliocene deposit of North St. Petersburg, Fla.

The type has lost about the first 4 postnuclear turns; the 10.5 remaining whorls measure: Length 11.2 mm., diameter 3.1 mm. The tip has the nucleus and 10 postnuclear whorls, and measures: Length 6.2 mm., diameter 2.5 mm. U.S.N.M. No. 561592 contains 4 specimens from the same source, and 12 additional specimens have been sent to the A.N.S.P.

The specific name is dedicated to Mr. Locklin's wife, Marion, who is an able student of mollusks.

KEY TO THE PYRAMIDELLIDAE WITH BIPLICATE COLUMELLA

Outer lip reinforced by internal spiral cords..... *Locklinia*
Outer lip not reinforced by internal spiral cords.
Aperture subquadrate ..... *Eulimella*
Aperture oval ..... (*Cossmannica*)

LOCKLINIA, new genus

Shell elongate-turrited, whorls flattened with microscopic lines of growth; columella biplicate; outer lip reinforced with internal spiral cords.

Type: *Locklinia fargoi,* new species.

KEY TO THE SPECIES OF LOCKLINIA

Summit of the whorls without spiral cord.
Shell large ..... *fargoi*
Shell small ..... *pliocena*
Summit of the whorls with spiral cord..... *ornata*

LOCKLINIA FARGOI, new species

Plate 2, figure 8

Shell elongate-turrited, large, polished, cream-yellow. Nuclear whorls 2.5, helicoid, with well-rounded turns, having their axis at right angles to those of the succeeding whorls, in the first of which they are about one-third immersed. The postnuclear whorls are flattened and marked by weak lines of growth only. Suture well impressed. Periphery well rounded. Base well rounded, without sculpture. Aperture obliquely oval, with the parietal wall covered by a moderately strong callus, the columella bearing two folds, of which the posterior at the insertion of the columella is much stronger than the anterior, which is also much more oblique; the outer lip is provided with four spiral lamellae within.

The type, U.S.N.M. No. 561597, comes from the Pliocene deposit at North St. Petersburg, Fla. It has lost the nucleus and about 3 of the postnuclear whorls; the 9 remaining measure: Length 6.8 mm.; diameter 1.9 mm. U.S.N.M. No. 561598 contains a young specimen from the same source which has the nucleus and 8.5 postnuclear whorls and measures: Length 5.2 mm.; diameter 1.4 mm. U.S.N.M. No. 561599 contains two additional specimens (Collectors' No. 2787) from the same source. In addition to these, 3 lots, 5 specimens, are in the collection of the A.N.S.P.

LOCKLINIA PLIOCENA, new species

Plate 2, figure 3

Shell elongate-turrited, small, cream-yellow. The nucleus consists of about 2 whorls, which are well rounded, helicoid, and have their axis almost at right angles to that of the succeeding turns, in the first of which they are about one-half immersed. The postnuclear whorls are flattened and polished and marked by lines of growth only. Suture moderately well impressed. Periphery well rounded. Base hemispherical, without sculpture. Aperture oval, parietal wall covered by a thin callus; columella with two folds, the posterior of which is at the insertion of the columella and is much stronger than the anterior which is also much more oblique; the outer lip bears three spiral lamellae on its inside.

The type, U.S.N.M. No. 561600 (Collectors' No. 2565A) is a perfect specimen and comes from the Pliocene deposits of North St. Petersburg, Fla. It has 9 postnuclear whorls and measures: Length 4.8 mm., diameter 1.1 mm. U.S.N.M. No. 561601 (Collectors' No. 2571) is another specimen from the same source, showing the internal lamination of the outer lip.

LOCKLINIA ORNATA, new species

Plate 2, figure 7

Shell elongate-conic, small, cream-yellow. Nuclear whorls about $2\frac{1}{2}$, strongly rounded, forming a depressed helicoid spire, whose axis is at right angles to that of the postnuclear whorls, in the first of which they are about one-half immersed. The postnuclear whorls have a low depressed cord or thickening at the summit which extends over about one-fourth of the width of the turns. Anterior to this cord the whorls are slightly rounded; they are marked by fine lines of growth and spiral striations. Suture moderately well impressed. Periphery obsoletely angulated. Base hemispherical, marked like the spire.

Aperture elongate-oval? Parietal wall covered by a moderately thick callus; columella with two folds, of which the posterior, which is a little anterior to the insertion of the columella, is much stronger than the anterior, which is also much more oblique; the outer lip is fractured in the type and shows internal lirations.

The type, U.S.N.M. No. 561602, was collected by Mr. Locklin at the Pliocene deposits of North St. Petersburg, Fla. It has the nucleus and 7 postnuclear whorls and measures: Length 5.1 mm., diameter 1.8 mm.

Genus **EULIMELLA** Forbes

1846. *Eulimella* Forbes, Ann. Mag. Nat. Hist., vol. 19, p. 311.
1888. *Loxoptyxis* Cossmann, Catalogue illustré des coquilles fossiles de l'Eocene des environ de Paris, fasc. 3, p. 103 (Ann. Soc. Malac. Belgique, vol. 23, Mem., p. 99) (type: *Syrnola conulus* Cossmann).
1893. *Belonidium* Cossmann, Journ. de Conch., vol. 40, p. 350 (type: *Aciculina gracilis* Cossmann).

Shell elongate-turrited, slender, not umbilicated, without basal fasciole, aperture subquadrate (*Eulimella*), ovate in *Cossmannica,* surface polished with very faint lines of growth and spiral striations.

Type: *Eulimella crassula* Forbes=*Eulimella scilla* Scacchi.

KEY TO THE SUBGENERA OF EULIMELLA

Aperture subquadrate ..... *Eulimella*
Aperture oval ..... *Cossmannica*

Subgenus Eulimella Forbes

In this subgenus the aperture is subquadrate.

Type: *Eulimella crassula* Forbes.

EULIMELLA (EULIMELLA) TAMPAENSIS, new species

Plate 2, figure 1

Shell very elongate-turrited, slender, milk-white. The early whorls in all the specimens seen were lost; those remaining are slightly rounded, polished, and marked by lines of growth only. Suture well constricted. Periphery strongly rounded. Base short, well rounded. Aperture subquadrate; parietal wall glazed with a feeble callus; columella slender with two oblique folds; outer lip thin.

The type, U.S.N.M. No. 561603, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 8.2 whorls remaining and measures: Length 5.7 mm., diameter 1.5 mm. Two additional specimens are in the collection of the A.N.S.P.

Subgenus COSSMANNICA Dall and Bartsch

1904. *Cossmannica* Dall and Bartsch, Proc. Biol. Soc. Washington, vol. 17, p. 6.

Like *Eulimella* s.s., but with the aperture ovate.

Type: *Pyramidella clandestina* Deshayes.

EULIMELLA (COSSMANNICA) PINELLASI, new species

Plate 2, figure 2

Shell elongate-turrited, very slender, polished, cream-yellow. Nuclear whorls 2.5, well rounded, forming a depressed helicoid spire whose axis is at right angles to that of the postnuclear turns, in the first of which the nucleus is slightly immersed. The postnuclear whorls are very slightly rounded, almost flattened, and marked by microscopic lines of growth and spiral striations. Suture slightly constricted. Periphery well rounded. Base rather long, well rounded, marked like the spire. Aperture ovate; parietal wall glazed with a thin callus; columella slender with two weak oblique folds; outer lip curved, thin.

The type, U.S.N.M. No. 561604, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 9 postnuclear whorls and measures: Length 4.7 mm., diameter 9 mm.

Genus **ORINELLA** Dall and Bartsch

1904. *Orinella* Dall and Bartsch, Proc. Biol. Soc. Washington, vol. 17, p. 6.

Shell elongate-turrited, umbilicated, surface polished or with microscopic lines of growth and spiral striations; peripheral sulcus present in subgenus *Sulcorinella,* absent in subgenus *Orinella,* columella with a single fold.

KEY TO THE SUBGENERA OF ORINELLA

Peripheral sulcus present.....*Sulcorinella*
Peripheral sulcus absent.....*Orinella*

Subgenus SULCORINELLA Dall and Bartsch

1904. *Sulcorinella* Dall and Bartsch, Proc. Biol. Soc. Washington, vol. 17, p. 6.

Shell elongate-turrited, umbilicated, surface polished or with microscopic lines of growth and spiral striation; periphery sulcate, columella with a single fold.

Type: *Pyramidella* (*Sulcorinella*) *dodona* Dall and Bartsch.

ORINELLA (SULCORINELLA) LOCKLINI, new species

Plate 2, figure 5

Shell small, elongate-conic, cream-yellow. Nucleus small, obliquely immersed in the first postnuclear whorl. The postnuclear whorls are much broader at the summit than at the suture. The summit is slightly shouldered. The surface is polished and is marked by fine protractively slanting lines of growth. The periphery is strongly sulcate, and the succeeding turns drop a little below the sulcus, producing a deeply channeled suture. The base is hemispherical, narrowly umbilicated. The aperture is broadly oval; the parietal wall is covered by a thin callus; the columella is slender and provided with a weak spiral fold a little anterior to its insertion; outer lip evenly curved, thin.

The type, U.S.N.M. No. 561607, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 6.5 whorls and measures: Length 3.2 mm., diameter 1 mm. It bears Locklin's No. 2670.

Subgenus ORINELLA Dall and Bartsch

Shell elongate-turrited, umbilicated, surface polished or with microscopic lines of growth, periphery without sulcus, columella with a single fold.

Type: *Orina pinguicula* A. Adams.

ORINELLA (ORINELLA) PLIOCENA, new species

Plate 2, figure 9

Shell elongate-conic, small, cream-yellow. The nuclear whorls are very small and so completely immersed in the first postnuclear turn as to appear absent. The postnuclear whorls are almost flattened, marked only by lines of growth. Suture slightly impressed. Periphery of last whorl well rounded. Base rather long, marked by lines of growth only. Aperture elongate-ovate; columella with a single strong fold a little anterior to its middle that lends it a somewhat twisted appearance; outer lip thin, evenly curved.

The type, U.S.N.M. No. 561608, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 6 postnuclear whorls and measures: Length 4.7 mm., diameter 1.5 mm.

This species is closely related to the recent *Orinella vanhyningi* Bartsch, which comes from Boca Ciego Bay, St. Petersburg, Fla. It differs from it in having the whorls flatter and higher and the aperture narrower and longer.

Genus PERISTICHIA Dall

1889. *Peristichia* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 339.

Shell turrited, whorls with strong axial ribs between summit and periphery which extend feebly over the base. The spiral sculpture consists of three strong cords that render the axial ribs strongly nodulose. Base with two strong spiral cords, one immediately below the periphery, which is weakly nodulose, and a second less strong on the middle of the base, which is almost smooth.

Type: *Peristichia toreta* Dall.

PERISTICHIA MARTSCHI, new species

Plate 2, figure 6

Shell small, elongate-ovate, cream-yellow. The nucleus is deeply obliquely immersed in the first postnuclear turn. The postnuclear whorls are very strongly rounded and marked by strong retractively slanting axial ribs, of which 12 are present from the second to the last whorl, the latter having 15. The intercostal spaces are a little wider than the ribs. The spiral sculpture consists of three cords, of which the first, which is at the summit, is a little less strong than the other two and a little nearer to the second than that is to the third. The junction of the axial ribs and spiral cords form strong tubercles, those on the first cord at the summit being a little less strong than the rest. The spaces enclosed by the axial ribs and spiral cords are deep, squarish pits. The periphery is marked by a sulcus, which is crossed by the strong axial ribs extending to the strong nodulose basal cord immediately below the periphery enclosing pittings like those on the spire. The base is slightly concave and bears a strong median spiral cord, which is rendered feebly nodulose by the threadlike extensions of the axial ribs. The aperture is subquadrate; the columella is stout, oblique; the parietal wall bears a weak callus; the outer lip is strongly angled at its junction with the basal lip and rendered sinuous by the spiral cords.

The type, U.S.N.M. No. 561671, comes from the Pliocene of North St. Petersburg, Fla. It has 5.2 whorls and measures: Length 2.4 mm., diameter 1.1 mm.

The species is named for William P. Martsch, who has done much collecting in the region.

Genus **UGARTEA** Bartsch

1917. *Ugartea* Bartsch, Proc. U. S. Nat. Mus., vol. 52, p. 662.

Shell elongate-turrited with a fold on the columella and another on the parietal wall; the whorls are marked by axial ribs.

Type: *Turbonilla* (*Ugartea*) *juani* Bartsch.

UGARTEA LOCKLINI, new species

Plate 2, figure 4

Shell elongate-turrited, cream-yellow. The nucleus consists of about 2.3 well-rounded whorls that form a depressed helicoid spire whose axis is at right angles to that of the postnuclear turns, in the first of which the nucleus is about one-fourth immersed. The postnuclear whorls are slightly rounded and marked by strong, slightly retractively slanting axial ribs, which are separated by spaces about as wide as the ribs. Of these ribs 11 of equal strength are present on the posterior seven-eighths of the last whorl in the type and 6 more closely spaced and enfeebled on the last eighth. The penultimate whorl in the type shows 12 equally strong ribs. The ribs extend equally strong over the exposed portion of the whorl but weaken after they pass the well-rounded periphery, disappearing on the base shortly after passing this. Suture well impressed. Base rather long, well rounded. Aperture obliquely oval; parietal wall covered by a strong callus that bears a weak spiral fold a little anterior to its middle; columella with a strong spiral fold at its insertion. The outer lip at intervals bears three spiral folds on its inside.

The type, U.S.N.M. No. 561605, comes from the Pliocene deposit at North St. Petersburg, Fla. It has 6.5 whorls remaining and measures: Length 4.7 mm., diameter 1.2 mm. U.S.N.M. No. 561606 contains three topotypes from the same place, one of which has furnished the description of the nucleus. Six additional specimens are in the collection of the A.N.S.P.

Genus **TURBONILLA** Risso

1826. *Turbonilla* Risso, Histoire naturelle des principales productions de l'Europe méridionale, vol. 4, pp. 224, 394.

1861. *Euturbonilla* Semper, Arch. Ver. Freunde Naturg. Mecklenburg, vol. 15, p. 354 (no type).

1861. *Elusa* A. Adams, Ann. Mag. Nat. Hist., ser. 3, vol. 7, p. 297 (type: *Elusa teres* A. Adams).

Shell with sinistral apex, cylindroconic, many whorled, generally slender; with a single columellar fold which varies in strength and

frequently is not visible in the aperture. The sculpture, both axial and spiral, ranges from obsolete to strongly incised lines or raised lamellae.

Type: *Turbonilla typica* Dall and Bartsch.

KEY TO THE SUBGENERA OF TURBONILLA

Axial ribs and incised intercostal spaces extending over the base to the umbilicus ..... *Turbonilla*
Axial ribs and incised intercostal spaces terminating at the periphery ..... *Chemnitzia*

Subgenus CHEMNITZIA d'Orbigny

1839. *Chemnitzia* d'Orbigny, *In* Webb and Berthelot, Histoire naturelle des Îles Canaries, vol. 2, pt. 2, Mollusques, p. 77.
1861. *Euturbonilla* Semper (part), Arch. Ver. Freunde Naturg. Mecklenberg, vol. 15, pp. 354-361 (no type).
1874. *Microbeliscus* Sandberger, Die Land- und Süsswasser-Conchylien der Vorwelt, p. 690 (type: *Turbonilla* (*Microbeliscus*) *inaspectus* Fuchs).

Turbonillas without spiral sculpture, having prominent axial ribs which fuse or terminate at the periphery. The intercostal spaces are deep and sunken and terminate at the periphery, extending upward to the summits of the whorls. Base smooth, devoid of all sculpture. Columella straight.

Type: *Melania campanellae* Philippi.

KEY TO THE SPECIES OF THE SUBGENUS CHEMNITZIA

Periphery appearing as a spiral cord ..... *acisi*
Periphery not appearing as a spiral cord.
  Whorls strongly rounded.
    Shell large ..... *admeta*
    Shell small ..... *geryoni*
  Whorls only moderately rounded.
    Shell large.
      Axial ribs protractive ..... *hippolyta*
      Axial ribs vertical ..... *adonisi*
    Shell small.
      Shell slender ..... *alcmena*
      Shell stout ..... *iolausi*
  Whorls flattened, not moderately rounded.
    Shell large.
      Axial ribs vertical ..... *hydra*
      Axial ribs protractive ..... *augeasi*

Shell not large.
Shell of medium size.
Shell cylindric.
Axial ribs vertical.....*curytioni*
Axial ribs retractive.....*hesperusi*
Shell not cylindric.
Shell turrited .....*atlasi*
Shell not of medium size, small.
Axial ribs vertical.
Shell very slender.....*antaeusi*
Shell not very slender.....*terra*
Axial ribs not vertical.
Axial ribs protractive.
Shell stout .....*cacusi*
Shell not stout.....*cerberusi*

TURBONILLA (CHEMNITZIA) ACISI, new species

Plate 3, figure 2

Shell minute, elongate-turrited, cream-yellow. The nucleus is decollated in both specimens. The postnuclear whorls are very slightly rounded and crossed by very strong, slightly protractively slanting axial ribs which are thickened at the summit, where they appear almost nodulose; they are likewise thickened at their peripheral termination, giving the periphery the appearance of possessing a spiral cord. Of these ribs, 16 are present upon the last whorl of the type which appears not quite adult. The intercostal spaces are about as wide as the ribs and are deeply impressed and terminate abruptly at the periphery. Base short, well rounded, without sculpture. Aperture subquadrate.

The type, U.S.N.M. No. 561609, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 8.8 whorls remaining, having lost the nucleus and probably a part of the first postnuclear whorl, and measures: Length 3.7 mm., diameter 1 mm. An additional specimen is in the collection of the A.N.S.P.

TURBONILLA (CHEMNITZIA) ADMETA, new species

Plate 3, figures 6a, b

Shell large, elongate-turrited, cream-yellow. The nucleus consists of 2.5 strongly rounded turns, which form a rather elevated spire whose axis is at right angles to that of the succeeding whorls, in the first of which the last whorl is about one-fourth immersed. The postnuclear whorls are strongly rounded and crossed by very strong, protractively slanting axial ribs, which are broader than the spaces

that separate them. These ribs extend strongly from the summit to the periphery and render the suture wavy, while the impressed intercostal spaces also terminate their deep impression at the periphery. The young specimen has 13 ribs on the last whorl and the adult cotype bears 14. The suture is strongly constricted. The base is rather short and well rounded. The aperture is obliquely subquadrate.

The two cotypes, U.S.N.M. No. 561610, come from the Pliocene deposits of North St. Petersburg, Fla. One has the nucleus and 11.5 whorls and measures: Length 6.6 mm., diameter 1.8 mm. The other consists of the last 6.1 whorls, and measures: Length 6.2 mm., diameter 2 mm. A young specimen is in the collections of the A.N.S.P.

TURBONILLA (CHEMNITZIA) GERYONI, new species

Plate 3, figure 5

Shell small, elongate-turrited, cream-yellow. The nucleus consists of about 2.5 strongly rounded whorls that form a rather elevated spire whose axis is at right angles to that of the postnuclear whorls, in the first of which it is about one-third immersed. The nuclear whorls are rather large and project somewhat beyond the outline of the postnuclear spire on the left side. The postnuclear whorls are strongly rounded and marked by very strong, somewhat rounded, decidedly protractively slanting axial ribs. These ribs are of equal strength from the summit of the whorls to their termination at the periphery. The excavated intercostal spaces are narrower than the ribs and also terminate at the periphery. Suture strongly impressed, rendered somewhat wavy by the strong ribs at the summit of the whorls. Of these ribs 15 are present on the last whorl of the type. Periphery well rounded; base rather short, well rounded, without sculpture. Aperture obliquely subquadrate.

The type, U.S.N.M. No. 561611, comes from the Pliocene beds of North St. Petersburg, Fla. It is a complete specimen, having 9 postnuclear whorls, and measures: Length 4 mm., diameter 1.1 mm.

TURBONILLA (CHEMNITZIA) HIPPOLYTA, new species

Plate 3, figures 4a, b

Shell rather large, elongate-turrited, cream-yellow. The nucleus consists of about 2.5 strongly rounded whorls that form a small elevated spire whose axis is at right angles to that of the postnuclear spire, in the first of which its last turn is slightly immersed. The postnuclear whorls are moderately rounded, marked by strong, somewhat

sinuous, protractively slanting axial ribs, which extend equally strong from the summit to the periphery. The excavated intercostal spaces are not quite so wide as the axial ribs and terminate abruptly at the periphery. Suture strongly impressed, rendered somewhat wavy by the strong summit of the axial ribs. Periphery well rounded; base rather short, well rounded, without sculpture. The last whorl of the type has 18 axial ribs. Aperture obliquely subquadrate, columella rather stout, bearing a spiral fold near its insertion.

The type, U.S.N.M. No. 561612, comes from the Pliocene beds of the North St. Petersburg, Fla., deposits. It is a broken specimen, having 13.5 whorls and measures: Length 8 mm., diameter 1.5 mm. Two additional specimens from the same source are in the collection of the A.N.S.P.

TURBONILLA (CHEMNITZIA) ADONISI, new species

Plate 3, figure 8

Shell rather large, elongate-turrited, cream-yellow. The nucleus consists of about 2.5 strongly rounded whorls that form a moderately elevated helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which the last whorl is about one-fourth immersed. The postnuclear whorls are moderately rounded and crossed by strong vertical axial ribs that terminate at the periphery. The impressed intercostal spaces are about as wide as the ribs and, like these, terminate at the periphery. The suture is strongly impressed and rendered wavy by the strong termination of the axial ribs at the summit. The type bears 18 axial ribs on the last whorl. The periphery is strongly rounded, and the base is short, well rounded, and smooth. The aperture is obliquely subquadrate, and the columella bears a weak fold near its insertion which renders it somewhat flexuose.

The type, U.S.N.M. No. 561613, comes from the Pliocene deposits of North St. Petersburg, Fla. It has lost the early whorls; the 11.3 remaining measure: Length 8 mm., diameter 2 mm. U.S.N.M. No. 561614 contains three topotypes from the same source, one of which has furnished the description of the nucleus. Five additional specimens are in the collection of the A.N.S.P.

TURBONILLA (CHEMNITZIA) ALCMENA, new species

Plate 3, figure 1

Shell small, elongate-turrited, slender, cream-yellow. The nucleus and early postnuclear whorls are lost; those remaining are moderately

rounded and provided with strong, decidedly protractively slanting axial ribs which are of equal strength from the summit to the periphery, where they terminate. Of these ribs 15 are present upon the last whorl of the type. The gouged-out intercostal spaces are a little narrower than the ribs and, like these, terminate at the periphery. Suture strongly impressed, rendered wavy by the strong axial ribs. Periphery well rounded. Base short, well rounded, smooth. Aperture obliquely subquadrate, columella moderately strong, provided with an oblique spiral fold a little anterior to its insertion, outer lip fractured.

The type, U.S.N.M. No. 561615, comes from the Pliocene beds of North St. Petersburg, Fla. It has 6.5 whorls remaining which measure: Length 3.1 mm., diameter 1 mm.

TURBONILLA (CHEMNITZIA) IOLAUSI, new species

Plate 3, figure 3

Shell small, elongate-turrited, stout, cream-yellow. The nucleus consists of about 2.5 strongly rounded whorls that form an elevated spire whose axis is at right angles to that of the postnuclear turns, in the first of which the last whorl is about one-third immersed. The postnuclear whorls are moderately rounded. They are crossed by strong, sinuously curved, strongly protractively slanting axial ribs that terminate at the periphery. The impressed intercostal spaces, which are about as wide as the ribs, also terminate at the periphery. Of the axial ribs 15 are present on the last whorl of the type. The suture is well impressed, rendered wavy by the strong summit of the ribs. The periphery is well rounded. The base is short, well rounded, smooth. The aperature is subquadrate; the columella bears a feeble spiral fold at its insertion.

The type, U.S.N.M. No. 561616, comes from the Pliocene deposits of North St. Petersburg, Fla. It is a complete specimen, having 6.5 postnuclear whorls, and measures: Length 3.7 mm., diameter 1 mm.

TURBONILLA (CHEMNINZIA) HYDRA, new species

Plate 3, figure 9

Shell elongate-turrited, cream-yellow, large. The nucleus consists of 2.5 strongly rounded smooth turns that form a well-elevated spire whose axis is at right angles to that of the postnuclear whorls, in the first of which the last nuclear turn is about one-fourth immersed. The postnuclear whorls are flattened and crossed by very strong

vertical axial ribs that extend equally strong from the summit to the periphery, where they terminate. Of these ribs 19 are present upon the last whorl of the type. The intercostal spaces are about as wide as the ribs; they are well impressed and terminate at the periphery. The suture is well impressed and rendered slightly wavy by the summit of the axial ribs. The periphery is well rounded. The base is hemispherical, well rounded, smooth. The aperture is obliquely subquadrate; the columella is slender and provided with a weak fold near its insertion; the outer lip is thin.

The type, U.S.N.M. No. 561617, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 10 whorls remaining which measure: Length, 7.2 mm., diameter 2 mm. U.S.N.M. No. 561618 contains the young specimen from which the nucleus was described. Two additional specimens are in the collection of the A.N.S.P.

TURBONILLA (CHEMNITZIA) AUGEASI, new species

Plate 3, figure 7

Shell elongate-turrited, cream-yellow, large. The nucleus and early postnuclear whorls are lost in all the specimens seen. The whorls remaining are flattened and crossed by very strong, protractively slanting, slightly sinuous axial ribs, which pass equally strong from the summit to the periphery, where they terminate. Of these ribs 19 are present on the last whorl in the type. The intercostal spaces are deeply gouged and not quite so broad as the ribs and, like these, also terminate at the periphery which is well rounded. The base is short, well rounded, smooth. The aperture is obliquely subquadrate; the columella is slender and provided with a feeble fold near its insertion; the outer lip is fractured.

The type, U.S.N.M. No. 561619, comes from the Pliocene beds of North St. Petersburg, Fla. It has 12 whorls remaining and measures: Length 9.7 mm., diameter 2.3 mm. Two additional specimens are in the collection of the A.N.S.P.

TURBONILLA (CHEMNITZIA) EURYTIONI, new species

Plate 4, figure 1

Shell cylindric, of moderate size, cream-yellow. The nucleus and early postnuclear whorls were lost in all the specimens seen. The remaining turns are decidedly flattened and marked by not very strong vertical axial ribs which become enfeebled on the last whorl on which 24 are present, while the antipenultimate turn shows only 17. These intercostal spaces are moderately deeply gouged out and termi-

nate at the periphery. They are about as wide as the ribs. The suture is well impressed and rendered sinuous by the ribs. The periphery is well rounded. The base is short, well rounded, smooth. The aperture is obliquely subquadrate; the columella is slender and bears a feeble fold near its insertion; the outer lip is thin.

The type, U.S.N.M. No. 561620, comes from the Pliocene beds of North St. Petersburg, Fla. It has 8.6 whorls remaining and measures: Length 6.2 mm., diameter 1.4 mm. An additional specimen is in the collection of the A.N.S.P.

TURBONILLA (CHEMNITZIA) HESPERUSI, new species

Plate 4, figure 2

Shell cylindric, of medium size, cream-yellow. Nucleus and early postnuclear whorls decollated, the whorls remaining form a cylindric spire. The postnuclear whorls are flattened and crossed by decidedly protractively slanting axial ribs, which are equally strong from the summit to the periphery. Of these ribs 14 are present on the penultimate whorl of the type; on the last half of the last whorl the ribs become less strong and more numerous and closely spaced, indicating a senescent stage. The intercostal spaces are a little narrower than the ribs, the gouged-out part, like the ribs, terminating at the periphery. Suture well impressed, rendered wavy by ribs. Periphery well rounded. Base hemispherical, smooth. Aperture obliquely subquadrate; columella slender, provided with a weak fold a little anterior to its insertion.

The type, U.S.N.M. No. 561621, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 8.4 whorls remaining which measure: Length 5 mm., diameter 1 mm. An additional specimen is in the collection of the A.N.S.P.

TURBONILLA (CHEMNITZIA) ATLASI, new species

Plate 4, figures 5a, b

Shell elongate-turrited, of medium size, cream-yellow. The nucleus consists of a little more than two strongly rounded whorls, which form a helicoid spire whose axis is at right angles to that of the postnuclear turns, in the first of which the nuclear spire is half immersed. The postnuclear whorls are flattened and crossed by strong, moderately protractively slanting axial ribs, which are of equal strength from the summit to the periphery where they terminate. The last whorl of the type shows 15 axial ribs. The intercostal spaces are a little nar-

rower than the ribs, the gouged-out portion terminating at the periphery like the ribs. Suture well impressed, rendered wavy by the summit of the axial ribs. Periphery well rounded. Base short, well rounded, smooth. Aperture obliquely subquadrate; columella slender, with a weak fold; outer lip thin.

The type, U.S.N.M. No. 561622, comes from the Pliocene beds of North St. Petersburg, Fla. It is a broken specimen. The nucleus and 8 postnuclear whorls measure: Length 4 mm., diameter 1.1 mm.; the basal half has 4 whorls and measures: Length 3.4 mm., diameter 1.3 mm. U.S.N.M. No. 561623 contains an additional specimen, and two more are in the collection of the A.N.S.P.

TURBONILLA (CHEMNITZIA) ANTAEUSI, new species

Plate 4, figure 6

Shell elongate-turrited, very small, slender, nuclear whorls about 2, strongly rounded, forming a moderately elevated spire whose axis is at right angles to that of the succeeding turns, in the first of which it is about one-third immersed. The postnuclear whorls are flattened and crossed by strong vertical axial ribs, which terminate at the periphery. Of these ribs 14 are present on the last whorl of the type; they are of equal strength from the summit to the periphery. The intercostal spaces are about as broad as the ribs and are strongly gouged out and also terminate at the periphery. The suture is well impressed and rendered wavy by the summit of the ribs. Periphery well rounded. Base hemispherical, smooth. Aperture rather large, subovate; columella and outer lip slender.

The type, U.S.N.M. No. 561624, comes from the Pliocene deposits of North St. Petersburg, Fla. It is a complete specimen, having 7.7 postnuclear whorls and measures: Length 3.5 mm., diameter 9 mm.

TURBONILLA (CHEMNITZIA) TERRA, new species

Plate 4, figure 3

Shell elongate-turrited, small, rather stout, pale cream-colored. The nucleus consists of about 2.5 whorls that form a moderately elevated helicoid spire, whose axis is at right angles to that of the postnuclear turns, in the first of which the nucleus is about two-fifths immersed. The postnuclear whorls are flattened and crossed by strong vertical axial ribs, which are of equal strength from the summit to the periphery, where they terminate. These ribs are less strong and more numerous on the last whorl, which shows 18, while the anti-

penultimate turn bears only 12. The intercostal spaces are about as wide as the ribs, and the gouged-out portion terminates at the periphery. Suture well impressed, rendered wavy by the summit of the axial ribs. Periphery well rounded. Base hemispherical, smooth. Aperture broadly oval; columella slender, with a weak fold near its insertion; outer lip thin.

The type, U.S.N.M. No. 561625, comes from the Pliocene beds of North St. Petersburg, Fla. It is a complete specimen, having 9.5 postnuclear whorls and measures: Length 4.2 mm., diameter 1 mm.

TURBONILLA (CHEMNITZIA) CACUSI, new species

Plate 4, figure 4

Shell elongate-conic, small, stout, cream-yellow. Nucleus decollated. Postnuclear whorls flattened, marked by very strong, decidedly protractively slanting ribs, which terminate at the periphery. Of these, 15 are present on the last whorl of the type. The gouged-out intercostal spaces are a little narrower than the ribs and terminate at the periphery. Suture well impressed, rendered somewhat wavy to the summits of the ribs. Periphery rounded. Base short, strongly rounded, smooth. Aperture decidedly obliquely subquadrate; columella moderately stout, provided with a weak fold near its insertion; outer lip thin.

The type, U.S.N.M. No. 561626, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 8.8 whorls and measures: Length 4 mm., diameter 1.1 mm. Another specimen is in the collection of the A.N.S.P.

TURBINELLA (CHEMNITZIA) CERBERUSI, new species

Plate 4, figure 7

Shell elongate-turrited, small, cream-yellow. The nucleus and probably the first 1.5 postnuclear whorls are decollated. The remaining whorls are flattened and crossed by slender, slightly wavy, decidedly protractively slanting axial ribs, of which 13 are present on the last whorl of the type. These ribs extend equally strong from the summit to the periphery. The intercostal spaces are moderately excavated and a little narrower than the ribs; they terminate at the periphery. Suture well impressed, rendered slightly sinuous by the summit of the ribs. Periphery well rounded. Base hemispherical, smooth. Aperture?; columella short, provided with a fold near its insertion; outer lip? fractured.

The type, U.S.N.M. No. 561627, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 9.3 whorls remaining and measures: Length 4 mm., diameter 1.1 mm. U.S.N.M. No. 561628 contains an additional specimen from the same source and two more are in the collection of the A.N.S.P.

Genus **MORMULA** A. Adams

1863. *Mormula* A. Adams, Journ. Linn. Soc. London, vol. 7, p. 1.
1884. *Pyrgostylus* Monterosato, Nomenclatura generica e specifica di alcune Conchiglie mediterranee . . ., p. 90 (type: *Turbo striatulus* Linnaeus).

Pyramidellids having axial ribs and deeply incised spiral lines or grooves; also irregularly disposed varices on the outer surface, which usually mark internal lirations on the outer lip, or internal lirations of the outer lip only. Sculpture never nodulose.

Type: *Mormula rissoina* A. Adams.

KEY TO THE SPECIES OF MORMULA

Axial ribs slanting protractively.
- Shell of gigantic size ..... *vaughani*
- Shell not of gigantic size.
  - Shell short and stout.
    - Shell acutely tapering ..... *gardnerae*
    - Shell not acutely tapering ..... *mansfieldi*
  - Shell not short and stout.
    - Whorls very strongly rounded ..... *cookei*
    - Whorls moderately rounded.
      - Axial ribs distantly spaced ..... *woodringi*
      - Axial ribs not distantly spaced.
        - Shell very slender ..... *marshalli*
        - Shell not very slender.
          - Axial ribs fine ..... *harrisi*
          - Axial ribs stout ..... *palmerae*

Axial ribs slanting retractively.
- Shell rather stout ..... *pilsbryi*
- Shell rather slender.
  - Whorls flattened ..... *robertsonae*
  - Whorls rounded ..... *teskeyae*

MORMULA VAUGHANI, new species

Plate 6, figures 3a, b

Shell elongate-turrited, very large, cream-yellow. The unique type is a fragment consisting of the last 5.1 whorls, which are rather high and flattened. The whorls are marked by axial ribs, which are slightly

protractively slanting and are of the same strength from the summit to the periphery. Of these ribs 20 are present upon the first, 21 upon the second, 22 upon the third, 26 upon the fourth, and 28 upon the last whorl. At irregular intervals some of the ribs become somewhat thickened, or two may become fused to form a varix. The intercostal spaces are about as wide as the ribs. They are marked by 28 incised transverse lines, which vary considerably in strength and spacing. They are best visualized by examining our detailed sketch (pl. 6, fig. 3b). The suture is well marked but not channeled. The periphery is well rounded. The base is hemispherical and marked by the weakening axial ribs which fade out on its middle. In addition to the axial ribs the base has about 14 spiral striations, which are of almost the same strength and spacing. The aperture is irregularly oval; the columella is thick and reflected and bears a strong fold at its insertion; the parietal wall is covered by a thick callus; the outer lip bears five internal folds which vary in strength and spacing.

The type, U.S.N.M. No. 561680, comes from the Pliocene of North St. Petersburg, Fla. The 5.1 whorls remaining measure: Length 10.2 mm., diameter 3.7 mm.

The huge size and fine spiral sculpture easily distinguish this species from all the other known East American Mormulas.

I take pleasure in naming this species for the late Dr. T. Wayland Vaughan, whose many years of work in Tertiary paleontology, corals, and oceanography have been of great help to many of us.

MORMULA GARDNERAE, new species

Plate 4, figures 10a, b

Shell very regularly elongate-turrited, cream-yellow. The nucleus consists of about two strongly rounded whorls that form a depressed helicoid spire whose axis is at right angles to that of the postnuclear whorls. The postnuclear whorls are flattened and marked by strong protractively slanting axial ribs, which are of the same strength from the summit to the periphery where they terminate. Of these ribs 16 are present upon the second and third whorls and 18 upon the rest. At irregular intervals some of these ribs become thickened to form a weak varix. The intercostal spaces are about as wide as the ribs and are marked by seven incised spiral lines, which vary in strength and spacing. Our detailed sketch describes these better than words (pl. 4, fig. 10b). The suture is rendered wavy by the summit of the axial ribs. The periphery is well rounded and marks the end of the axial ribs. The base is hemispherical and without sculpture. The

aperture is subquadrate; the columella is short, moderately stout, reflected, and provided with a weak oblique fold at its insertion; the parietal wall is glazed by a thin callus; the outer lip bears several spiral cords deep within.

The type, U.S.N.M. No. 561681, comes from the Pliocene of North St. Petersburg, Fla. It is a young specimen, having 8 postnuclear whorls, and measures: Length 5.0 mm., diameter 1.8 mm.

The acutely tapering outline and spiral sculpture will readily distinguish this species from the rest of the known Mormulas.

I take pleasure in naming this species for Dr. Julia Gardner, one of America's foremost feminine paleontologists.

MORMULA MANSFIELDI, new species

Plate 4, figures 9a, b

Shell elongate-turrited, cream-yellow. The nuclear whorls are lost in both of the specimens seen. The postnuclear whorls are flattened and slightly shouldered at the summit. They are marked by very strong axial ribs, of which 16 are present upon all but the last turn, which has 18. These ribs are strongest at the summit and pass only feebly beyond the periphery on the base. The intercostal spaces are a little wider than the ribs and are marked by six rather wide, strongly incised spiral grooves, of which the one near the summit is less strong while the rest are subequal. The spacing of these incised grooves is best visualized by viewing our detailed sketch (pl. 4, fig. 9b). The suture is rendered wavy by the summit of the axial ribs. The periphery is well rounded. The base is hemispherical and marked by six incised spiral lines which vary in strength and spacing. The aperture is obliquely subquadrate; the columella is short, slender, curved, and slightly revolute, and bears a weak fold at its insertion; the outer lip bears four spiral folds within that vary in strength.

The type, U.S.N.M. No. 561682, comes from the Pliocene of North St. Petersburg, Fla. It has 8.9 whorls remaining, which measure: Length 6.2 mm., diameter 2.0 mm. Another specimen from the same source is in the collection of the A.N.S.P.

The less tapering outline and stronger sculpture will easily distinguish this species from *Mormula gardnerae* (p. 28).

I take pleasure in naming this species for the late Dr. W. C. Mansfield, of the United States Geological Survey, who has done much work in Florida Tertiary paleontology.

MORMULA COOKEI, new species

Plate 5, figures 2a, b

Shell elongate-turrited, cream-yellow. The type and additional four specimens before me have lost all the early whorls. Those remaining are strongly rounded and crossed by strong, protractively slanting axial ribs, which are of the same strength from the summit to the periphery where they terminate. Of these ribs 14 are present upon the first and second whorl of the type; 16 upon the third; 17 upon the fourth; 18 upon the fifth, and 20 upon the last turn. At irregular intervals some of the ribs become fused to form a strong varix. The intercostal spaces are about as wide as the ribs and are crossed by seven incised spiral lines or grooves. Of these the first two below the summit are very slender. While the last one immediately above the periphery is very broad, the two above this are about half as strong as the two above it and twice as strong as the two below the summit. This arrangement, as well as the spacing, is best visualized by examining the sketch (pl. 5, fig. 2b). The suture is considerably constricted. The periphery is well rounded. The base is short, hemispherical, and without sculpture. The aperture is subquadrate; the columella is slender, vertical, slightly revolute and provided with a feeble fold at its insertion; the parietal wall is glazed by a thin callus; the outer lip is thin and bears four strong spiral cords within.

The type, U.S.N.M. No. 561683, comes from the Pliocene of North St. Petersburg, Fla. It has 6.2 whorls remaining which measure: Length, 5.9 mm., diameter 2.0 mm. U.S.N.M. No. 561684 contains two additional specimens from the same source, and two more are in the collection of the A.N.S.P.

The very strongly rounded whorls readily distinguish this species from the other Mormulas.

It is a pleasure to name this species for Dr. C. Wythe Cooke, of the United States Geological Survey, who has devoted a lifetime of energy to the unraveling and elucidation of southeastern United States geology and paleontology.

MORMULA WOODRINGI, new species

Plate 4, figures 8a, b

Shell elongate-turrited, cream-yellow. The early whorls are lost in the unique type; those remaining are moderately rounded and crossed by strong, protractively slanting, rather distantly spaced axial ribs, which are of the same strength from the summit to the periphery

where they terminate. Of these ribs 10 are present upon the first two of the remaining turns, 11 upon the third; 12 upon the fourth, and 14 upon the rest of the whorls. At irregular intervals some of these ribs become thickened to form a varix. The intercostal spaces are deeply impressed and a little wider than the ribs. The intercostal spaces are marked by 20 incised spiral lines and grooves, which vary decidedly in strength and spacing. They are best visualized by examining the detailed sketch on plate 4, figure 8b. The suture is well constricted and rendered wavy by summits of the axial ribs. The periphery is well rounded. The base is short, strongly rounded, smooth, and without sculpture. The aperture is subquadrate; the anterior portion of the columella and basal lip are broken; the upper part of the columella is thick, and provided with a weak fold; the parietal wall is glazed with a thin callus; the fractured outer lip is thick.

The type, U.S.N.M. No. 561685, comes from the Pliocene of North St. Petersburg, Fla. It has 8.2 whorls remaining and measures: Length 5.1 mm., diameter 1.8 mm.

The less rounded whorls and entirely different spiral sculpture easily distinguish this species from *Mormula cookei* (p. 30).

I take pleasure in naming this species for Dr. W. P. Woodring, of the United States Geological Survey, whose exhaustive and masterful report on the fauna of the Bowden beds of Jamaica lent a new impetus to West Indian and Tropical American paleontology.

MORMULA MARSHALLI, new species

Plate 5, figures 5a, b

Shell elongate-turrited, slender, cream-yellow. The early whorls in all our specimens have been lost. Those remaining are slightly rounded and marked by very strong, broad, slightly protractively slanting axial ribs, which are of the same strength from the summit of the whorls to the periphery, where they terminate. Of these ribs 14 are present on all the whorls. At irregular intervals some of the ribs become thickened to form a weak varix. The intercostal spaces are a little narrower than the ribs and are crossed by 13 incised lines and grooves which vary greatly in strength and spacing and are best visualized by viewing the detailed sketch on plate 5, figure 5b. The suture is slightly constricted and rendered wavy by the summit of the axial ribs. The periphery is well rounded. The base is hemispherical and without sculpture. The aperture is subquadrate; the columella is thick, vertical, and provided with a strong

fold at its insertion; the parietal wall is glazed with a thin callus; the outer lip is thick and provided with 4 strong spiral folds deep within.

The type, U.S.N.M. No. 561686, comes from the Pliocene of North St. Petersburg, Fla. It has 9.5 whorls remaining which measure: Length 6.0 mm., diameter 1.7 mm. U.S.N.M. No. 561687 contains an additional specimen from the same source and another is in the collection of the A.N.S.P.

The much narrower intercostal spaces and different spiral markings will readily distinguish this species from *Mormula woodringi* (p. 30).

I take pleasure in naming this species for William B. Marshall, my colleague, who was the able assistant curator of the division of mollusks for many years.

MORMULA HARRISI, new species

Plate 5, figures 1a, b

Shell elongate-turrited, cream-yellow. The nucleus consists of a little more than 2 strongly rounded, smooth whorls that form a depressed helicoid spire whose axis is at right angles to that of the postnuclear spire, in the first whorl of which the nucleus is about one-third immersed. The postnuclear whorls are almost flattened and crossed by moderately strong axial ribs, which have the same strength from the summit to the periphery, where they terminate. Of these ribs 16 are present upon the second to fifth whorl; 17 upon the sixth; 18 upon the seventh, and 20 upon the rest of the whorls. At irregular intervals some of the ribs become thickened and form a weak varix. The intercostal spaces are about as wide as the ribs and are crossed by 26 incised lines or pits which vary greatly in width and spacing and are best described by our detailed sketch (pl. 5, fig. 1b). The suture is well marked and rendered wavy by the axial ribs at the summit of the whorls. The periphery is well rounded. The base is hemispherical and without sculpture. The aperture is subquadrate; the columella is slender, vertical, slightly revolute and provided with a weak fold at its insertion; the parietal wall is glazed by a thin callus; the outer lip is thin, gently curved, and shows no internal cords.

The type, U.S.N.M. No. 561688, comes from the Pliocene of North St. Petersburg, Fla. It has 10 postnuclear whorls and measures: Length 6.0 mm., diameter 2.4 mm. U.S.N.M. No. 561689 contains three specimens from the same source, and four more are in the collection of the A.N.S.P.

The finer ribbing and detailed spiral sculpture readily distinguish this species from *Mormula marshalli* (p. 31).

I take pleasure in naming this species for Prof. G. D. Harris, of Cornell University, who has not only contributed much to our knowledge of geology, but has also trained a host of students to continue his researches. He is also the founder of the Paleontological Research Institute at Cornell University.

MORMULA PALMERAE, new species

Plate 5, figures 4a, b

Shell elongate-turrited, cream-yellow. The early whorls in all our specimens are decollated; those remaining are slightly rounded and crossed by very stout, protractively slanting axial ribs, which are of the same strength from the summit to the periphery, where they terminate. Of these ribs, 12 are present upon the first three of the remaining whorls, 14 upon the fourth, 16 upon the fifth, and 17 upon the last turn. At irregular intervals some of the ribs are thickened to form a varix. The intercostal spaces are well impressed and about as wide as the ribs. They are crossed by five pits, of which the first near the summit and the fourth are about half as wide as the rest; the space between the summit and the first pit is about as wide as that between the first and second and third and fourth, while the space between the second and third and fourth and fifth are of about half the width of the rest. The suture is strongly impressed and rendered wavy by the summit of the axial ribs. The periphery is well rounded. The base is hemispherical and without sculpture. The aperture is subquadrate; the columella is rather stout, reflected, vertical, and bears a strong fold a little below its insertion; the parietal wall is glazed with a thin callus; the outer lip in the specimen before us shows some ill-defined indications of spiral cords deep within.

The type, U.S.N.M. No. 561690, comes from the Pliocene of North St. Petersburg, Fla. Its 6.2 whorls remaining measure: Length 7.5 mm., diameter 2.0 mm. U.S.N.M. No. 561691 contains another fragment, and a third specimen is in the collection of the A.N.S.P.

This species is readily distinguished from *Mormula harrisi* (p. 32) by its much stouter axial ribs and intercostal sculpture.

I take pleasure in naming this species for Dr. K. V. W. Palmer, Dr. Harris's able associate and successor as director of the Paleontological Research Institute at Cornell University.

MORMULA PILSBRYI, new species

Plate 6, figures 2a, b

Shell elongate-turrited, stout, stained with brown. The nucleus is decollated in both specimens seen. The postnuclear whorls are flattened and crossed by decidedly retractively slanting, crowded, low axial ribs, of which 20 are present upon each of the remaining turns. These ribs are of the same strength from the summit to the periphery, where they terminate. At irregular intervals some of the ribs become thickened to form a varix. The intercostal spaces are narrower than the ribs and are crossed by six strongly incised pits, of which the first two below the summit are about half as wide as the fourth and fifth, while the third and sixth are much broader and of about equal width. The spacing of the pits is subequal. The suture is shallow and is rendered wavy by the summit of the axial ribs. The periphery is well rounded. The base is hemispherical and marked by a few ill-defined spiral striations. The aperture is ovate; the columella is stout, oblique, and bears a strong fold a little below its insertion; the parietal wall is glazed by a thin callus; the outer lip is thick and seems to show indications of spiral cords deep within.

The type, U.S.N.M. No. 561692, comes from the Pliocene of North St. Petersburg, Fla. It has 9 whorls remaining and measures: Length 5.7 mm., diameter 1.5 mm. Another specimen is in the collection of the A.N.S.P.

The stout form and different spiral sculpture will readily distinguish this species from the other Mormulas, having retractively slanting axial ribs.

I take pleasure in naming this species for Dr. Henry A. Pilsbry, one of the world's foremost malacologists.

MORMULA ROBERTSONAE, new species

Plate 5, figures 3a, b

Shell elongate-turrited, cream-yellow. The nuclear whorls are decollated in all our specimens. The postnuclear whorls are rather high and flattened. They are marked by strong, retractively slanting axial ribs, which are of the same strength from the summit to the suture. Of these ribs 16 are present upon the first of the remaining whorls and 18 upon each of the rest, except for the last, where they become enfeebled, less regular and less distinct. At irregular intervals some of the ribs become thickened to form a varix. The intercostal spaces are about as wide as the ribs and are crossed by six grooves

that vary from mere lines to broad pits. They are best visualized for strength and spacing by viewing our detailed sketch (pl. 5, fig. 3b). The suture is well impressed and rendered wavy by the strong ribs at the summit of the whorls. The last whorl is somewhat inflated at the periphery which is well rounded. On the last whorl the axial ribs become enfeebled. They pass over the hemispherical base as weak extensions to the umbilical chink. No spiral sculpture is present upon the base. All these sculptural features of the last whorl and base speak for old age and senescence. The aperture is ovate; the columella is slender, thin, and anteriorly revolute; the parietal wall is glazed by a thin callus; the outer lip is reinforced within by two spiral cords, of which the basal is broad and low.

The type, U.S.N.M. No. 561693, comes from the Pliocene of North St. Petersburg, Fla. It has 9 whorls remaining and measures: Length 6.2 mm., diameter 1.9 mm. U.S.N.M. No. 561694 contains another specimen, and two more are in the collection of the A.N.S.P.

The more slender and different spiral sculpture readily distinguishes this specimen from *Mormula pilsbryi* (p. 34).

I take pleasure in naming this species for Mrs. Imogene Strickler Robertson, who served the American Malacological Union as faithful secretary-treasurer for many years.

MORMULA TESKEYAE, new species

Plate 6, figures 1a, b

Shell elongate-turrited, cream-yellow. All the early whorls are lost, the last 5 only remaining. These are well rounded and marked by strong retractively slanting axial ribs which are of the same strength from the summit to the periphery, where they terminate. Of these ribs 16 are present upon all the whorls except for the first, which has 14. The intercostal spaces are about as wide as the ribs and are crossed by 18 incised grooves that vary in strength from mere lines to broad pits. Their variation in width and spacing are best visualized by examining the detailed sketch (pl. 6, fig. 1b). The suture is well impressed and rendered wavy by the strong ribs at the summit of the whorl. The periphery is well rounded. The base is hemispherical, smooth, and without sculpture. The aperture is ovate; the columella is slender and provided with a strong fold a little below its insertion. The parietal wall is glazed by a thin callus; the outer lip is reinforced within by four spiral cords.

The type, U.S.N.M. No. 561695, comes from the Pliocene of North St. Petersburg, Fla. It consists of the last 5 whorls and measures: Length 4.1 mm., diameter 1.2 mm.

The rounded whorls and spiral sculpture easily distinguish this species from the rest of the Mormulas, having retractively slanting ribs.

I take pleasure in naming this species for Mrs. Margaret C. Teskey, the able secretary-treasurer of the American Malacological Union.

Genus **BARTSCHELLA** Iredale

1916. *Bartschella* Iredale, Proc. Malac. Soc. London, vol. 12, p. 36 (type: *Dunkeria subangulata* Carpenter).

1909. *Dunkeria* Dall and Bartsch, U. S. Nat. Mus. Bull. 68, p. 120 (type: *Dunkeria subangulata* Carpenter) (not *Dunkeria* Carpenter, 1856= *Dunkeria* Dall and Bartsch, 1904, Proc. Biol. Soc. Washington, vol. 17, p. 8; type: *D. paucilirata* Carpenter).

Pyramidellids having strongly rounded whorls, which are shouldered at the summit and marked by strong axial ribs and spiral cords whose junction is subnodulose.

Type: *Turbonilla* (*Bartschella*) *subangulata* Carpenter.

BARTSCHELLA PARKERI, new species

Plate 6, figures 4a, b

Shell turrited, shouldered at the summit, cream-yellow. The nucleus consists of about 2 well-rounded whorls, which form a low helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which the nucleus is about one-fourth immersed. The postnuclear whorls are almost flattened and shouldered at the summit. They are marked by very strong axial ribs, of which 16 are present upon the second and third, 18 upon the fourth, 20 upon the fifth, and 22 upon the last whorl. These ribs are very strong at the summit where they render the suture decidedly sinuous. The intercostal spaces are about as wide as the ribs. The spiral sculpture between the sutures consists of six subequal cords, of which the first is on the shoulder at the summit; this and the second are about half as wide as the third, which forms the anterior angle of the shoulder; the other three cords are of equal size and spacing and occupy the anterior half of the whorls. The junction of the axial ribs and spiral cords form feeble nodules. Suture strongly marked. The periphery of the last whorl is marked by a spiral cord which equals the third in width, that is, it is about twice as wide as its neighbor. Base short, well rounded, marked by the feeble continuations of the axial ribs and six incised spiral lines. The aperture is ovate; the columella is short, stout, and bears a prominent fold at its insertion; the parietal wall bears a thin callus; the outer lip is fractured.

The type, U.S.N.M. No. 561696, comes from the Pliocene of North St. Petersburg, Fla. It has 6½ postnuclear whorls and measures: Length 2.3 mm., diameter 0.8 mm.

I take pleasure in naming the species for John Parker, who made all the drawings accompanying this paper.

Genus **PYRGISCUS** Philippi

1841. *Pyrgiscus* Philippi, Wiegmann's Arch. Naturg., vol. 7, pt. 1, p. 50 (type: *Melania rufa* Philippi).

1843. *Ortostelis* Aradas and Maggiore, Atti Accad. Gioenia Sci. Nat. Catania, vol. 20, p. 117 (same type).

1884. *Pyrgostelis* Monterosato, Nomenclature generica e specifica di alcune Conchiglie mediterranee . . ., p. 89 (same type).

Pyramidellids having prominent axial ribs and deeply incised spiral lines, but no varices or internal lirations on the outer lip. Columella usually somewhat flexuous.

Type: *Melania rufa* Philippi.

KEY TO THE SPECIES OF PYRGISCUS

Incised spiral lines 4 ..... *yamai*
Incised spiral lines not 4.
  Incised spiral lines 5.
    Axial ribs fine and closely spaced ..... *zethusi*
    Axial ribs not fine or closely spaced.
      Whorls strongly rounded ..... *vishnui*
      Whorls not strongly rounded.
        Axial ribs very strong and distantly spaced ..... *venusae*
        Axial ribs not very strong and not distantly spaced. *tityusi*
  Incised spiral lines not 5.
    Incised spiral lines 6.
      Axial ribs very strong and widely spaced.
        Shell broadly conic ..... *thestiusi*
        Shell not broadly conic, slender.
          Incised spiral lines of uniform strength ..... *tellusae*
          Incised spiral lines not of uniform strength .... *clionae*
      Axial ribs not very strong and less widely spaced.
        Whorls strongly rounded ..... *tantalusi*
        Whorls not strongly rounded.
          Whorls only moderately rounded ..... *sylvanusi*
          Whorls not moderately rounded, flattened.
            Shell large.
              Shell stout ..... *somnusi*
              Shell slender ..... *sisyphusi*
            Shell small.
              Axial ribs fine ..... *silenusi*
              Axial ribs not fine but strong ..... *pyrrhusi*

Incised spiral lines not 6.
Incised spiral lines 7.
Shell stout.
Whorls strongly rounded.....*apolloi*
Whorls not strongly rounded.
Shell broadly conic.....*dianae*
Shell not broadly conic.....*latonae*
Shell not stout.
Shell very elongate.....*phaetoni*
Shell not very elongate.
Axial ribs retractive.....*harmoniae*
Axial ribs vertical.....*cadmusi*
Incised spiral lines 8.
Shell large.
Whorls shouldered .....*inoae*
Whorls not shouldered.....*telamoni*
Shell not large.
Shell slender .....*hebcae*
Shell not slender.....*aesoni*

PYRGISCUS YAMAI, new species

Plate 6, figures 6a, b

Shell small, turrited, cream-colored. Nuclear whorls 2.5, forming a depressed helicoid spire whose axis is at right angles to that of the succeeding turns, in the first of which it is almost half immersed. Postnuclear whorls moderately round, marked by strong, vertical axial ribs which render the suture wavy at the summit. Of these ribs 14 are present upon the third and fourth, 15 upon the fifth, 16 upon the sixth, 18 upon the seventh, and 20 upon the last turn. These ribs extend very feebly over the well-rounded hemispherical base. The deeply impressed intercostal spaces are about as wide as the ribs and are crossed by four broad, strongly impressed spiral grooves that are of equal strength but not equal spacing (see detailed sketch). Aperture subquadrate, columella slender, outer lip thin, parietal wall covered by thin callus.

The type, U.S.N.M. No. 561629, has 8.5 postnuclear whorls and measures: Length 4.5 mm., diameter 1 mm. It comes from the Pliocene deposits of North St. Petersburg, Fla. Another specimen from the same source is in the collection of the A.N.S.P.

PYRGISCUS ZETHUSI, new species

Plate 7, figures 7a, b

Shell small, turrited, cream-yellow. Nuclear whorls 2.5, forming a low helicoid spire whose axis is at right angles to that of the suc-

ceeding turns, in the first of which it is about one-third immersed. Postnuclear whorls rather high, moderately rounded, separated by a well-impressed suture. They are crossed by axial ribs, which are stronger and more distantly spaced and vertical on the first three whorls, beyond which they become finer and more closely spaced and slightly retractively slanting. These ribs extend equally strong from the summit to the periphery. Of these ribs 12 are present upon the second whorl, 14 upon the third, 16 upon the fourth, 22 upon the fifth, 26 upon the sixth, 28 upon the seventh, and 34 upon the last whorl. The axial ribs render the whorls slightly crenulated at the summit. The intercostal spaces vary in width like the ribs and are about as wide as the ribs. They are marked by five strong spiral pits, of which the upper three are of equal spacing, the first being about as far below the summit as the third is separated from the fourth that is about double the space as that separating the first three pits; the last two pits are slightly more distantly spaced than the first three. The base is subhemispherical with a few irregularly spaced, faint spiral lines. Aperture subquadrate columella reflected, bearing a weak fold near its insertion, outer lip thin, parietal wall covered with a thin callus.

The type, U.S.N.M. No. 561630, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 8.5 postnuclear whorls and measures: Length 4.4 mm., diameter 1.1 mm.

The closely spaced axial ribs of the later postnuclear whorls readily distinguish this species from the other, having five incised spiral pits in the intercostal spaces.

PYRGISCUS VISHNUI, new species

Plate 7, figures 2a, b

Shell small, turrited, rather stout, cream-yellow. Nucleus small, more than half immersed in the first postnuclear turn. The postnuclear whorls are strongly rounded, marked by strong, slightly retractively slanting axial ribs, of which 12 are present upon the second, 14 upon the third, 16 upon the fourth and fifth, 17 upon the sixth, 20 upon the seventh, and 21 upon the last whorl. These ribs are about as wide as the spaces that separate them, and they extend equally strong from the summit to the periphery. Their summits render the suture wavy. The intercostal spaces are strongly impressed and marked by five deep spiral pits. Base hemispherical, smooth. Aperture subquadrate, columella stout, reflected, bearing a feeble oblique fold near its insertion, outer lip fractured, parietal wall covered by a thin callus.

The type, U.S.N.M. No. 561631, comes from the Pliocene of North St. Petersburg, Fla. It has 8 postnuclear whorls and measures: Length 4.9 mm., diameter 1 mm. U.S.N.M. No. 561632 contains seven additional specimens from the same source, and seven more are in the collection of the A.N.S.P.

The strongly rounded whorls and strong axial ribs will distinguish this species from the other five spirally pitted forms.

PYRGISCUS VENUSAE, new species

Plate 6, figures 5a, b

Shell moderately large, very regularly turrited, cream-yellow. The nucleus consists of about 2.4 well-rounded whorls that form a low helicoid spire whose axis is at right angles to that of the postnuclear spire, in the first whorl of which the nucleus is about one-third immersed. The postnuclear whorls are flattened and crossed by very strong vertical axial ribs, of which 12 are present on the second to eighth whorl, 14 upon the ninth, and 16 upon the last whorl. The axial ribs extend equally strong from the summit to the periphery. The intercostal spaces are a little narrower than the ribs and are crossed by fine strong spiral pits, which are of almost equal spacing (see detailed drawing, pl. 6, fig. 5b). The suture is moderately impressed and rendered wavy by the axial ribs. The base is hemispherical and smooth. The aperture is subquadrate, the columella is reflected and bears a strong fold near its insertion, the outer lip is thin, and the parietal wall is covered by a thin callus.

The type, U.S.N.M. No. 561633, comes from the Pliocene of North St. Petersburg, Fla. It has 11 postnuclear whorls and measures: Length 5.1 mm., diameter 1.1 mm. U.S.N.M. No. 561634 contains two additional specimens from the same source, and two more are in the collection of the A.N.S.P.

PYRGISCUS TITYUSI, new species

Plate 7, figures 1a, b

Shell moderately large, turrited, cream-yellow. The nucleus consists of 2.5 whorls that form a low helicoid spire whose axis is at right angles to the axis of the postnuclear whorls, in the first of which it is about one-third immersed. The postnuclear whorls are flattened and crossed by moderately strong axial ribs, which are of the same strength from summit to suture; of these ribs 16 are present upon the second to sixth whorl. On the last turn, which is slightly inflated, the axial ribs become gradually weaker, much more numerous, and

very closely spaced. The intercostal spaces are about as wide as the ribs and are crossed by five broad and deep subequally spaced series of spiral pits. Suture moderately well impressed, rendered wavy by the summits of the axial ribs. Base hemispherical, marked by the feeble continuations of the axial ribs and weak indications of fine spiral threads. Aperture obliquely oval, columella thin, somewhat twisted, with an oblique fold near its insertion, parietal wall covered with a thin callus.

The type, U.S.N.M. No. 561635, comes from the Pliocene of North St. Petersburg, Fla. It has 9 postnuclear whorls and measures: Length 4.5 mm., diameter 1.1 mm. U.S.N.M. No. 561636 contains 11 additional specimens from the same source, and 13 more are in the collection of the A.N.S.P.

This species is nearest related to *Pyrgiscus venusae* (p. 40), from which it is readily distinguished by having the axial ribs much less strongly developed and more closely spaced and extending feebly upon the base, which also shows spiral lirations.

PYRGISCUS THESTIUSI, new species

Plate 7, figures 8a, b

Shell small, broadly conic, cream-yellow. Nucleus lost. The postnuclear whorls are slightly rounded and crossed by very strong, distantly spaced axial ribs, of which 14 are present on all the whorls. The ribs are of equal strength from the summit to the periphery. The intercostal spaces are strongly impressed and about as wide as the ribs; they are crossed by six spiral pits that vary in strength and spacing (see detailed sketch, pl. 7, fig. 8b). Suture moderately impressed, rendered wavy by the summit of the axial ribs. Base hemispherical, smooth. Aperture fractured, apparently subquadrate, columella rather thick with an oblique fold near its insertion, outer lip fractured, parietal wall covered by a thin callus.

The type, U.S.N.M. No. 561637, comes from the Pliocene of North St. Petersburg, Fla. It has 7 postnuclear whorls remaining which measure: Length 4.1 mm., diameter 1 mm. The broadly conic shape and very strong distantly spaced axial ribs readily distinguish this species from the other members having six spiral pits.

PYRGISCUS TELLUSAE, new species

Plate 7, figures 5a, b

Shell small, turrited, slender, cream-colored. The nucleus consists of about 2.5 whorls that form a depressed helicoid spire, whose axis

is at right angles to that of the postnuclear whorls, in the first of which it is about half immersed. The postnuclear whorls are only slightly rounded; they are crossed by strong vertical axial ribs, of which 12 are present upon the second to sixth, 14 upon the seventh, and 15 upon the last whorl. These ribs become stronger and wider on succeeding turns, and they are of the same strength from the summit to the periphery. The intercostal spaces are as wide as the ribs and bear six deeply impressed spiral pits which are of equal strength but not of equal spacing (see sketch, pl. 7, fig. 5b). Suture moderately impressed, rendered wavy by the summit of the ribs. Base hemispherical, smooth. Aperture obliquely oval, columella slender with an oblique fold near its insertion. Outer lip thin, parietal wall covered with a thin callus.

The type, U.S.N.M. No. 561638, comes from the Pliocene of North St. Petersburg, Fla. It has 9.5 postnuclear whorls and measures: Length 3.9 mm., diameter 0.9 mm.

This species resembles *Pyrgiscus thestiusi* (p. 41) but is easily distinguished from that by its much more slender form.

PYRGISCUS CLIONAE, new species

Plate 7, figures 4a, b

Shell small, turrited, slender, cream-colored. Nuclear whorls decollated. The postnuclear whorls are almost flattened and crossed by strong vertical axial ribs, of which 12 are present upon the first to third of the remaining turns, 13 upon the fourth, 14 upon the fifth, 16 upon the sixth, and 18 upon the last whorl. These ribs are of the same strength from the summit to the periphery. The intercostal spaces are as wide as, or a little wider than, the ribs; they are crossed by six deeply impressed spiral pits, which are not of the same strength or spacing (see detailed sketch, pl. 7, fig. 4b). Suture moderately impressed, rendered wavy by the summit of the ribs. Base hemispherical, smooth. Aperture obliquely oval; columella slender, reflected, and provided with an oblique fold a little below its insertion; outer lip thin, parietal wall glazed with a thin callus.

The type, U.S.N.M. No. 561639, comes from the Pliocene of North St. Petersburg, Fla. It has 7.5 postnuclear whorls remaining and measures: Length 3.5 mm., diameter 1 mm.

This species resembles most nearly *Pyrgiscus tellusae* (p. 41) but is readily distinguished from it by its less strong sculpture and more uniform spiral markings.

PYRGISCUS TANTALUSI, new species

Plate 7, figures 6a, b

Shell large, turrited, cream-yellow. The early whorls were lost; those remaining are strongly rounded and marked by axial ribs, which are protractively slanting on the first three of the remaining whorls and vertical upon the rest. Of these ribs 12 are present upon the first, 14 upon the second and third, 15 upon the fourth, 16 upon the fifth, 18 upon the sixth, 20 upon the seventh, and 21 upon the last whorl. These ribs are of the same strength from the summit to the periphery. The intercostal spaces are strongly impressed and about as wide as the ribs. They are marked by six broad spiral pits, of which the first five are subequal while the basal one is much wider (see detailed sketch, pl. 7, fig. 6b). Suture well marked, rendered wavy by the summits of the ribs. Base short, hemispherical, smooth. Aperture subquadrate, columella slender, provided with an oblique fold a little below its insertion; outer lip thin.

The type, U.S.N.M. No. 561640, comes from the Pliocene of North St. Petersburg, Fla. It is a fragment consisting of the last 8 whorls and measures: Length 5 mm., diameter 1.5 mm.

The large size, almost cylindric outline, and strongly rounded whorl distinguish this species from *Pyrgiscus sylvanusi* (below).

PYRGISCUS SYLVANUSI, new species

Plate 7, figures 3a, b

Shell small, turrited, cream-yellow. The nucleus consists of 2.5 strongly rounded whorls, which form a depressed helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which it is about one-fourth immersed. The postnuclear whorls are moderately rounded and crossed by moderately strong vertical ribs, of which 10 are present upon the second, 14 upon the third, 18 upon the fourth, 20 upon the fifth, 21 upon the sixth, and 23 upon the last turn. These ribs are of equal strength from the summit to the periphery. The intercostal spaces are about as wide as the ribs and are crossed by six spiral pits, of which the last four are of equal strength, the first being about half as wide as these and the second half as wide as the first. The spacing of these pits is irregular and best noted by examining the detailed sketch, plate 7, figure 3b. Suture well impressed. Base hemispherical, smooth. Aperture obliquely oval, columella slightly twisted, moderately stout and reflected, provided with a weak fold a little below its insertion, outer lip thin, parietal wall glazed with a weak callus.

The type, U.S.N.M. No. 561641, comes from the Pliocene of North St. Petersburg, Fla. It has 7.6 whorls and measures: Length 4.4 mm., diameter 1.3 mm.

PYRGISCUS SOMNUSI, new species

Plate 8, figures 4a, b

Shell rather large, turrited, reddish cream-colored. All but the last 7 whorls decollated. Those remaining are flattened and crossed by moderately strong, vertical, axial ribs, of which 14 are present upon the first and second of the remaining whorls, 16 upon the third and fourth, 17 upon the fifth, 22 upon the sixth, while beyond this the ribbing becomes gradually finer and more closely spaced, showing senescent features. The intercostal spaces are about as wide as the ribs; they are crossed by 6 spiral pits which vary in size and spacing (see detailed sketch, pl. 8, fig. 4b). Suture moderately impressed. Base hemispherical, smooth. Aperture obliquely oval, columella straight, slightly reflected and provided with an oblique fold a little below its insertion; outer lip thin.

The type, U.S.N.M. No. 561642, comes from the Pliocene of North St. Petersburg, Fla. It has the last seven whorls which measure: Length 5 mm., diameter 1.2 mm. Another decollated specimen is in the collection of the A.N.S.P.

This species is nearest related to *Pyrgiscus sisyphusi* (below), from which its much stouter shape, as well as its spiral sculpture, readily distinguishes it.

PYRGISCUS SISYPHUSI, new species

Plate 8, figures 5a, b

Shell moderately large, turrited, slender, cream-colored. The early whorls in both our specimens are decollated. The remaining post-nuclear whorls are rather high and flattened and are crossed by slightly retractively slanting axial ribs which are of the same strength from the summit to the periphery. Of these ribs 17 are present upon the first to third of the remaining whorls, 20 upon the fifth, and 22 upon the last. The intercostal spaces are about as wide as the ribs and are crossed by six spiral pits which are of unequal size and spacing (see detailed sketch, pl. 8, fig. 5b). Suture rendered wavy by the summit of the axial ribs. Base rather long, hemispherical, marked by the feeble continuation of the axial ribs which extend slightly beyond the periphery and vanish a little distance anterior to this. There is also a deep spiral pit which shows slightly in the suture of

the preceding turns but extends below the periphery as a spiral band. This makes our sketch (pl. 8, fig. 5b) appear as if seven spiral bands were present. The rest of the base is smooth. Aperture elongate-oval, columella slender, curved, and provided with an oblique fold a little below its insertion, outer lip thin, parietal wall covered by a thin callus.

The type, U.S.N.M. No. 561643, comes from the Pliocene of North St. Petersburg, Fla. It has 6.5 whorls remaining which measure: Length 4.5 mm., diameter 1.1 mm. Another specimen of about the same size is in the collection of the A.N.S.P.

This species resembles most nearly *Pyrgiscus somnusi* (p. 44), from which it is easily distinguished by its much more slender form and spiral sculpture.

PYRGISCUS SILENUSI, new species

Plate 8, figures 3a, b

Shell small, turrited, cream-colored. Nuclear whorls 2.5, forming a depressed helicoid spire whose axis is at right angles to that of the succeeding whorls, in the first of which the nuclear turns are about one-fourth immersed. The postnuclear whorls are flattened and marked by rather weak, retractively slanting axial ribs which are merely indicated upon the first two whorls; the third whorl shows 15, the fourth 18, the fifth and sixth 20, and the last 22. The intercostal spaces are about as wide as the ribs and are crossed by six spiral pits, of which the first five are subequal and subequally spaced. The first pit is about three times the distance below the summit as it is from its neighbor. The sixth pit is double the width of the rest. (See detailed sketch, pl. 8, fig. 3b.) Suture not strongly impressed. Base hemispherical, smooth. Aperture obliquely oval, columella provided with an oblique fold a little anterior to its insertion, outer lip fractured, parietal wall glazed by a weak callus.

The type, U.S.N.M. No. 561644, comes from the Pliocene of North St. Petersburg, Fla. It has 7 postnuclear whorls and measures: Length 3.5 mm., diameter 1 mm.

It is nearest related to *Pyrgiscus pyrrhusi* (below) but is distinguished from that by its different spiral sculpture and less strongly developed axial ribs.

PYRGISCUS PYRRHUSI, new species

Plate 8, figures 1a, b

Shell small, turrited, cream-yellow. Nuclear whorls 2.3, strongly rounded, forming a rather elevated, helicoid spire whose axis is at

right angles to that of the postnuclear spire, in the first whorl of which the nucleus is about one-third immersed. The postnuclear whorls are flattened and crossed by strong, retractively slanting axial ribs, which have the same strength from the summit to the periphery. Of these ribs 12 are present upon the second whorl, 13 upon the third and fourth, and 14 upon the rest, except for the last, which has 16. The intercostal spaces are about as wide as the ribs and are crossed by six spiral pits, of which the first and the last two are finer than the rest and subequal. The second and fourth are of equal strength and about two and one-half times as wide as the first, fifth, and sixth, while the third is still wider. The spacing and details are best realized by viewing the sketch, plate 8, figure 1b. Base hemispherical, smooth. Suture moderately strongly impressed, rendered wavy by the summit of the strong axial ribs. Aperture rather short, obliquely oval, columella slender, curved, provided with an oblique fold a little below its insertion; outer lip thin.

The type, U.S.N.M. No. 561645, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 9.5 postnuclear whorls and measures: Length 4.2 mm., diameter 1.1 mm.

This species differs from *Pyrgiscus silenusi* (p. 45) by its more conic outline, much stronger axial ribs, and detailed spiral sculpture.

PYRGISCUS APOLLOI, new species

Plate 8, figures 2a, b

Shell small, turrited, stout, cream-colored. Nuclear whorls 2.3, strongly rounded, forming a moderately elevated helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which the nuclear spire is slightly immersed. The postnuclear whorls are strongly rounded, and crossed by strong, broad, almost vertical axial ribs, of which 14 are present on the first and 16 on all the rest of the whorls except the last, which has 18. The axial ribs are a little wider than the spaces that separate them and are of the same strength from summit to the periphery. The intercostal spaces are crossed by seven deep, broad spiral pits, of which the first, second, and fourth are of equal width and a little more than half the width of the rest which are subequal. (See sketch, pl. 8, fig. 2b.) Suture strongly constricted, rendered decidedly wavy by the summit of the strong axial ribs. Base hemispherical, smooth. Aperture obliquely oval, columella with an oblique fold a little below its insertion, outer lip fractured in the type.

The type, U.S.N.M. No. 561646, comes from the Pliocene of North

St. Petersburg, Fla. It has 8.2 postnuclear whorls and measures: Length 4.4 mm., diameter 1.1 mm. U.S.N.M. No. 561647 has two additional specimens from the same source and two more are in the collection of the A.N.S.P.

The strongly rounded whorls and strong, broad axial ribs will easily distinguish this from the other seven spirally pitted species.

PYRGISCUS DIANAE, new species

Plate 9, figures 2a, b

Shell small, turrited, stout, broadly elongate-conic, cream-yellow. Nuclear whorls 2.5, strongly rounded, forming a rather elevated helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which it is about one-fourth immersed. The postnuclear whorls are flattened and crossed by retractively slanting axial ribs, which are poorly developed on the first two turns, beyond which they become stronger on successive whorls. Of these ribs, 14 are present upon the third, 16 upon the fourth to sixth, 18 upon the seventh, and 21 upon the last turn. They are of the same strength from the summit to the periphery. The intercostal spaces are about as wide as the ribs; they are crossed by seven spiral pits, of which the third is much wider than the rest which are of subequal strength; for spacing of these pits see detailed sketch, plate 9, figure 2b. Suture moderately strongly impressed, rendered wavy by the summit of the axial ribs. Base rather short, hemispherical, smooth. Aperture subquadrate, columella short, with a small oblique fold a little below its insertion, outer lip strongly curved, parietal wall with a moderately strong callus.

The type, U.S.N.M. No. 561648, comes from the Pliocene of North St. Petersburg, Fla. It has 8 postnuclear whorls and measures: Length 3.6 mm., diameter 1.1 mm.

The more conic outline, less strong axial ribs, and flattened whorls will readily distinguish this species from *Pyrgiscus apolloi* (p. 46).

PYRGISCUS LATONAE, new species

Plate 9, figures 1a, b

Shell moderately large, turrited, cream-yellow. The nucleus consists of 2 small, strongly rounded whorls, which form a well-elevated helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which it is about one-fourth immersed. The postnuclear whorls are almost flattened and crossed by strong re-

tractively slanting axial ribs, of which in the cotype having the nuclear spire 12 are present upon the second and third whorl, 14 upon the fourth and the rest. The adult cotype has the last 6.3 whorls remaining, of which the first has 14 ribs, the second 16, and the rest 18. These ribs extend equally strong from the summit to the periphery. The intercostal spaces are about as wide as the axial ribs; they are crossed by seven spiral pits, of which the first is a mere line, while the second, third, and fourth are very large, being only excelled in width by the last, the fifth and sixth being a little narrower than the three above it. (The sketch, pl. 9, fig. 1b, gives details of size and spacing.) Suture moderately well impressed, rendered wavy by the summit of the axial ribs. Base hemispherical, smooth. Aperture broad, obliquely oval, columella vertical, rather slender, and slightly reflected, bearing an oblique fold a little below its insertion, outer lip fractured, parietal wall glazed with a thin callus.

The two cotypes, U.S.N.M. No. 561649, come from the Pliocene of North St. Petersburg, Fla. The specimen with the nucleus has 8.4 postnuclear whorls and measures: Length 4.2 mm., diameter 1.3 mm. The other cotype has the last 6.5 postnuclear whorls and measures: Length 4.8 mm., diameter 1.5 mm. U.S.N.M. No. 561650 contains two specimens from the same source. Two additional specimens are in the collection of the A.N.S.P.

This species differs from *Pyrgiscus dianae* (p. 47) in not being broadly conic and in details of the spiral sculpture.

PYRGISCUS PHAETONI, new species

Plate 8, figures 6a, b

Shell moderately large, turrited, not stout, elongate, cream-colored. The nucleus has 2.3 strongly rounded whorls, which form a moderately elevated helicoid spire whose axis is at right angles to that of the axis of the postnuclear whorls, in the first of which it is about one-fourth immersed. The postnuclear whorls are flattened and crossed by decidedly retractive axial ribs, of which in the type, which has lost the nucleus and the first two postnuclear whorls, 18 are present on the second to fifth of the remaining turns, 20 on the sixth, and 22 on the last. The intercostal spaces are narrower than the ribs and bear seven spiral pits which vary greatly in width and spacing and are best described by our detailed sketch (see pl. 8, fig. 6b). Suture moderately constricted, rendered wavy by the summits of the axial ribs. Base hemispherical, smooth, excepting a fine incised spiral line which is at a little distance below the periphery. The axial ribs extend feebly beyond the periphery to this line. Aperture obliquely

oval, columella slender, gently curved and provided with an oblique fold a little below its insertion, outer lip thin.

The type, U.S.N.M. No. 561651, comes from the Pliocene of North St. Petersburg, Fla. It has 8.1 whorls remaining and measures: Length 5.2 mm., diameter 2.2 mm. U.S.N.M. No. 561652 contains another specimen that has furnished the description of the nucleus. A third specimen is in the collection of the A.N.S.P.

The rather large size and elongated shape, as well as detailed spiral sculpture, will readily differentiate this from *Pyrgiscus harmoniae* (below).

PYRGISCUS HARMONIAE, new species

Plate 9, figures 8a, b

Shell rather large, turrited, elongate-conic, cream-yellow. The nucleus consists of about 2.5 strongly rounded whorls, which form a moderately elevated helicoid spire whose axis is at right angles to that of the postnuclear spire. The postnuclear whorls are much wider at the periphery than the summit. The first postnuclear whorl is smooth; the rest are marked by strong, retractively slanting axial ribs, of which 20 are present upon the second to sixth, 21 upon the seventh, 22 upon the eighth, and 24 upon the last whorl. The intercostal spaces are about as wide as the ribs and are crossed by seven incised spiral pits which are subequal, excepting the first which is only about half the width of the rest. The spacing of these pits is best described in our detailed sketch, plate 9, figure 8b. The suture is moderately constricted and rendered wavy by the summit of the axial ribs. The base is hemispherical, smooth. The aperture is obliquely oval; the columella is short, slender, curved and provided with an oblique fold a little below its insertion; the outer lip is thin.

The type, U.S.N.M. No. 561653, comes from the Pliocene of North St. Petersburg, Fla. It has lost the nucleus; the 9 postnuclear whorls measure: Length 4.7 mm., diameter 1.2 mm. U.S.N.M. No. 561654 contains a young specimen, which has furnished the description of the nucleus.

The decidedly retractively slanting axial ribs and different spiral sculpture readily distinguish this species from *Pyrgiscus cadmusi* (below).

PYRGISCUS CADMUSI, new species

Plate 9, figures 6a, b

Shell small, turrited, elongate-conic, cream-yellow. The nucleus consists of about 2.5 strongly rounded whorls that form a moderately

elevated helicoid spire whose axis is at right angles to that of the postnuclear whorls. The postnuclear whorls are marked by very strong vertical axial ribs except for the first turn, which is smooth. Of these ribs 16 are present upon the second and third, 17 upon the fourth to seventh, and 18 upon the last whorl. The intercostal spaces are about as wide as the axial ribs and are marked by seven spiral pits which vary greatly in width and spacing and are best described by our sketch, plate 9, figure 6b. Suture moderately constricted, rendered wavy by the summit of the axial ribs. Base hemispherical, smooth. Aperture obliquely oval, columela slender, curved and provided with an oblique fold a little below its insertion; outer lip thin.

The type, U.S.N.M. No. 561655, comes from the Pliocene of North St. Petersburg, Fla. It has 8.2 postnuclear whorls and measures: Length 3.8 mm., diameter 1 mm. U.S.N.M. No. 561656 contains two specimens from the same source, and two more are in the collection of the A.N.S.P.

The vertical axial ribs and detailed spiral sculpture readily distinguish this species from *Pyrgiscus harmoniae* (p. 49).

PYRGISCUS INOAE, new species

Plate 9, figures 5a, b

Shell moderately large, turrited, shouldered near the summit, cream-colored. Nuclear whorls 2, strongly rounded, forming a depressed helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which it is about one-fourth immersed. The postnuclear whorls have the space between the second and third spiral pit elevated into a spiral cord, which lends to the whorls the shouldered appearance. The postnuclear whorls are crossed by strong axial ribs of which 12 are present upon the first, 14 upon the second and third, 16 upon the fourth and fifth, 18 upon the sixth and seventh, and 24 upon the last whorl. These ribs are equally strong from the summit to the periphery and show conspicuously the hump between the second and third spiral pit. The intercostal spaces are about as wide as the ribs and are crossed by eight spiral pits which differ greatly in size and spacing and are best described by our detailed sketch, plate 9, figure 5b. The suture is only moderately impressed and rendered wavy by the summit of the axial ribs. The base is rather short, rounded, and smooth. The basal part of the aperture is broken but it is probably subquadrate; the columella bears a strong oblique fold a little below its insertion.

The type, U.S.N.M. No. 561657, comes from the Pliocene of North

St. Petersburg, Fla. It is a young specimen and has 8.4 whorls and measures: Length 3.5 mm. (this is a false length measurement of the shell since the basal part of the outer lip and columella are broken away); diameter 1 mm.

An additional young specimen from the same source is in the collection of the A.N.S.P.

The shouldered whorls will readily distinguish this species from the rest of *Pyrgiscus*.

PYRGISCUS TELAMONI, new species

Plate 9, figures 3a, b

Shell large, turrited, cream-yellow. The nucleus is small and consists of about 2 whorls that form a depressed helicoid spire whose axis is at right angles to that of the postnuclear spire, in the first whorl of which the nucleus is about one-fourth immersed. The postnuclear whorls are slightly rounded and crossed by strong, slightly retractively slanting axial ribs, of which 12 are present upon the first and second, 14 upon the third, 16 upon the fourth, 18 upon the fifth, 20 upon the sixth, 24 upon the seventh, and 28 upon the last whorl. These ribs are of the same strength from the summit to the periphery. The intercostal spaces are about as wide as the ribs and are crossed by eight spiral pits that differ greatly in size and spacing and are best visualized by our sketch, plate 9, figure 3b. Suture moderately impressed, rendered wavy by the summit of the axial ribs. Base hemispherical, marked by the continuation of the axial ribs, which become gradually weaker after passing the periphery and vanish before reaching the middle of the base. The base also has nine weak spiral cords, which gradually become finer from the periphery toward the tip of the base. Aperture elongate, obliquely oval; the columella has a strong oblique fold a little below its insertion; the outer lip is fractured.

The type, U.S.N.M. No. 561658, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 8.5 postnuclear whorls and measures: Length 5.5 mm., diameter 1.1 mm. The type is a not quite adult specimen. U.S.N.M. No. 561659 is a fragment of a more mature specimen; this has 4.4 whorls and measures: Length 4 mm., diameter 1.2 mm.

The nine spiral threads of the base will readily distinguish this species from its near relatives.

PYRGISCUS HEBEAE, new species

Plate 9, figures 4a, b

Shell small, turrited, cream-yellow. The nucleus consists of about 2.5 strongly rounded whorls that form a rather elevated helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which it is only slightly immersed. The postnuclear whorls are flattened and marked by moderately strong vertical axial ribs, of which 12 are present upon the first and second, 13 upon the third, 14 upon the fourth, 16 upon the fifth, 18 upon the sixth, 20 upon the seventh, and 22 upon the last whorl. These ribs are of the same strength from the summit to the periphery. The intercostal spaces are about as wide as the ribs and are marked by eight spiral pits that differ much in width and spacing and are best described by our figure 4b, on plate 9. The suture is not strongly impressed and is rendered wavy by the summits of the axial ribs. The base is hemispherical and smooth. The aperture is obliquely elongate-oval; the columella is straight and provided with an oblique fold a little anterior to its insertion; the outer lip is thin and evenly curved.

The type, U.S.N.M. No. 561660, comes from the Pliocene deposits of North St. Petersburg, Fla. It has 8.5 postnuclear whorls and measures: Length 3.2 mm., diameter 0.9 mm.

The less regularly elongate-conic shape, as well as the different spiral sculpture of the intercostal spaces, easily distinguishes this species from *Pyrgiscus aesoni* (below).

PYRGISCUS AESONI, new species

Plate 9, figures 7a, b, c

Shell small, turrited, very regularly elongate-conic, cream-colored. The nucleus is small, and consists of about 2.5 strongly rounded whorls that form a moderately elevated helicoid spire, whose axis is at right angles to that of the postnuclear spire. The postnuclear whorls are flattened and marked by very regular, strong, retractively slanting axial ribs, which are obscure upon the first whorl, while the rest of the whorls in the young cotype show 16. The adult fragment of the other cotype also shows 16 ribs upon all its whorls. These ribs are equally strong from the summit to the periphery. The intercostal spares are a little narrower than the ribs and are crossed by eight spiral pits that differ greatly in width and spacing and are best described by our sketch on plate 9, figure 7c. The suture is not strongly impressed and is rendered wavy by the summits of the axial ribs.

The base is hemispherical and smooth. The aperture is broad and obliquely oval; the columella is slender with an oblique fold a little below its insertion; the outer lip is thin.

The two cotypes, U.S.N.M. No. 561661, come from the Pliocene deposits of North St. Petersburg, Fla. The young specimen has the nucleus and 6.1 postnuclear whorls and measures: Length 2.2 mm., diameter 0.7 mm. The other cotype, a fragment, consists of the last 4.1 whorls and measures: Length 3.5 mm., diameter 1 mm.

The very regular elongate-conic form and different spiral sculpture easily distinguish this species from *Pyrgiscus hebeae* (p. 52).

HYBRIDIZATION AMONG MOLLUSKS

The Pliocene deposits of North St. Petersburg, Fla., have yielded another very variable complex in the family Pyramidellidae. This complex recalls *Turbonilla* (*Pyrgiscus*) *tenuicula* Gould of the West Coast of America, of which I wrote, in 1909, in the Monograph of West American Pyramidellid Mollusks (U. S. Nat. Mus. Bull. 68, p. 92):

Turbonilla (*Pyrgiscus*) *tenuicula* Gould is the most abundant and most variable species of all the West American forms, presenting many varieties or incipient species; to describe these would not aid science or the collector, but would only add to the confusion which this paper is intended to dispel.

A second very variable complex on the west coast was noted in the same paper and described on pages 160-161 as *Odostomia* (*Chrysallida*) *virginalis* Dall and Bartsch:

This is the most variable and the most abundant member of the subgenus *Chrysallida*. On some the axial ribs extend only over the first two cords below the summit, on others they extend strongly over the periphery and part of the base. The spiral cords also vary in number and strength. The general form, however, seems quite constant.

A similar state of affairs was noted in the northeast Atlantic and described as *Turbonilla (Pyrgiscus) winkleyi* Bartsch (Pyramidellidae of New England and the Adjacent Region, Proc. Boston Soc. Nat. Hist., vol. 34, No. 4, pp. 90-91, 1909). From this I quote:

This is probably the most abundant and variable species on the Atlantic coast. The above description shows that the sculpture in a single specimen, the type, is quite variable. The variability is emphasized when we examine such a wealth of material as has been at our disposal. (177 specimens from 27 localities.) The axial ribs may be crowed or distantly spaced, the spiral markings may vary not only in numbers but also in strength, from deep lines of pits, to fine striations. It is one of those forms in which scarcely two individuals present exactly the same phase of ornamentation, resembling in this respect *Turbonilla* (*Pyrgiscus*)

tenuicula Gould, of the west coast of America. The yellow color which appears on the surface like an epidermis, and the shape, serve as a guide to this form.

Among the Pyramidellidae it seems to be the rule, that the most variable forms are the most abundant and most widely distributed. This leads one to wonder if it is not the optimum condition that weakens specific bonds and tends to throw an organism into the so-called "state of flux" rather than the reverse.

It is interesting to note that these "stages of flux" are not confined to mollusks but are found in many groups of plants and animals, and are put to human use by breeders.

The explanation for the phenomenon was furnished me by a colony of Bahama Cerions (land shells) which I had planted on the Florida Keys. Here I had placed, in 1912, colonies of 500 of *Cerion viaregis* Bartsch and *Cerion casablancae* Bartsch on alternate keys, from Miami to the Tortugas, in the hope that these would tell whether the enormous numbers of species of Cerions in the Bahamas were constant in their characters or varied with varying environments.

It was held by some of our foremost malacologists that a wet year might produce giants and a dry year dwarfs.

My planting proved first of all that Bahama Cerions required three years to gain maturity. Then they showed no change of form or color throughout the range of Florida Keys. But on two of the keys I met with a great surprise in 1914 and 1915. A hurricane had passed over the central portion of the chain of islands prior to my planting and had evidently swept away the native Florida *Cerion incanum* from the grass-covered beaches. Here I found on New Found Harbor Key, on a single bush, a number of Cerions entirely unlike the *C. viaregis* that I had planted there. Also I found among this colony quite a number of *C. incanum* that had evidently been buried under sand by the storm when I did my planting and thus escaped my notice. Next year I found many more hybrids in this colony.

In 1915 I found a similar condition in the adjacent colony on Boca Grande of the much larger white *Cerion casablancae* Bartsch. These hybrids also showed, upon dissection, that the anatomy of the soft parts presented by different individuals was as varied as the characters presented by the shell. One dissection showed even a duplication of the sexual organs.

Later plantings of individual pairs of the Florida and Bahama species, in cages and water-bound plots, confirmed the hybrid theory. This work was carried on under the joint auspices of the Smithsonian Institution and the Marine Biological Laboratory of the Carnegie Institution at the Tortugas. In one of my reports to those institutions I suggested *"Hybridization, Mutation, Isolation, Fixation, Speciation"* as a method of producing new species.

To show that this mixup in *Cerion* is not unusual in the wilds of nature, I may report that in 1912, while in the Bahamas with the expedition of the Marine Biological Laboratory of the Carnegie Institution, we made a trip through South Bight to the flamingo colony on the west coast of Andros Island. On this trip we found many fingerlike extensions of low ridges of land into South Bight. Each of these spits harbored an abundant colony of Cerions resembling in a general way *C. viaregis*. When 100 of each of these colonies were biometrically measured, each one showed a distinctive curve. The most startling *Cerion* feature, however, was a colony of a magnificent huge white species to which I gave the name *Cerion mayori,* in honor of Dr. Alfred G. Mayor, the director of the expedition.

Returning to this region in 1921, I met an altogether unexpected state of affairs. The region had been swept by a hurricane anl floods, and the Cerions had been carried inland and dumped on the ridges in masses, all mixed up, a wonderful opportunity for hybridization of compatible elements.

A problem of this kind in fresh-water mollusks is going on at the very doorsteps of the Nation's Capital. When I began gathering mollusks in and about the District of Columbia to prepare a check list of its fauna I was greatly surprised to find *Goniobasis virginica* a most variable assemblage. It seemed that there were scarcely two individuals in my collections that were exactly alike. In size they varied from dwarfs to giants as 1 to 5, and in sculpture their variation ranged from smooth to axially ribbed and spirally lirate. These combinations of sculpture might be constant on all the postnuclear whorls of an individual or indiscriminately varied in the same shell. The color, too, might be unicolor or spirally banded.

Extending my collecting down the valley of the Potomac to where the salt-water influence inhibited *Goniobasis* from existing, I found that shortly below the mouth of the Occoquan Creek all the shells were uniformly multilirate. If one had only such a collection he would not hesitate to call it *Goniobasis multilirata.*

Going north and up the Shenandoah Valley and also in Occoquan Creek above the falls at Occoquan, I found that *Goniobasis* had smooth shells usually with a spiral brown band.

In the Potomac itself I found an interesting state of affairs. The Chesapeake and Ohio Canal contained a fluxed fauna like that at Washington, and the same was true on the shoreline of the Maryland side of the river, but on the Virginia side below the mouth of the Shenandoah the smooth form prevailed a long way down, becoming

gradually contaminated with the fluxed elements from the overflows or discharges of the Chesapeake and Ohio Canal.

These findings offered interesting problems. The first section of the Chesapeake and Ohio Canal, from Little Falls to Seneca, Md., was opened in 1830, while the rest, Seneca to Cumberland, Md., was opened to water travel in 1860. This canal covered a stretch of 186 miles. In 1896, when I went to Washington, the Canal was used extensively to carry huge barges of coal from Cumberland to Washington and other freight northwestward. These barges served as carriers for the Washington complex of *Goniobasis* that had attached themselves to the bottom and sides of the barges while anchored at Washington. This, therefore, was the explanation for the fluxed condition of the Chesapeake anl Ohio Canal *Goniobasis* fauna.

The smooth Shenandoah and the multilirate lower Potomac *Goniobasis* faunas suggested two species, mutually fertile, that at their meeting place crossed and produced the endless number of mutants now found there.

Cage breeding in the Shenandoah, Roaches Run, and Fort Belvoir furnished confirming evidence that the fluxed condition in the Potomac was due to the crossing of the smooth and multilirate species at their meeting contacts.

This process of hybridizing and mutating is going on all about us. The various breeds of dogs, cattle, pigeons, fowls, *Drosophila,* and most of our cultivated plants tell a marvelous confirming story! Here man's selection of what he wishes to preserve expedites fixation, which in the unaided field of nature works slowly and haphazardly with the survival of the fittest. The human hodgepodge is no exception.

The microcosms of chemical compounds contained in the chromosomes and fluids of germ cells convey not only the spark we call life, but their specific composition determines and assures that the end of the developing offspring shall be of the parents' kind, i.e., when the mating of the two parent germ cells are of the same kind. When germ cells of nonrelated species meet, we believe that they are not attracted to each other or are incompatible, or in instances where fertilization takes place the resultant embryo fails to run a complete course and is lost. If, on the other hand, germ cells of species of related groups meet, they may prove compatible and result in the production of what we call hybrids, traceable, we believe, to the unstabilized microchemical composition of the contents of the germ cell.

In the Pyramidellidae, Cerions, and *Goniobasis* mentioned, the hy-

bridization has caused an enormous efflorescence of individuals, and on the west coast it has also caused the pyramidellids mentioned to extend their range over the adjacent faunal areas to which the fixed species of the region are confined.

The present complex combines features characterizing the subgenera *Strioturbonilla* and *Pyrgiscus,* and, if we follow the precept of our botanists, may be called *Striopyrgus,* with the specific designation *hybridus.*

It will be interesting to see if, when the Miocene pyramidellids of the region are worked up, we may be able to discover the parents responsible for this group of mutants, and it will be equally interesting to note the Pleistocene and Recent descendants of the group.

STRIOPYRGUS, new pseudogenus

Shell of typical *Turbonilla* shape. The sculpture consists of axial ribs and a mixture of strong incised spiral grooves and fine spiral lines in the intercostal spaces.

Type: *Striopyrgus hybridus,* new species.

STRIOPYRGUS HYBRIDUS, new species

Plates 10-14, figures 1-61

Shell of typical turrited *Turbonilla* shape. There is a considerable range in size in the complex. The nuclear whorls are typically turbonilloid; they form a helicoid apex whose axis is placed at right angles to the axis of the postnuclear whorls. The postnuclear whorls are crossed by axial ribs which vary in numbers, strength, and spacing in different individuals. The intercostal spaces of the whorls show an enormous range of differentiation in spiral sculpture in the complex. While this sculpture is usually constant on all the whorls of an individual shell, different individuals may have incised spiral lines and pits varying in number from 9 to 31 in the material before us. These spiral markings likewise vary in strength from mere lines to broad pits, and their number of pits and incised lines varies greatly in different individuals of the complex. The suture, base, and aperture are typically turbonilloid.

Following the customary procedure, I am designating U.S.N.M. No. 561697 (pl. 10, fig. 1) as type specimen.

Genus SALASSIA Folin

1870. *Salassia* Folin, Ann. Soc. Linn. Maine-et-Loire, vol. 12, p. 200.

Shell pupiform, whorls not inflated, marked by axial ribs which extend from the tabulated summit of the whorl to the umbilical area. Varices absent.

Type: *Salassia tropidita* Dall and Bartsch.

SALASSIA (SALASSIA) FARGOI, new species

Plate 15, figure 1

Shell minute, pupiform, cream-yellow. The nucleus consists of about 1.5 small whorls whose axis is at right angles to the axis of the postnuclear whorls, in the first of which it is obliquely half immersed. The postnuclear whorls are moderately well rounded with almost flattened, broad, shouldered summit and marked by very strong, slightly protractively slanting, very distantly spaced axial ribs. These ribs are very feeble on the first whorl while the rest bear eight each. The suture appears contracted, rendered so by the shoulder. Periphery and base well rounded and crossed by the strong axial ribs, which extend to the umbilical region. Aperture obliquely oval; columella slender, provided with a fold; parietal wall strong, rendering the aperture complete; outer lip curved and slightly thickened.

The type, U.S.N.M. No. 561664, comes from the Pliocene of North St. Petersburg, Fla. It has 4.6 postnuclear whorls and measures: Length 1.8 mm., diameter 0.8 mm. U.S.N.M. No. 561665 contains another specimen from the same source, while two more are in the collection of the A.N.S.P.

Subgenus Salassiella Dall and Bartsch

1909. *Salassiella* Dall and Bartsch, U. S. Nat. Mus. Bull. 68, p. 133.

Shell pupiform, whorls inflated, marked by axial ribs which extend undiminished from the summit to the umbilical area. Varices strong, irregularly distributed.

Type: *Odostomia* (*Salassiella*) *laxa* Dall and Bartsch.

SALASSIA (SALASSIELLA) BALCHI, new species

Plate 15, figure 5

Shell minute, elongate-pupoid, pale buff. The nucleus consists of about 2 small turns whose axis is at right angles to that of the postnuclear spire, in the first whorl of which the nucleus is half immersed.

The postnuclear whorls are well rounded and crossed by very strong, rounded axial ribs which render the summit of the whorls and suture wavy. These ribs pass over the periphery of the last whorl upon the base, where they become decidedly reduced. Of these ribs 18 are present upon the third and fourth and 20 upon the last whorl. At irregular intervals some of the ribs become stronger, forming a varix. The intercostal spaces are deep and a little narrower than the ribs. Suture very marked, rendered decidedly wavy by the strong summits of the ribs. Periphery rounded. Base well rounded, marked as indicated above by the feeble continuations of the axial ribs. Aperture oval; columella slender, curved, with a mere indication of a fold; parietal wall covered by a callus; outer lip thick.

The type, U.S.N.M. No. 561662, comes from the Pliocene of North St. Petersburg, Fla. It has 5.5 postnuclear whorls and measures: Length 2.4 mm., diameter 1.0 mm. U.S.N.M. No. 561663 contains another specimen from the same source, and a third is in the collection of the A.N.S.P.

I take pleasure in bestowing the name *balchi* upon this species in recognition of the great amount of help Francis N. Balch has rendered young mollusk students in northeastern America as well as his splendid studies upon the nudibranch fauna in the same region.

Genus **IOLAEA** A. Adams

1860. *Iole* A. Adams, Ann. Mag. Nat. Hist., ser. 3, vol. 5, p. 300 (not *Iole* 1844, Blyth, Journ. Asiat. Soc. Bengal, vol. 13, pt. 1, p. 386).
1867. *Iolaea* A. Adams, Proc. Zool. Soc. London, 1867, p. 310.

Shell umbilicated, marked by spiral cords and axial riblets which cross the grooves between them.

Type: *Iole scitula* A. Adams.

IOLAEA WAGNERI, new species

Plate 15, figure 3

Shell small, conic, cream-yellow. The nuclear whorls are deeply obliquely immersed in the first postnuclear turn above which only the tilted edge of the last whorl projects. The postnuclear whorls are well rounded and marked by three strong subequal spiral cords separated by deep spiral grooves which equal the cords in width. The space between the suture and the first spiral cord is as wide as the rest of the spiral grooves and renders the summit of the whorls decidedly shouldered. The axial sculpture consists of numerous very slender but well-elevated threads not quite so wide as the spaces that

separate them, which cross the spiral grooves and extend up on the sides of the spiral cords but do not cross them on the later turns. On the early whorls the axial sculpture tends to crenulate the spiral cords. The suture is rendered strongly channeled by the spiral cords. The periphery of the last whorl is marked by a spiral cord that is only a little less strong than those of the spire. The base is well rounded and marked by two spiral cords, which are consecutively a little less strong than the peripheral cord and equally spaced. The axial sculpture of the base is a duplication of that on the spire. The base has a narrow umbilical chink. The aperture is ovate. the columella is thin, curved, and slightly reflected; the parietal wall is covered by a thick callus that renders the peristome complete; the outer lip is thin, curved, and rendered wavy by the spiral cords.

The type, U.S.N.M. No. 561676, comes from the Pliocene of North St. Petersburg, Fla. It has 5.2 postnuclear whorls and measures: Length 3.1 mm., diameter 1.2 mm. U.S.N.M. No. 561677 contains two additional specimens from the same source, and two more are in the collection of the A.N.S.P.

I take pleasure in naming this species for William Wagner, the founder of the Wagner Free Institute of Science of Philadelphia, which has contributed much to our knowledge of Tertiary paleontology.

Genus **CHRYSALLIDA** Carpenter

1856. *Chrysallida* Carpenter, Catalogue of the collection of Mazatlan shells in the British Museum, p. 416.

1870. *Noemia* Folin, Ann. Soc. Linn. Maine-et-Loire, vol. 12, p. 200 (type: *Noemia angusta* Folin).

1886. *Noemiamea* Folin, *in* Hoyle, Zool. Rec., 1885, p. 94 (Mollusca) (same type).

Not *Noemia* Pasco, 1857.

Shells having strong axial ribs crossed by equally strong spiral keels between the sutures, the intersection of these two elements forming nodules. The axial ribs pass only faintly over the base, while the spiral sculpture remains quite prominent.

Type: *Odostomia* (*Chrysallida*) *torrita* Dall and Bartsch=*Chrysallida communis* Carpenter; not *Chemnitzia*=*Chrysallida communis* C. B. Adams.

KEY TO THE SPECIES OF CHRYSALLIDA

Axial ribs stronger than the spiral cords.
- Spiral cords 5 between the sutures on the later whorls.
  - Suture deeply channeled..... *aldrichi*
  - Suture not deeply channeled..... *weberi*

Spiral cords 4 between the sutures on the later whorls.
Suture very strongly constricted, whorls angulated at the second spiral cord.
First spiral cord much weaker than the second.
Shell ovate ..... *dalli*
Shell elongate-ovate ..... *cookei*
First spiral cord not smaller than the second.
Shell ovate ..... *gardnerae*
Shell elongate-ovate.
Shell large ..... *harrisi*
Shell small ..... *palmerae*
Suture not strongly constricted.
Shell elongate-ovate ..... *mansfieldi*
Shell elongate-conic ..... *macneili*
Axial ribs not stronger than the spiral cords.
Spiral cords between the sutures of the later whorls 5.
Sculpture strongly developed..... *simpsoni*
Sculpture not strongly developed.
Shell stout ..... *woodringi*
Shell slender ..... *vaughani*
Spiral cords between the sutures of the later whorls 4.
Suture deeply channeled.
Shell elongate-ovate ..... *stimpsoni*
Shell elongate-conic.
Base umbilicated ..... *leai*
Base not umbilicated.
Shell stout ..... *locklini*
Shell slender ..... *sayi*
Suture not deeply channeled.
Whorls shouldered from the second cord to the suture.
Shell stout ..... *smithi*
Shell not stout..... *pilsbryi*
Whorls not shouldered from the second cord to the suture.
Shell elongate-ovate.
Basal spiral cords strong..... *mcgintyi*
Basal spiral cords feeble..... *tuomeyi*
Shell not elongate-ovate.
Shell elongate-conic ..... *holmesi*

CHRYSALLIDA ALDRICHI, new species

Plate 15, figure 13

Shell minute, elongate-ovate, cream-colored. The nucleus consists of about 2 whorls, which are obliquely immersed in the first postnuclear turn. The postnuclear whorls are flattened and crossed by strong, slightly protractively slanting axial ribs. Of these ribs 12 are present upon the second, 13 upon the third, 14 upon the fourth, and 16 upon the last whorl. The ribs are equally strong from the summit

to the periphery. The intercostal spaces are a little wider than the ribs and are crossed by five spiral cords, which are less strong than the ribs and which render the ribs weakly nodulose. These spiral cords are equally spaced, the first being at the summit and the last immediately adjacent to the suture. The suture is deeply impressed and rendered wavy by the strong nodules at the summit of the whorls. The base is weakly rounded and marked by five spiral cords which are consecutively a little smaller from the one below the periphery toward the tip of the columella. The aperture probably is oval; the columella is stout and provided with a weak fold at its insertion; the parietal wall is covered by a heavy callus; the outer lip is fractured.

The type, U.S.N.M. No. 561698, comes from the Pliocene of North St. Petersburg, Fla. It has 6.5 postnuclear whorls and measures: Length 2.1 mm., diameter 0.9 mm.

I take pleasure in naming this species for Senator Truman H. Aldrich, whose explorations and collecting produced the fine collection now in the care of Johns Hopkins University.

CHRYSALLIDA WEBERI, new species

Plate 15, figure 8

Shell large, elongate-conic, cream-yellow. The nucleus consists of about 2 strongly rounded whorls, which are obliquely half immersed in the first postnuclear turns. The postnuclear whorls are moderately rounded and crossed by strong, retractively slanting axial ribs, which are equally strong from the summit to the periphery. The intercostal spaces are a little narrower than the ribs and are crossed by five spiral cords, which are not quite so strong as the axial ribs. The junctions of the spiral cords with the axial ribs render these strongly nodulose. The nodules on the 4 upper cords are equally strong while those above the periphery are a little weaker. The suture is rendered wavy by the strong nodules at the summit. The base is almost hemispherical, strongly rounded, and marked by eight spiral cords, of which the upper three are of equal strength, while the rest become consecutively weaker, the last being very slender. The spaces between the spiral cords on the base bear many slender axial threads. The aperture is large, oval; the columella is slender and reflected and bears a very strong internal fold at its insertion; the parietal wall is covered by a thick callus; the outer lip is curved and rendered wavy by the spiral cords.

The type, U.S.N.M. No. 561699, comes from the Pliocene of North St. Petersburg, Fla. It has lost the nuclear turns; the 7.5 whorls re-

maining measure: Length 5.2 mm., diameter 1.8 mm. Another specimen, not quite adult, is in the collection of the A.N.S.P. This has furnished the description of the nucleus.

I take pleasure in naming this species for Jay A. Weber, whose collecting of Tertiary Florida mollusks has contributed materially to our knowledge.

CHRYSALLIDA DALLI, new species

Plate 15, figure 6

Shell small, ovate, cream-yellow. The nucleus consists of 2.5 well-rounded smooth whorls, which are obliquely almost half immersel in the first postnuclear turn. The postnuclear whorls are well rounded and marked by very strong, slightly retractively slanting axial ribs, of which 12 are present upon the second, 13 upon the third, 14 upon the fourth, and 15 upon the last turn. The axial sculpture upon the first postnuclear whorl, as well as the spiral sculpture, is much finer, that is, less strongly developed. The intercostal spaces are about as wide as the ribs. The spiral sculpture consists of four cords, of which the one at the summit is weaker than the rest, which are of equal size. The junction of the axial ribs and spiral cords produce very strong oval tubercles whose long axis corresponds with the spiral cords. The tubercles of the cord at the summit, being smaller than those of the second cord, gives to the whorls a sloping-shoulder effect. The suture is deeply constricted and rendered sinuous by the tubercles at the summit of the whorls. The periphery of the last whorl is deeply grooved and crossed by the weakened axial ribs which extend to the first basal spiral cord. The base is broad, hemispherical, marked by nine spiral cords, the first of which is almost as strong as the cord above the periphery; the rest grow consecutively less strong, the last being mere elevated threads. The aperture is elongate-ovate, effuse at the junction of the basal lip and the columella; the columella is thin, slightly curved, oblique and slightly reflected, and bears a strong internal fold at its insertion; the parietal wall is covered by a thin callus; the outer lip is thin, gently curved and rendered sinuous by the external spiral cords.

The type, U.S.N.M. No. 561700, comes from the Pliocene of North St. Petersburg, Fla. It has 5.6 postnuclear whorls and measures: Length 3.1 mm., diameter 1.2 mm. An additional specimen is in the collection of the A.N.S.P.

I take pleasure in naming this exquisite species for that master paleontologist Dr. William H. Dall, whose exhaustive report on the

wonderful fauna of the Caloosahatchie deposits focused attention upon the rich Pliocene deposits of Florida.

CHRYSALLIDA COOKEI, new species

Plate 15, figure 10

Shell small, elongate-ovate, cream-yellow. The nuclear whorls are decollated in the type. The postnuclear whorls are rounded and slopingly shouldered from the second spiral cord to the summit. The postnuclear whorls are marked by very strong, slightly retractively slanting axial ribs, of which 16 are present upon all the whorls except the first and the last, the latter having 17. The intercostal spaces are about as wide as the ribs and are crossed by four spiral cords, of which the first at the summit and the last are a little weaker than the other two. The junction of the axial ribs and spiral cords forms strong tubercles, while the spaces enclosed by them are deep and slightly oblong, their long axis coinciding with the spiral sculpture. The suture is deeply impressed and rendered wavy by the tubercles of the cord at the summit of the whorls. The periphery is marked by a deep groove a little wider than that separating the fourth from the third cord. It is crossed by the continuation of the axial ribs which terminate at the first basal cord. The base is well rounded and marked by six spiral cords, of which the one below the peripheral groove is the strongest; the rest grow consecutively weaker. The spaces between these cords are crossed by many fine axial threads. The aperture is ovate, slightly effuse at the junction of the columella and basal lip; the columella is slender, gently curved, and bears a strong fold at its insertion; the parietal wall has a weak callus; the outer lip is thin, gently curved, and rendered slightly wavy by the spiral cords.

The type, U.S.N.M. No. 561701, comes from the Pliocene of North St. Petersburg, Fla. It has 6 postnuclear whorls and measures: Length 4.0 mm., diameter 1.1 mm.

It is a pleasure to name this species for Dr. C. Wythe Cooke, who has devoted a lifetime of energy to the unraveling and elucidation of southeast American Tertiary geology.

CHRYSALLIDA GARDNERAE, new species

Plate 15, figure 7

Shell small, conic, cream-yellow. The nuclear whorls are decollated. The postnuclear whorls are very slightly rounded, almost flattened,

which makes the lateral outline of the spire appear almost as a straight line. The sculpture of the first postnuclear whorl is indistinct; the rest are marked by strong vertical axial ribs, of which 14 are present upon the second, 16 upon the third, 18 upon the fourth, and 21 upon the last turn. These ribs are a little wider than the intercostal spaces. The spiral sculpture consists of four subequal cords whose junction with the axial ribs produce almost hemispherical nodules. The cord at the summit and its neighbor slightly shoulder the whorls. The space enclosed by the axial ribs and spiral cords form deeply impressed round pits. The suture is deeply impressed and rendered wavy by the nodules at the summit of the whorls. The periphery is deeply grooved and crossed by the continuations of the axial ribs, which extend to the first basal spiral cord. The base is hemispherical and marked by five subequal spiral cords, the first of which, below the periphery, is strongly elevated and weakly nodulose; the rest are less strongly elevated with scarcely an indication of nodules. They are separated by equally wide spiral grooves. The aperture is ovate; the columella is oblique, slightly reflected, and bears a strong internal fold at its insertion; the parietal wall is covered by a strong callus; the outer lip is gently curved and rendered wavy by the external spiral cords.

The type, U.S.N.M. No. 561702, comes from the Pliocene of North St. Petersburg, Fla. It has 5.5 postnuclear whorls and measures: Length 2.5 mm., diameter 1.2 mm. An additional specimen is in the collection of the A.N.S.P.

I take pleasure in naming this species for Dr. Julia Gardner, of the U. S. Geological Survey.

CHRYSALLIDA HARRISI, new species

Plate 15, figure 12

Shell elongate-ovate, rather large, cream-yellow. The nucleus consists of about 2 small whorls that form a moderately elevated spire, whose axis is at right angles to that of the succeeding turns, in the first of which it is about half immersed. The postnuclear whorls are slightly rounded and slopingly shouldered from the second spiral cord to the summit. They are marked by very strong, slightly protractively slanting axial ribs, of which 12 are present upon the second and third, 14 upon the fourth, 15 upon the fifth, and 16 upon the last whorl. These ribs pass equally strong from the summit to the first basal spiral cord. The four spiral cords are equally strong and equally spaced. The first is at the summit. The junction of the

axial ribs and spiral cords forms strong, oval nodules, whose long axis coincides with the spiral cords. The spaces enclosed by the axial ribs and spiral cords are deeply impressed elongate pits. The suture is strongly constricted and rendered wavy by the tubercles at the summit of the whorls. The periphery of the last whorl is marked by a spiral cord that is not quite as strong as those above it; it is rendered weakly nodulose by the continuations of the axial ribs. The base is rather long, strongly rounded and marked by four rather broad, low, equally spaced spiral cords, which are feebly nodulose. The aperture is broadly oval; the columella is slightly curved and slightly reflected, and bears a strong fold at its insertion; the parietal wall is covered by a thick callus; the outer lip is gently curved and rendered wavy by the external spiral cords; the junction of the basal lip and columella forms almost a right angle.

The type, U.S.N.M. No. 561703, comes from the Pliocene of North St. Petersburg, Fla. It has 6.5 postnuclear whorls and measures: Length 3.9 mm., diameter 1.2 mm.

This species is nearest related to *Chrysallida palmerae* (below), from which its much larger size will readily distinguish it.

I take pleasure in naming this species for Prof. G. D. Harris, of Cornell University, who has not only contributed much to our knowledge of southeastern American geology but also has trained a host of students to continue his researches. He is also the founder of the Paleontological Research Institution at Cornell University.

CHRYSALLIDA PALMERAE, new species

Plate 15, figure 4

Shell elongate-ovate, small, cream-yellow. The nuclear whorls are deeply obliquely immersed in the first postnuclear turn, above which the rounded, tilted edge of the last turn only projects. The postnuclear whorls are slightly rounded and marked by very strong, retractively slanting axial ribs, of which 14 occur upon the second, 15 upon the third, 16 upon the fourth, and 17 upon the last postnuclear turn. These ribs extend equally strong from the summit to the peripheral spiral cord. Four equally strong and equally spaced spiral cords mark the whorls, the first being at the summit. The junction of the axial ribs and spiral cords forms strong, oblong tubercles, whose long axis corresponds with the spiral cords. The spaces enclosed by the spiral cords and axial ribs are deep, slightly oblong pits. The suture is strongly constricted and rendered wavy by the strong tubercles at the summit of the whorls. The periphery is marked by a strong spiral

cord which bears tubercles that are a little less strong than those on the spiral cords above it. The base is well rounded and marked by four equal and equally spaced, low, slightly rounded spiral cords. The aperture is oval; the columella is oblique and somewhat reflected basally and bears a strong fold at its insertion; the parietal wall has a weak callus; the outer lip is gently curved and rendered wavy by the external spiral cords.

The type, U.S.N.M. No. 561704, comes from the Pliocene of North St. Petersburg, Fla. It has 5.5 postnuclear whorls and measures: Length 2.3 mm., diameter 1.0 mm. An additional specimen is in the collection of the A.N.S.P.

I take pleasure in naming this species for Dr. K. V. W. Palmer, Dr. Harris's able associate at the Paleontological Research Institute, at Cornell University, of which she is now the director.

CHRYSALLIDA MANSFIELDI, new species

Plate 15, figure 14

Shell elongate-ovate, cream-yellow. The nucleus consists of about 2 whorls, which form a helicoid spire whose axis is at right angles to that of the postnuclear spire, in the first whorl of which the nucleus is half immersed. The postnuclear whorls are almost flattened and crossed by very strong axial ribs, which are of the same strength from the summit to the periphery. Of these ribs 12 are present upon the second, 14 upon the third, 16 upon the fourth, 18 upon the fifth, and 20 upon the last whorl. The intercostal spaces are a little narrower than the axial ribs. The spiral sculpture consists of four equal and equally spaced cords, the first of which is at the summit of the whorl. The junction of the axial ribs and spiral cords forms strong, oval tubercles whose long axis corresponds with the spiral cords. The spaces enclosed by the axial ribs and spiral cords are almost round, deep pits. The suture is not deeply channeled. It is rendered wavy by the strong tubercles at the summit of the whorl. The periphery bears a spiral cord that is not quite so strong as the four above it and which is weakly nodulose. The base is rather short, hemispherical, well rounded. It bears seven spiral cords which become consecutively smaller from the periphery basalward. These cords are low, and are separated by narrow, subequal, impressed lines. The aperture is ovate; the columella is moderately stout, slightly curved, and slightly effuse and reflected basally; it bears a strong fold at its insertion; the parietal wall is covered by a thin callus; the outer lip is gently curved, thin, and rendered wavy by the external cords.

The type, U.S.N.M. No. 561705, comes from the Pliocene of North St. Petersburg, Fla. It has 7 postnuclear whorls and measures: Length 3.5 mm., diameter 1.9 mm. An additional specimen is in the collection of the A.N.S.P.

This species is nearest related to *Chrysallida macneili* (below), from which it can be readily distinguished by its much stouter outline.

I take pleasure in naming this species for Dr. W. C. Mansfield, of the United States Geological Survey, who did much work in Florida Tertiary paleontology.

CHRYSALLIDA MACNEILI, new species

Plate 15, figure 15

Shell elongate-ovate, cream-yellow. The nucleus consists of about 2 rounded whorls, which form a depressed helicoid spire whose axis is at right angles to the postnuclear spire, in the first whorl of which the nucleus is half immersed. The postnuclear whorls are rather high and almost flattened. They are crossed by very strong, almost vertical axial ribs which are of the same strength from the summit to the periphery. Of these ribs 11 are present upon the second, 13 upon the third, 16 upon the fourth, 18 upon the fifth, and 23 upon the last whorl. The intercostal spaces are much narrower than the ribs. The spiral sculpture consists of four cords, of which the first at the summit is a little stronger than the rest and is a little more distantly spaced from its neighbor than the subequal spaces that separate the rest of the cords. The junction of the axial ribs and spiral cords forms strong, slightly elongated nodules whose long axis coincides with the spiral cords. The spaces enclosed by the axial ribs and spiral cords are deep, almost round pits. The suture is only slightly constricted and rendered wavy by the very strong tubercles at the summit of the whorls. The periphery is marked by a weakly nodulose spiral cord which is not quite so strong as the four above it. The base is well rounded and marked by seven spiral cords and numerous fine raised axial threads. Aperture elongate-oval, somewhat effuse at the junction of the columella and basal lip; columella oblique, thin and slightly reflected; parietal wall glazed by a thin callus; the outer lip is gently curved and rendered slightly wavy by the external spiral cords.

The type, U.S.N.M. No. 561706, comes from the Pliocene of North St. Petersburg, Fla. It has 7.5 postnuclear whorls and measures: Length 4.0 mm., diameter 1.5 mm.

This species is nearest related to *Chrysallida mansfieldi* (p. 67), from which its more slender outline will easily distinguish it.

It is named for F. Stearns Macneil, of the United States Geological Survey, who has been devoting much time to Tertiary paleontology.

CHRYSALLIDA SIMPSONI, new species

Plate 15, figure 11

Shell large, elongate-conic, cream-yellow. The nucleus consists of about 2 whorls, which form a depressed helicoid spire whose axis is at right angles to that of the postnuclear spire, in the first whorl of which the nucleus is deeply immersed, showing only the tilted edge of the last turn. The postnuclear whorls are weakly rounded and marked by moderately strong, vertical axial ribs which are of the same strength from the summit to the fifth spiral cord. Of these ribs 12 are present upon the second, 14 upon the third, 16 upon the fourth, 18 upon the fifth, 22 upon the sixth, and 25 upon the last whorl. The intercostal spaces are much narrower than the axial ribs. The spiral sculpture consists of five cords between the summit and the periphery, of which the posterior 4 are equal and equally spaced; the fifth cord near the periphery is a little weaker with less strongly developed nodules. The junction of the spiral cords, which almost equal the axial ribs in strength, with the ribs forms strongly elevated hemispherical tubercles, while the spaces enclosed between them are deep, round pits. The suture is strongly impressed and rendered wavy by the tubercles at the summit. The periphery is marked by a strong spiral cord. The base is well rounded and marked by seven subequal spiral cords and numerous slender axial threads. The aperture is elongate-oval; the columella is oblique and bears a strong fold at its insertion; the parietal wall is glazed by a thin callus; the outer lip is gently curved and rendered sinuous by the external cords.

The type, U.S.N.M. No. 561707, comes from the Pliocene of North St. Petersburg, Fla. It has 7.5 postnuclear whorls and measures: Length 5.0 mm., diameter 1.3. U.S.N.M. No. 561708 contains another specimen from the same source, and two more are in the collection of the A.N.S.P.

The strongly developed sculpture will readily differentiate this species from the other two that have five spiral cords.

I take pleasure in naming this species for Charles T. Simpson, who was for many years assistant curator of the division of mollusks at the United States National Museum. He is the author of the Manual on American Fresh Water Mussels. His immense collection of mollusks is at the University of Miami.

CHRYSALLIDA WOODRINGI, new species

Plate 15, figure 9

Shell large, stout, cream-yellow. The early whorls are decollated in all our specimens. The sculpture of the remaining whorls is not strongly developed. The axial ribs slant retractively and are much wider than the spaces that separate them. Of these ribs 18 are present upon the second of the remaining whorls, 24 upon the third, and 26 upon the last turn. The sculpture of the first whorl is ill defined. The spiral sculpture consists of five low, broad cords, which are separated by spaces about one-fourth as wide as the cords. The junction of the axial ribs and spiral cords forms low, rounded tubercles, while the spaces enclosed between them are shallow, more or less rounded pits. The suture is moderately constricted and rendered wavy by the tubercles at the summit of the whorls. The fifth spiral cord is not quite so wide as those above it and is less strongly nodulose. The base is strongly rounded and marked by six low, rounded spiral cords, which grow consecutively less wide from the subperipheral cord basalward. The narrow grooves separating the basal spiral cords are crossed by numerous fine axial threads. The aperture is ovate, somewhat effuse at the junction of the columella and basal lip; the columella is oblique and bears a strong fold at its insertion; the parietal wall is crossed by a moderately thick callus; the outer lip is gently curved and rendered wavy by the external spiral cords.

The type, U.S.N.M. No. 561709, comes from the Pliocene of North St. Petersburg, Fla. It has 4.2 whorls remaining and measures: Length 3.5 mm., diameter 1.3 mm. U.S.N.M. No. 561710 contains another specimen from the same source, and an additional specimen is in the collection of A.N.S.P.

This species is nearest related to *Chrysallida vaughani* (below), from which its much stouter outline will readily distinguish it.

I take pleasure in naming this species for Dr. W. P. Woodring, of the United States Geological Survey, whose exhaustive and masterful report on the fauna of the Bowden beds of Jamaica gave a new impetus to West Indian and tropical American paleontology.

CHRYSALLIDA VAUGHANI, new species

Plate 15, figure 2

Shell large, slender, cream-yellow. The nuclear whorls are decollated in the type. The postnuclear whorls are high and almost flattened. They are crossed by not strongly developed axial ribs which

are obsolete on the first whorl, while the second bears 16, the third 18, the fourth 20, and the last 25. These ribs are much wider than the spaces that separate them. The spiral sculpture consists of five cords which equal the axial ribs in width and render these nodulose at their junction, the nodules being low and rounded and subequal on the upper four cords and less strongly developed on the fifth cord which is also a little narrower than the rest. The suture is strongly impressed and rendered wavy by the tubercles at the summit of the whorls. The base is hemispherical and marked by five spiral cords which grow consecutively smaller from the periphery basally. The base also bears many fine axial threads. The aperture is oval and effuse at the junction of the basal lip and columella; the columella is slender and reflected and bears a strong fold at its insertion; the parietal wall is glazed by a callus; the outer lip is thin and is rendered wavy by the external spiral cords.

The type, U.S.N.M. No. 561711, comes from the Pliocene of North St. Petersburg, Fla. It has 6.2 whorls remaining and measures: Length 3.2 mm., diameter 1.1 mm.

This species is nearest related to *Chrysallida woodringi* (p. 70), from which its much more slender form will readily distinguish it.

I take pleasure in naming this species for Dr. T. Wayland Vaughan, whose many years of work in Tertiary paleontology, corals, and oceanographic research have been of great help to many of us.

CHRYSALLIDA STIMPSONI, new species

Plate 16, figure 11

Shell moderately large, elongate-ovate, cream-yellow. The nuclear whorls are decollated. The postnuclear whorls are very slightly rounded and strongly, squarely shouldered. The sculpture of the first postnuclear whorl is obsolete. The succeeding whorls are marked by strong axial ribs, of which 12 are present upon the second, 14 upon the third, 18 upon the fourth, and 20 upon the last whorl. The intercostal spaces equal the axial ribs in width. The spiral sculpture consists of four strong cords, of which the upper three are of equal strength, while the fourth is a little weaker. The first cord is at the summit and is separated from the second by a mere impressed line. The space separating the second from the third cord is about as wide as that separating the third from the fourth cord and equal to the width of the cords. The junction of the axial ribs and spiral cords forms strongly elevated tubercles which are equal on the upper three spiral cords but only merely indicated on the fourth cord. The spaces

enclosed by the axial ribs and spiral cords are deep, round pits. The suture is constricted and rendered very conspicuous by the shouldered summit of the whorls. The strong tubercles also render it wavy. The base is hemispherical and bears a strong spiral cord below the deep groove that marks the periphery. Anterior to this cord are mere indications of four additional cords. The aperture is elongate-oval, effuse at the junction of the basal lip and columella; the columella is stout, vertical, and provided with a strong fold; the parietal wall is glazed by a thin callus; the outer lip is gently curved and rendered wavy by the external spiral cords.

The type, U.S.N.M. No. 561712, comes from the Pliocene of North St. Petersburg, Fla. It has 5.9 postnuclear whorls and measures: Length 2.8 mm., diameter 1.4 mm. U.S.N.M. No. 561713 contains another specimen from the same source and another is in the collection of the A.N.S.P.

The elongate-ovate shape will readily distinguish this from the other species having a deeply channeled suture.

I take pleasure in naming this species for William Stimpson, one of America's pioneer conchologists.

CHRYSALLIDA LEAI, new species

Plate 16, figure 8

Shell rather large, elongate-conic, cream-yellow. The nucleus is decollated. The postnuclear whorls are slightly rounded. On the first two the sculpture is obsolete. On the third, 12 axial ribs are present, on the fourth and fifth 14, while the last turn shows 16. These ribs extend equally strong from the summit to the periphery. The intercostal spaces equal the ribs in width. The spiral sculpture consists of four cords which equal the axial ribs in strength. They are subequal in width and equally spaced. The spaces enclosed by the axial ribs and spiral cords are deep, rectangular pits whose long axis coincides with the spiral cords. The suture is deeply channeled and rendered wavy by the strong tubercles at the summit; it shows the edge of the peripheral spiral cord. The periphery is marked by a spiral cord which is almost as strong as those on the spire but lacks the strong tubercles. The base is hemispherical, narrowly umbilicated, and marked by four weakly developed spiral cords and numerous fine axial threads. The aperture is ovate; the columella is thin-edged and provided with a strong fold at its insertion; the parietal wall is covered by a thick callus which renders the aperture complete; the outer lip is thin, strongly curved, and rendered sinuous by the external spiral cords.

The type, U.S.N.M. No. 561714, comes from the Pliocene of North St. Petersburg, Fla. It has 6.8 postnuclear whorls and measures: Length 3.9 mm., diameter 1.5 mm.

The umbilicated base will readily distinguish this species from *Chrysallida locklini* (below).

I take pleasure in naming this species for Isaac Lea, who donated his immense unique collection of mollusks to the United States National Museum. He published many volumes on American Unionidae and other mollusks. He is also the author of numerous descriptions of southeastern United States Tertiary fossils.

CHRYSALLIDA LOCKLINI, new species

Plate 16, figure 10

Shell moderately large, elongate-conic, cream-yellow. The nucleus consists of almost 2 well-rounded turns, which form a low helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which it is about one-third obliquely immersed. The postnuclear whorls are slightly rounded, shouldered at the summit, and marked by strong, retractively slanting axial ribs, which are of equal strength from the summit to the periphery. Of these ribs 12 are present upon the second, 14 upon the third, 16 upon the fourth, 18 upon the fifth, and 19 upon the last whorl. The sculpture on the first whorl is obsolete. The intercostal spaces are about as wide as the ribs. The spiral sculpture consists of four equally strong cords that equal the ribs in strength. The spiral cords are separated by equally wide spaces. The junctions of the axial ribs and spiral cords form almost round, strongly elevated tubercles while the spaces between them are deep, round pits. The suture is deeply channeled and rendered wavy by the tubercles at the summit of the whorls. The periphery is marked by a spiral cord which is about half as wide as those on the spire and separated from them by a channel a little wider than that separating them. The peripheral cord shows feeble nodules. The base is rather long, strongly rounded, and marked by seven spiral cords, which grow consecutively smaller from the periphery basalward. In addition to this the base shows numerous slender axial threads. The aperture is oval, somewhat effuse at the junction of the basal lip and columella; the columella is thin-edged, slightly sinuous, and bears a strong fold at its insertion; the parietal wall is glazed by a thin callus; the outer lip is gently curved and rendered wavy by the external spiral cords.

The type, U.S.N.M. No. 561715, comes from the Pliocene of North

St. Petersburg, Fla. It has 6.3 postnuclear whorls and measures: Length 3.9 mm., diameter 1.6 mm.

This species is easily distinguished from *Chrysallida sayi* (below) by its stouter form.

I take pleasure in naming this species for one of the partners, Charles R. Locklin, whose joint effort has made these reports on the North St. Petersburg Pliocene fauna possible.

CHRYSALLIDA SAYI, new species

Plate 16, figure 13

Shell elongate-conic, slender, cream-yellow. The nuclear whorls are decollated. The postnuclear whorls are almost flattened and shouldered at the top. They are marked by strong retractively slanting axial ribs, which are of the same strength from the summit to the periphery. Of these ribs 12 are present upon the second whorl, 14 upon the third, 16 upon the fourth, 18 upon the fifth, and 20 upon the last. The intercostal spaces are as wide as the ribs. The spiral sculpture consists of four strong cords which are as wide as the ribs and render these strongly, roundly nodulose. The spaces between the spiral cords are about half as wide as the cords, and the spaces enclosed by the axial ribs and spiral cords are deep, rounded pits. The suture is deeply channeled and shows the edge of the peripheral spiral cord. It is rendered wavy by the strong tubercles at the summit of the whorls. The periphery is marked by a spiral cord that is not quite as wide as those above it. The space separating the peripheral cord from the cord above it is as wide as the spaces separating the spiral cords on the spire. The base is strongly rounded and marked by seven spiral cords, of which the two below the periphery are stronger than the rest, which become consecutively weaker and are very faint toward the tip of the columella. The base also has numerous very fine axial threads. The aperture is probably oval, the outer lip being broken, does not complete it; the columella is straight and bears a strong fold at its insertion; the parietal wall is glazed by a thin callus.

The type, U.S.N.M. No. 561716, comes from the Pliocene of North St. Petersburg, Fla. It has 6.1 whorls remaining and measures: Length 3.0 mm., diameter 1.1 mm. Another specimen is in the collection of the A.N.S.P.

The slender outline will readily distinguish this from *Chrysallida locklini* (p. 73).

It is named for Thomas Say, one of America's able pioneer naturalists.

CHRYSALLIDA SMITHI, new species

Plate 16, figure 12

Shell very large, elongate-conic, cream-yellow. The nucleus consists of about 2 rounded whorls that form a depressed helicoid spire whose axis is at right angles to that of the succeeding turns, in the first of which the nucleus is half obliquely immersed. The postnuclear whorls are strongly rounded and slopingly shouldered from the second spiral cord to the summit. They are marked by strong axial ribs which pass equally strong from the summit to the periphery. Of these ribs 16 are present on the second whorl of the type, 18 upon the third, 20 upon the fourth, 22 upon the fifth, and 30 upon the last turn. The intercostal spaces are much narrower than the ribs. The spiral sculpture consists of 4 very strong cords which are not of equal strength, the second below the summit of the whorls being the strongest, followed by the third, then the cord at the summit, and last the cord above the periphery. The spaces separating the spiral cords are about one-fourth as wide as the cords. The junction of the axial ribs and the spiral cords forms strongly elevated, somewhat oblong tubercles whose long axis coincides with the axial ribs. The spaces enclosed by the spiral cords and axial ribs are rounded pits. The suture is deeply channeled and rendered wavy by the tubercles at the summit. The periphery is marked by a spiral cord, which is a little less strong than the one above it and separated from the fourth cord by a groove which is a little wider than that separating the fourth from the third. This groove is crossed by the weak continuation of the axial ribs. The base is marked by six spiral cords that grow consecutively weaker from the periphery basalward. The aperture is elongate-ovate and effuse at the junction of the basal lip and columella; the columella is oblique and provided with a strong fold at its insertion; the parietal wall is covered by a thin callus; the outer lip is gently curved and rendered wavy by the external spiral cords.

The type, U.S.N.M. No. 561717, comes from the Pliocene of North St. Petersburg, Fla. It has 7 whorls remaining and measures: Length 5.1 mm., diameter 2.0 mm. U.S.N.M. No. 561718 contains a not quite adult specimen from the same source that has furnished the description of the nucleus. Another specimen is in the collection of the A.N.S.P.

The large size will easily distinguish this species from all the Chrysallidas here described.

I take pleasure in naming this species for Maxwell Smith, whose publications have done much to help popularize the study of mollusks.

CHRYSALLIDA PILSBRYI, new species

Plate 16, figure 6

Shell large, elongate-conic, cream-yellow. The nuclear whorls are decollated in both of our specimens. The postnuclear whorls are slightly rounded and slopingly shouldered from the second spiral cord to the summit. They are marked by strong, slightly retractively slanting axial ribs, of which 16 are present upon the second and third, 18 upon the fourth, 20 upon the fifth, and 24 upon the last whorl. The intercostal spaces equal the axial ribs in width. The spiral sculpture consists of four cords that equal the axial ribs in strength. These cords are separated by spaces as wide as the cords. The junction of the axial ribs and spiral cords forms strong, round tubercles, while the spaces enclosed between them are round pits. The suture is channeled and shows the edge of the peripheral cord. The periphery bears a spiral cord which is feebly nodulose and about half as wide as the cords above it. The base is hemispherical and marked by five spiral cords that grow consecutively less strong from the periphery basalward. The aperture is oval, somewhat effuse at the junction of the basal lip and columella; the columella is oblique and provided with a strong fold at its insertion; the parietal wall is glazed by a strong callus; the outer lip is rendered wavy by the external spiral cords.

The type, U.S.N.M. No. 561719, comes from the Pliocene of North St. Petersburg, Fla. It has 7 whorls remaining and measures: Length 4.0 mm., diameter 1.5 mm. Another specimen from the same source is in the collection of the A.N.S.P.

The more slender outline and detailed sculpture will readily distinguish this species from *Chrysallida smithi* (p. 75).

I take pleasure in naming this species for Dr. H. A. Pilsbry, one of the foremost malacologists in the world.

CHRYSALLIDA MCGINTYI, new species

Plate 16, figure 7

Shell moderately large, elongate-ovate, cream-yellow. The nuclear whorls are decollated in all our specimens. The postnuclear whorls are almost flattened, which gives to the lateral outline of the spire a straight-line appearance. The postnuclear whorls are marked by strong, retractively slanting axial ribs, which extend undiminished from the summit to the periphery of the whorls. Of these ribs, 14 are present upon the second, 16 upon the third, 17 upon the fourth,

18 upon the fifth, and 20 upon the last whorl. The intercostal spaces equal the ribs in width. The junction of the axial ribs and spiral cords forms rounded tubercles while the spaces enclosed by them are deep round pits. The suture is moderately constricted, not channeled. The periphery is marked by a feebly nodulose spiral cord that equals those above it in strength. The space between the peripheral spiral cord and the fourth cord of the spire is a little wider than the spaces separating the cords on the spire. The base is strongly rounded with a slight umbilical chink; it is marked by five spiral cords, which grow consecutively weaker from the periphery basalward. It also has numerous fine axial raised threads best seen in the spaces between the spiral cords. The aperture is ovate, effuse at the junction of the basal lip and columella; the columella is straight with its edges reflected and bears a strong fold at its insertion; the parietal wall is glazed by a thin callus; the outer lip is gently curved and rendered wavy by the external spiral cords.

The type, U.S.N.M. No. 561720, comes from the Pliocene of North St. Petersburg, Fla. It has 6.3 whorls remaining and measures: Length 4.0 mm., diameter 1.5 mm. Another specimen from the same source is in the collection of the A.N.S.P.

The strong basal spiral cords easily distinguish this species from *Chrysallida tuomeyi* (below).

I take pleasure in naming this species for Thomas McGinty, who has done much collecting of Recent and fossil mollusks in Florida.

CHRYSALLIDA TUOMEYI, new species

Plate 16, figure 14

Shell small, elongate-ovate, cream-yellow. The nucleus consists of about 2 whorls that form a low helicoid spire whose axis is at right angles to that of the postnuclear whorls, in the first of which it is about one-third immersed. The postnuclear whorls are almost flattened, which gives to the lateral outline of the shell an almost straight-line appearance. The postnuclear whorls are marked by strong, decidedly retractively slanting axial ribs, which are of the same strength from the summit to the periphery. Of these ribs, 12 are present upon the second, 14 upon the third, 16 upon the fourth, and 18 upon the last whorl. The intercostal spaces are as wide as the ribs. The spiral sculpture consists of four equally and strongly developed cords, which equal the axial ribs in strength. The space separating the cord at the summit from its neighbor is narrower than the spaces that separate the rest of the cord, which are about as wide as the cords.

This is also the case of the space that separates the fourth cord from the peripheral cord. The junction of the axial ribs and spiral cords forms strong, rounded tubercles, while the spaces enclosed between them are rounded pits. The suture is constricted and shows the edge of the peripheral cord; it is rendered wavy by the tubercles at the summit of the whorls. The periphery bears a feebly nodulose spiral cord which is about half as wide as those on the spire. The base is well rounded and marked by five almost obsolete spiral cords. The aperture is oval and effuse at the junction of the basal lip and columella; the columella is straight and bears a strong fold at its insertion; the parietal wall is glazed with a thin callus; the outer lip is gently curved and rendered slightly wavy by the external sculpture.

The type, U.S.N.M. No. 561721, comes from the Pliocene of North St. Petersburg, Fla. It has 5.5 postnuclear whorls and measures: Length 3.1 mm., diameter 1.3 mm. U.S.N.M. No. 561722 contains another specimen from the same source, and another is in the collection of the A.N.S.P.

The feeble spiral sculpture of the base will easily distinguish this species from *Chrysallida mcgintyi* (p. 76).

I take pleasure in naming this species for M. Tuomey, whose joint work with F. S. Holmes on the fossils of the Carolinas was a great stimulus to American paleontology.

CHRYSALLIDA HOLMESI, new species

Plate 16, figure 9

Shell of moderate size, elongate-conic, cream-yellow. The nuclear whorls are decollated in both our specimens. The postnuclear whorls are almost flattened and marked by moderately strong, almost vertical axial ribs, of which 14 are present upon the second, 15 upon the third, 16 upon the fourth, 18 upon the fifth, and 22 upon the last whorl. They are of the same strength from the summit to the periphery. The intercostal spaces are about as wide as the ribs. The spiral sculpture consists of four equally strong cords which equal the axial ribs in strength. These cords are separated by grooves about half as wide as the cords. The junction of the axial ribs and spiral cords forms moderately strong, rounded tubercles, while the spaces enclosed between them are moderately strong, rounded pits. The suture is moderately impressed and shows the edge of the peripheral cord; it is rendered wavy by the tubercles at the summit of the whorls. The periphery bears a feebly nodulose spiral cord, which equals those on the spire in strength. The space separating the peripheral cord

from the cord above it is a little wider than the spaces separating the spiral cords on the spire. The base is strongly rounded and marked by four equal and equally spaced moderately strong spiral cords. The aperture is oval; the columella is stout and bears a very strong fold at its insertion; the parietal wall is glazed by a callus; the outer lip is fractured.

The type, U.S.N.M. No. 561723, comes from the Pliocene of North St. Petersburg, Fla. It has 6.3 whorls remaining and measures: Length 4.0 mm., diameter 1.5 mm. Another specimen from the same source is in the collection of the A.N.S.P.

The elongate-conic outline and strong basal spiral cords will readily distinguish this species from *Chrysallida tuomeyi* (p. 77).

I take pleasure in naming this species for F. S. Holmes, who, with Mr. Tuomey, produced the monumental work on Carolina paleontology.

Genus **MIRALDA** A. Adams

1863. *Miralda* A. Adams, Journ. Linn. Soc. London, vol. 7, p. 3.
1873. *Lia* Folin, Les fonds de la mer, vol. 2, p. 171 (type: *Lia decorata* Folin).
1904. *Ividia* Dall and Bartsch, Proc. Biol. Soc. Washington, vol. 17, p. 11 (type: *Parthenia armata* Carpenter).

Shells with very strong spiral keels between the sutures and on the base; the anterior one of which, and sometimes the one next to it, is strongly crenulate; the remainder simple and acute. Base axially lirate.

Type: *Parthenia diadema* A. Adams.

Miraldella, new subgenus

Shell very minute, with strong axial ribs extending from the summit to a deep peripheral sulcus and beyond this as slender threads over the base. Spiral sculpture confined to a very strong subperipheral nodulose cord.

Type: *Miralda (Miraldella) gordonae,* new species.

MIRALDA (MIRALDELLA) GORDONAE, new species

Plate 16, figure 3

Shell very minute, pupoid, cream-yellow. Nuclear whorls small, obliquely about half immersed in the first postnuclear turn. The postnuclear whorls are slightly rounded and marked by very strong axial ribs, which are slightly thickened at the summit and at their strong termination above the peripheral sulcus. Of these ribs 12 are present

upon the second, 14 upon the third, and 15 upon the last whorl. The periphery is marked by a strong, deep sulcus, which is bordered basally by a strong nodulose spiral cord. The rest of the base is well rounded and marked by slender threadlike continuations of the axial ribs. Aperture ovate; columella curved and provided with a fold at the umbilical chink; parietal wall covered by a moderately thick callus; outer lip thin and strongly curved.

The type, U.S.N.M. No. 561670, comes from the Pliocene of North St. Petersburg, Fla. It has almost 4 postnuclear whorls and measures: Length 1.2 mm., diameter 0.7 mm.

It is named for Mrs. Edna G. Gordon, one of the St. Petersburg's enthusiastic shell students.

FARGOA, new genus

Shell minute, pupoid, having axial ribs and four strong spiral cords that render the ribs nodulose on the first three whorls and less so on the fourth. The axial ribs and the first two spiral cords are more closely approximated than the rest and form a dumbbell-shaped sculpture below the summit of the whorls. The base is marked by spiral cords.

Type: *Fargoa calesi,* new species.

KEY TO THE SPECIES OF FARGOA

Shell slender ..... *archeri*
Shell stout ..... *calesi*

FARGOA CALESI, new species

Plate 16, figure 2

Shell minute, pupoid, cream-yellow. Nuclear whorls almost completely obliquely immersed in the first postnuclear turn. The postnuclear whorls are moderately well rounded and crossed by strong retractively slanting axial ribs, of which 18 are present upon the second, 20 upon the third and the last whorl. The spiral sculpture consists of four cords, which equal the axial ribs in strength and which form strong nodules at their junction. The first spiral cord is at the summit and is a little nearer the second cord than that is to the third. The first two cords in conjunction with the axial ribs produce a dumbbell-like effect while the spaces between the second and third spiral cord are much more deeply incised. The nodules on the first three cords are about equal; those on the fourth cord are much weaker and almost let this cord appear smooth. The suture appears

deeply channeled and is rendered wavy by the strong summits of the axial ribs. The periphery is deeply channeled. The base is well rounded and marked by five spiral cords which become consecutively weaker from the periphery to the umbilical region. These cords are also very feebly nodulose. Aperture ovate; columella slender, curved, provided with a fold at its insertion; parietal wall covered by a thick callus that renders the peristome complete; outer lip thin, well curved.

The type, U.S.N.M. No. 561666, comes from the Pliocene of North St. Petersburg, Fla. It has almost five postnuclear whorls and measures: Length 1.6 mm., diameter 0.7 mm. U.S.N.M. No. 561667 contains two additional specimens from the same source, and two more are in the collection of the A.N.S.P.

The more slender outline will readily distinguish this species from *Fargoa archeri* (below).

I take pleasure in naming this species for Archie Pogue Cales, the discoverer of the Pliocene deposit of North St. Petersburg, Fla.

FARGOA ARCHERI, new species

Plate 16, figure 4

Shell minute, ovate, cream-yellow. Nuclear whorls deeply, almost completely, obliquely immersed in the first of the postnuclear turns. The postnuclear whorls are moderately rounded and marked by strong axial ribs on all but the first turn where they are weak. Of these ribs, 18 are present upon the second, 22 upon the third, and 25 upon the last whorl. These ribs extend strongly from the summit to the periphery and are separated by intercostal spaces about as wide as the ribs. The spiral sculpture consists of four strongly elevated cords, which at their junction with the axial ribs form strong rounded nodules on the first three whorls while on the supraperipheral cord they become very much enfeebled. The spiral cord at the summit and its neighbor are more closely spaced than the other two cords and their combination with the axial ribs produce a dumbbell-like appearance. The fourth cord is bounded on both sides by a very deeply impressed groove which makes this stand out conspicuously. Suture deeply channeled, rendered wavy by the strong summits of the axial ribs. Periphery of the last whorl and base strongly rounded. The base is marked by five spiral cords which become consecutively smaller from the periphery toward the umbilical chink. Aperture broadly ovate; columella thin, curved, and provided with a fold at its insertion; parietal wall covered with a thick callus that renders the peristome complete; outer lip thin and strongly curved.

The type, U.S.N.M. No. 561668, comes from the Pliocene of North St. Petersburg, Fla. It has 4.5 postnuclear whorls and measures: Length 2.0 mm., diameter 0.9 mm. U.S.N.M. No. 561669 contains an additional specimen from the same source, and another is in the collection of the A.N.S.P.

This species is easily distinguished from *Fargoa calesi* (p. 80) by its stout shape.

This species is named for Harry Archer, who has worked the Pliocene deposits of North St. Petersburg diligently.

Genus **EULIMASTOMA** Bartsch

1916. *Eulimastoma* Bartsch, Nautilus, vol. 30, p. 73.

Shells having a strong peripheral keel.

Type: *Odostomia* (*Eulimastoma*) *dotella* Dall and Bartsch= *Odostomia* (*Scalanostoma*) *dotella* Dall and Bartsch, 1909.

KEY TO THE SPECIES OF EULIMASTOMA

Shell openly umbilicated.....*harbisoni*
Shell not openly umbilicated.....*olssoni*

EULIMASTOMA HARBISONAE, new species

Plate 16, figure 1

Shell small, turrited, pale brown. The nuclear whorls are deeply obliquely immersed in the first postnuclear turn, above which the tilted edge of the last whorl only projects. The postnuclear whorls are moderately rounded and rendered strongly angulated at about one-third of the width of the turns above the suture. This angulation is less expressed on the last whorl than on the preceding turns. The suture is strongly constricted. The base is rather long, rounded, and openly umbilicated. The surface of the shell is smooth, with the merest indication of lines of growth and microscopic spiral striations. The aperture is broadly ovate; the columella is oblique and bears a fold at its insertion; the parietal wall is covered by a thick callus that renders the peritreme complete; the outer lip is thin and gently curved.

The type, U.S.N.M. No. 561678, comes from the Pliocene of North St. Petersburg, Fla. It has 6.2 postnuclear whorls and measures: Length 2.2 mm., diameter 0.9 mm.

The larger size and open umbilicus will easily distinguish this species from *Eulimastoma olssoni* (p. 83).

I take pleasure in naming this species for Miss Anne Harbison, one of the coauthors of the main volume, Bulletin 8, the Pliocene Mollusks of Southern Florida.

EULIMASTOMA OLSSONI, new species

Plate 16, figure 5

Shell small, elongate-conic, cream-yellow. The nuclear whorls are deeply obliquely immersed in the first postnuclear turn, above which the tilted edge of the last whorl only projects. The postnuclear whorls are slightly rounded and bear a keel about one-third of the width of the turns above the suture. Suture strongly constricted. The base is strongly rounded, with a mere umbilical chink. The surface of the shell is without sculpture. The aperture is ovate; the columella is slender, curved, and bears a strong spiral fold at its insertion; the parietal wall bears a strong callus which renders the peritreme complete; the outer lip is thin and gently curved.

The type, U.S.N.M. No. 561679, comes from the Pliocene of North St. Petersburg, Fla. It has 5.8 whorls and measures: Length 2.1 mm., diameter 0.8 mm.

The small size and absence of an open umbilicus will easily distinguish this species from *Eulimastoma harbisonae* (p. 82).

I take pleasure in naming this species for Axel A. Olsson, one of the coauthors of Bulletin 8.

Genus **ODOSTOMIA** Fleming

1813. *Odostomia* Fleming, Edinburgh Encycl., vol. 7, pt. 1, p. 76.
1839. *Odontostomia* Jeffreys, Mal. and Conch. Mag.. 1939, pt. 2, p. 34.
1886. *Ptychostomon* Locard, Prodrome des mollusques de France, pp. 228, 571.
1892. *Turritodostomia* Sacco, I Molluschi . . . del Piemonte e della Liguria, p. 41. (same type).

Shell with sinistral apex, usually short, few-whorled, subconic or ovate, with a single columellar fold which varies in strength and sometimes is not apparent at the aperture. The sculpture varies from smooth in *Odostomia* to spirally lirate in *Evalea*.

Type: *Turbo plicatus* Montagu.

KEY TO THE SUBGENERA OF ODOSTOMIA

Shell with spiral striations..... *Evalea*
Shell without spiral striations..... *Odostomia*

Subgenus Evalea A. Adams

1847. *Auriculina* Gray, Proc. Zool. Soc. London, 1847, p. 519 (type: *Odostomia obliqua* Alder).
1860. *Evalea* A. Adams, Ann. Mag. Nat. Hist., ser. 3, vol. 6, p. 22.
1870. *Ondina* Folin, Les fonds de la mer, p. 214 (type: *Ondina sulcata* Folin).

Odostomias having the surface marked by fine incised spiral lines. Type: *Evalea elegans* A. Adams.

KEY TO THE SPECIES OF THE SUBGENUS EVALEA

Base umbilicated.
  Periphery of the last whorl rounded.....*emeryi*
  Periphery of the last whorl angulated.
    Suture deeply constricted.....*pomeroyi*
    Suture not deeply constricted.....*caloosaensis*
Base not umbilicated.....*willcoxi*

ODOSTOMIA (EVALEA) EMERYI, new species

Plate 17, figure 1

Shell elongate-ovate, thin, strongly umbilicated, cream-yellow. The nuclear whorls are small and obliquely immersed in the first postnuclear turn. The postnuclear whorls are well rounded and crossed by numerous very fine incised spiral lines. The suture is strongly impressed. The periphery is strongly rounded. The base is inflated, hemispherical, openly umbilicated, and marked like the spire by fine incised spiral lines. The aperture is large, ovate; the columella is slender, curved with an internal spiral cord near its insertion; the parietal wall is covered with a thin callus, and the outer lip is thin and strongly curved.

The type, U.S.N.M. No. 561672, comes from the Pliocene of North St. Petersburg, Fla. It has 5.2 postnuclear whorls and measures: Length 2.9 mm., diameter 1.4 mm. Another specimen is in the collection of the A.N.S.P.

The rounded periphery will easily distinguish this species from *Odostomia* (*Evalea*) *caloosaensis* (p. 85) and *Odostomia* (*Evalea*) *pomeroyi* (below).

The species is named for the late Daniel L. Emery, one of St. Petersburg's mollusk students.

ODOSTOMIA (EVALEA) POMEROYI, new species

Plate 17, figure 2

Shell small, very elongate-ovate, openly umbilicated, cream-yellow. The nuclear whorls are obliquely immersed in the first postnuclear

turn. The postnuclear whorls are well rounded and angulated at the periphery. The summit of succeeding whorls falls at a little distance below the peripheral angulations, which lets the suture appear deeply channeled. The base is strongly rounded, hemispherical, and openly umbilicated. The entire surface of spire and base is crossed by many very finely closely spaced striations. The aperture is oval; the columella is slender, slightly curved, and bears an internal fold opposite the umbilicus; the parietal wall is covered by a heavy callus that renders the peristome complete; the outer lip is thin and gently curved.

The type, U.S.N.M. No. 561673, comes from the Pliocene of North St. Petersburg, Fla. It has 5.2 whorls and measures: Length 2.2 mm., diameter 1.0 mm.

The deeply channeled suture will readily distinguish this species from *Odostomia* (*Evalea*) *caloosaensis* (Dall).

The species is named for Lawrence Pomeroy, one of St. Petersburg's molluscan enthusiasts.

ODOSTOMIA (EVALEA) CALOOSAENSIS (Dall)

Plate 17, figure 4

1892. *Odontostomia* (*Syrnola*) *caloosaensis* Dall (part), Trans. Wagner Free Inst. Sci., vol. 3, pt. 2, p. 252, pl. 15, fig. 12b. (Dr. Dall here gives a complete description of things from many places, but the name and figure indicate this Pliocene species to be from the Caloosahatchie beds, so we here restrict it.)

Shell very elongate-ovate or narrowly conic, umbilicated, cream-yellow. The nucleus is small and obliquely immersed in the first of the postnuclear whorls. The postnuclear whorls are well rounded with a decidedly raised peripheral spiral thread. The summit of succeeding whorls adjoins this cord and leaves the suture less conspicuous than in *Odostomia* (*Evalea*) *pomeroyi*. Base hemispherical and openly umbilicated. The entire surface of the spire and base are marked by many fine incised spiral lines. The aperture is ovate; the columella is slender and gently curved and bears a weak internal fold a little below its insertion; the parietal wall is covered by a weak callus; the outer lip is gently curved and thin.

The specimen described and figured, U.S.N.M. No. 561674, comes from the Pliocene of North St. Petersburg, Fla. It has 6.1 postnuclear whorls and measures: Length 3.0 mm., diameter 1.1 mm. An additional specimen from the same source is in the collection of the A.N.S.P.

The lack of a deeply chaneled suture will readily distinguish this species from *Odostomia* (*Evalea*) *pomeroyi* (p. 84).

ODOSTOMIA (EVALEA) WILLCOXI, new species

Plate 17, figure 3

Shell very elongate-ovate, not umbilicated, buffish in color. The nuclear whorls, which are rather thick, are deeply immersed in the first postnuclear turn. The postnuclear whorls are high and almost flattened. They are separated by a weakly impressed suture. The periphery of the last whorl is well rounded. The base is rather long and well rounded with a mere umbilical chink. The entire surface of spire and base is marked by closely spaced very fine incised spiral lines. The aperture is elongate-ovate; the columella is moderately stout and recurved and bears a strong spiral fold a little below its insertion; the parietal wall is glazed by a weak callus; the outer lip is gently curved and thin.

The type, U.S.N.M. No. 561675, comes from the Pliocene of North St. Petersburg, Fla. It has 5 postnuclear whorls and measures: Length 2.5 mm., diameter 1.1 mm.

The absence of umbilicus will readily distinguish this species from the other Evaleas here described.

I have bestowed the name of Joseph Willcox, a former secretary of the Wagner Free Institute of Science, who has done much work in the Florida Tertiary, upon this species.

Subgenus Odostomia Fleming

Shell without axial or spiral sculpture except for microscopic lines of growth.

Type: *Turbo plicatus* Montagu.

KEY TO THE SPECIES OF THE SUBGENUS ODOSTOMIA

Shell umbilicated.
- Shell small, pupoid ..... *heilprini*
- Shell not small or pupoid.
  - Shell elongate-ovate.
    - Periphery of the last whorl rounded.
      - Shell large ..... *johnsoni*
      - Shell not large ..... *conradi*
    - Periphery of the last whorl angulated.
      - Shell stout ..... *gabbi*
      - Shell not stout ..... *stephensoni*
  - Shell elongate-conic.
    - Shell stout ..... *schwengelae*
    - Shell not stout ..... *gunteri*

Shell not umbilicated.
- Shell pupoid ..... *matsoni*
- Shell not pupoid.
  - Shell ovate.
    - Shell small ..... *burnsi*
    - Shell of medium size..... *nicoli*
  - Shell not ovate.
    - Shell elongate-ovate.
      - Shell large ..... *bassleri*
      - Shell small ..... *cooperi*
    - Shell elongate-conic.
      - Whorls almost flattened..... *stearnsi*
      - Whorls not almost flattened.
        - Shell stout ..... *coxi*
        - Shell slender ..... *pinellasensis*

ODOSTOMIA (ODOSTOMIA) HEILPRINI, new species

Plate 17, figure 5

Shell minute, pupoid, cream-yellow. The nucleus is deeply obliquely immersed in the first postnuclear whorl, above which only the tilted edge of the last turn projects. The postnuclear whorls are well rounded, polished, and without sculpture. The suture is well marked. The periphery is rounded. The base is hemispherical, very narrowly umbilicated, and devoid of sculpture. The aperture is oval; the columella is somewhat twisted with its edge slightly reflected; it bears a strong fold at its insertion; the parietal wall is glazed by a thick callus; the outer lip is evenly curved, thin at the edge, but thick within.

The type, U.S.N.M. No. 561724, comes from the Pliocene of North St. Petersburg, Fla. It has 5.2 postnuclear whorls and measures: Length 2.4 mm., diameter 1.2 mm.

The minute size and pupoid shape will easily distinguish this species from the others here described.

I take pleasure in naming this species for Prof. Angelo Heilprin, who was the first to give the East American Pliocene a definite status.

ODOSTOMIA (ODOSTOMIA) JOHNSONI, new species

Plate 17, figure 6

Shell moderately large, elongate-ovate, cream-yellow. The nucleus is small and deeply obliquely immersed in the first postnuclear whorl, showing only the tilted edge of the last whorl. The postnuclear whorls are much broader at the periphery than at the summit; they are slightly rounded and devoid of sculpture. The suture is lightly impressed. The periphery is well rounded. The base is broad, hemi-

spherical, openly umbilicated, and without sculpture. The aperture is broadly ovate; the columella is slightly twisted, reflected, and provided with a strong fold a little below its insertion; the parietal wall is covered by a thick callus; the outer lip is gently curved.

The type, U.S.N.M. No. 561725, comes from the Pliocene of North St. Petersburg, Fla. It has 6.4 postnuclear whorls and measures: Length 4.2 mm., diameter 2.2 mm. U.S.N.M. No. 561726 contains six additional specimens from the same source, and five more are in the collection of the A.N.S.P.

The much larger size and stouter form will readily distinguish this from *Odostomia conradi* (below).

I take pleasure in naming this species for the late Dr. Charles Willison Johnson, director of the Boston Society of Natural History.

ODOSTOMIA (ODOSTOMIA) CONRADI, new species

Plate 17, figure 9

Shell small, elongate-ovate, cream-yellow. The nucleus is deeply immersed in the first postnuclear whorl above which the obliquely tilted edge only projects. The postnuclear whorls are well rounded, polished, and without sculpture. The suture is a mere impressed line. The periphery is well rounded. The base is rather long, well rounded, very narrowly umbilicated, and without sculpture. The aperture is ovate; the columella is stout and rendered twisted by the heavy fold which it bears a little below its insertion; the parietal wall is glazed by a thin callus; the outer lip is rather thick, while the basal lip at its junction with the columella renders the aperture effuse at this point.

The type, U.S.N.M. No. 561727, comes from the Pliocene of North St. Petersburg, Fla. It has 6 postnuclear whorls and measures: Length 3.2 mm., diameter 1.0 mm. U.S.N.M. No. 561728 contains five additional specimens from the same source, and five more are in the collection of the A.N.S.P.

The more slender outline and less open umbilicus will readily distinguish this species from *Odostomia johnsoni* (p. 87).

This species is named for Timothy A. Conrad, one of the pioneer workers on the Southern Tertiaries.

ODOSTOMIA (ODOSTOMIA) GABBI, new species

Plate 17, figure 10

Shell moderately large, elongate-ovate, cream-yellow. The nucleus is deeply obliquely immersed in the first postnuclear whorl above which the tilted edge of the last whorl only projects. The postnuclear

whorls are much wider at the periphery than at the summit; they are polished and without sculpture. The suture is well impressed. The summit of the whorls falls immediately below the weak angulation of the periphery. The base is rather short, well rounded, narrowly umbilicated, and without sculpture. The aperture is rather short and very broadly oval; the columella is slender, oblique, slightly reflected at the edge and provided with a strong fold a little below its insertion; the parietal wall is glazed with a thin callus; and the outer lip is strongly curved.

The type, U.S.N.M. No. 561729, comes from the Pliocene of North St. Petersburg, Fla. It has 6.3 postnuclear whorls and measures: Length 3.2 mm., diameter 1.8 mm. U.S.N.M. No. 561730 contains three additional specimens from the same source, and three more are in the collection of the A.N.S.P.

The much stouter shape will easily distinguish this species from *Odostomia stephensoni* (below), which also has an angulated periphery.

This species is named for William M. Gabb, who made conspicuous contributions to West Indian paleontology.

ODOSTOMIA (ODOSTOMIA) STEPHENSONI, new species

Plate 17, figure 7

Shell small, elongate-ovate, cream-yellow. The nucleus is deeply immersed in the first postnuclear whorl above which the tilted edge of the last whorl only projects. The postnuclear whorls are slightly rounded; the summit of succeeding whorls falls a little below the peripheral angulation and thereby lends emphasis to the well-marked suture. The whorls are polished and without sculpture. The periphery is weakly angulated. The base is hemispherical, very narrowly umbilicated, and without sculpture. The aperture is obliquely oval; the columella is oblique, slightly reflected at the edge, and bears a strong fold a little below its insertion; the parietal wall is glazed by a thin callus; and the outer lip is evenly curved.

The type, U.S.N.M. No. 561731, comes from the Pliocene of North St. Petersburg, Fla. It has 5.3 postnuclear whorls and measures: Length 2.7 mm., diameter 1.1 mm. Another specimen from the same source is in the collection of the A.N.S.P.

The much more slender shape will easily distinguish this species from *Odostomia gabbi* (p. 88).

This species is named for Lloyd W. Stephenson, whose studies carried the pyramidellids into the Cretaceous.

ODOSTOMIA (ODOSTOMIA) SCHWENGELAE, new species

Plate 17, figure 8

Shell large, elongate-conic, cream-yellow. The nucleus consists of about 2 whorls, which are deeply immersed in the first postnuclear whorl above which the tilted edge only projects. The postnuclear whorls are almost flattened, rather high, and without sculpture. The suture is a mere line. The periphery is strongly rounded. The base is rather long, strongly rounded, and narrowly umbilicated, and without sculpture. The aperture is elongate-ovate; the columella is slender, rendered somewhat twisted by the strong fold, which is a little anterior to its insertion; the parietal wall is glazed by a strong callus; the outer lip is thin and gently curved.

The type, U.S.N.M. No. 561732, comes from the Pliocene of North St. Petersburg, Fla. It has 7.0 postnuclear whorls and measures: Length 4.8 mm., diameter 1.9 mm. Another specimen from the same source is in the collection of the A.N.S.P.

The larger size and more robust form will readily distinguish the species from *Odostomia gunteri* (below).

I take pleasure in naming this species for Dr. Jeanne S. Schwengel, who has done much in promoting the efforts of the American Malacological Union as well as adding materially to our knowledge of Florida mollusks by her dredging and publications.

ODOSTOMIA (ODOSTOMIA) GUNTERI, new species

Plate 17, figure 11

Shell moderately large, elongate-conic, cream-yellow. Nuclear whorls small, probably two, deeply obliquely immersed in the first postnuclear whorl, above which the tilted edge of the last whorl only projects. The postnuclear whorls are almost flattened, polished, smooth. The suture is a mere impressed line. Periphery well rounded. The base is rather long, narrowly umbilicated, polished like the spire. The aperture is rather long, ovate; the columella is thin, somewhat twisted, slightly revolute and provided with a moderately strong fold a little below its insertion; the parietal wall is glazed with a very thin callus; the outer lip is gently curved and thin at the edge.

The type, U.S.N.M. No. 561733, comes from the Pliocene of North St. Petersburg, Fla. It has 6.9 postnuclear whorls and measures: Length 4.1 mm., diameter 1.5 mm. Another specimen is in the collection of the A.N.S.P.

The more slender form will easily distinguish the species from *Odostomia schwengelae* (above).

I take pleasure in naming this species for Herman Gunter, director of the Florida State Geological Survey.

ODOSTOMIA (ODOSTOMIA) MATSONI, new species

Plate 18, figure 6

Shell very small, of pupoid shape, brown. The nucleus is deeply obliquely immersed in the first postnuclear whorl, above which only the rounded, tilted edge of the last volution projects. The postnuclear whorls are rather high, well rounded, and polished. The suture is a mere impressed line. The periphery is well rounded. The base is hemispherical, smooth, and not umbilicated. The aperture is ovate; the columella is rather stout, slightly reflected, and rendered somewhat twisted by the strong fold a little below its insertion; the parietal wall is glazed by a thick callus; the outer lip is gently curved and thin at the edge.

The type, U.S.N.M. No. 561734, comes from the Pliocene of North St. Petersburg, Fla. It has 5 postnuclear whorls, and measures: Length 2.0 mm., diameter 0.9 mm.

The minute size, pupoid shape, strong adult features, and coloration will readily distinguish this from all other nonumbilicated species.

I take pleasure in naming this species for George C. Matson, of the U.S. Geological Survey, who has done much work upon the Florida geology.

ODOSTOMIA (ODOSTOMIA) BURNSI, new species

Plate 18, figure 5

Shell small, ovoid, cream-yellow. The nucleus is deeply obliquely immersed in the first postnuclear whorl, above which a little of the rounded edge of the last volution only projects. The postnuclear whorls increase in width from summit to periphery and from whorl to whorl and in rounding in such a manner as to produce the egg-shaped appearance. In this they are aided by the lightly impressed suture. The entire spire is polished. The periphery is rounded. The base is hemispherical, strongly rounded, nonumbilicate and polished. The aperture is small and oval; the columella is short, thick, and reflected, and provided with a strong fold a little below its insertion; the parietal wall is covered by a thick callus that almost renders the peristome complete; the outer lip is thick within, thin at the edge.

The type, U.S.N.M. No. 561735, comes from the Pliocene of North St. Petersburg, Fla. It has 5.2 whorls and measures: Length 2.2 mm.,

diameter 1.0 mm. Another specimen from the same source is in the collection of the A.N.S.P.

The minute size will readily distinguish this species from the other ovate, nonumbilicate, much larger *Odostomia nicoli* (below).

I take pleasure in naming this species for Dr. Frank Burns, who assisted Dr. Dall for many years as an able field collector and preparator.

ODOSTOMIA (ODOSTOMIA) NICOLI, new species

Plate 18, figure 3

Shell ovate, cream-yellow. The nucleus is deeply obliquely immersed in the first postnuclear whorl, above which the rather thick edge of the last turn only projects. The postnuclear whorls are strongly rounded on the first two turns and less so on the rest. They are polished and separated by a moderately constricted suture. The periphery is strongly rounded. The base is hemispherical, somewhat inflated, strongly rounded, nonumbilicate, and polished. The aperture is ovate, short, and oblique; the columella is short, reflected, and rendered somewhat twisted by the strong fold a little below its insertion; the parietal wall is glazed by a thick callus; the outer lip is thick within and thin at the edge.

The type, U.S.N.M. No. 561736, comes from the Pliocene of North St. Petersburg, Fla. It has 6.1 whorls and measures: Length 2.5 mm., diameter 1.1 mm. Another specimen from the same source is in the collection of the A.N.S.P.

The much larger size will readily differentiate this species from *Odostomia burnsi* (p. 91).

I take pleasure in naming this species for Dr. David Nicol, associate curator of invertebrate paleontology at the United States National Museum.

ODOSTOMIA (ODOSTOMIA) BASSLERI, new species

Plate 18, figure 2

Shell elongate-ovate, rather large, cream-yellow. The nuclear whorls are deeply obliquely immersed in the first postnuclear turn, above which only the rounded, tilted edge of the last whorl projects. The postnuclear whorls are moderately rounded and polished. The suture is moderately constricted. The periphery is well rounded. The base is rather long, strongly rounded, and polished. The aperture is almost semicircular, the curve of the parietal wall and columella forming the axis; the columella is short, and rendered somewhat

twisted by the internal fold a little below its insertion; the parietal wall is glazed by a heavy callus; the outer lip is decidedly arched.

The type, U.S.N.M. No. 561737, comes from the Pliocene of North St. Petersburg, Fla. It has 6.2 postnuclear whorls and measures: Length 4.0 mm., diameter 1.8 mm. U.S.N.M. No. 561738 contains three additional specimens from the same source and four more are in the collection of the A.N.S.P. The large size will readily distinguish this species from *Odostomia cooperi* (below).

I take pleasure in naming this species for Dr. Ray S. Bassler, who served the United States National Museum so many years as able head curator of geology and foremost paleontologist.

ODOSTOMIA (ODOSTOMIA) COOPERI, new species

Plate 18, figure 4

Shell small, elongate-ovate, cream-yellow. The nuclear whorls are deeply obliquely immersed in the first postnuclear turn, above which the edge of the last whorl only projects. The postnuclear whorls are moderately rounded, smooth, and polished. The suture is merely indicated. The periphery is well rounded. The base is almost hemispherical, polished, smooth. The aperture is elongate-oval, somewhat effuse at the junction of the outer lip and columella; the columella is twisted and provided with a strong fold a little below its insertion; the parietal wall is glazed with a strong callus; the outer lip is gently curved.

The type, U.S.N.M. No. 561739, comes from the Pliocene of North St. Petersburg, Fla. It has 6.1 postnuclear whorls and measures: Length 3.0 mm., diameter 1.5 mm. U.S.N.M. No. 361740 contains another specimen from the same source and another is in the collection of the A.N.S.P.

The smaller size and different aperture will easily distinguish this species from *Odostomia bassleri* (p. 92).

I take pleasure in naming this species for Dr. G. Arthur Cooper, the helpful curator of invertebrate paleontology and paleobotany at the United States National Museum.

ODOSTOMIA (ODOSTOMIA) STEARNSI, new species

Plate 18, figure 8

Shell elongate-conic, chestnut-brown. The nucleus is deeply obliquely immersed in the first postnuclear whorl, above which the rounded, tilted edge of the last volution only projects. The post-

nuclear whorls are high between the sutures and almost flattened. They are without sculpture and polished. The suture is a mere transverse line. The periphery of the last whorl is slightly inflated and strongly rounded. The base is strongly rounded and polished like the spire. The aperture is long-oval, somewhat effuse at the junction of the basal lip and columella; the columella is short, vertical, not stout, and bears a strong fold a little above its middle which trails over the edge of the columella basalward and bounds its outer edge; the parietal wall is glazed with a callus; the outer lip is gently curved.

The type, U.S.N.M. No. 561741, comes from the Pliocene of North St. Petersburg, Fla. It has 6.4 postnuclear whorls and measures: Length 4.4 mm., diameter 1.5 mm. Another specimen from the same source is in the collection of the A.N.S.P.

I take pleasure in naming this species for Dr. R. E. Stearns, Dr. Dall's assistant curator of the division of mollusks at the United States National Museum in the 1890's.

ODOSTOMIA (ODOSTOMIA) COXI, new species

Plate 18, figure 7

Shell elongate-conic, moderately stout, cream-yellow. The nucleus is deeply, obliquely immersed in the first of the postnuclear whorls, above which only the tilted, rounded edge of the last turn projects. The postnuclear whorls are moderately rounded, polished, with the merest indications of microscopic, closely spaced spiral striations visible only under high-power magnification. The suture is well impressed but not constricted. The periphery of the last whorl is well rounded. The base is slightly prolonged, well rounded, smooth. The aperture is slightly oblique, elongate-ovate; the columella is slender, curved, slightly reflected, and provided with a fold a little below its insertion; the parietal wall is glazed with a strong callus; the outer lip is evenly curved.

The type, U.S.N.M. No. 561742, comes from the Pliocene of North St. Petersburg, Fla. It has 6.1 postnuclear whorls and measures: Length 3.9 mm., diameter 1.5 mm. U.S.N.M. No. 561743 contains four additional specimens from the same source, and four more are in the collection of the A.N.S.P.

The more slender shape will readily distinguish this species from *Odostomia pinellasensis* (p. 95).

I take pleasure in naming this species for Dr. George H. Cox, who has done much collecting in the region.

ODOSTOMIA (ODOSTOMIA) PINELLASENSIS, new species

Plate 18, figure 1

Shell elongate-conic, slender, cream-yellow. The nucleus is deeply obliquely immersed in the first postnuclear whorl, above which only the rounded, tilted edge projects. The postnuclear whorls are almost flattened, polished, shining, showing traces of exceedingly fine closely spaced striations under high magnification. The suture is a mere transverse line. The periphery of the last whorl is well rounded. The base is moderately long, strongly rounded, and marked like the spire. The aperture is ovate; the columella is short, oblique, slightly twisted and slightly reflected, and bears a strong fold a little below its insertion; the parietal wall is glazed by a strong callus; the outer lip is gently curved and thin at the edge.

The type, U.S.N.M. No. 561744, comes from the Pliocene of North St. Petersburg, Fla. It has 6.5 postnuclear whorls and measures: Length 3.5 mm., diameter 1.2 mm. Another specimen is in the collection of the A.N.S.P.

The much more slender form will readily distinguish this species from *Odostomia coxi* (p. 94).

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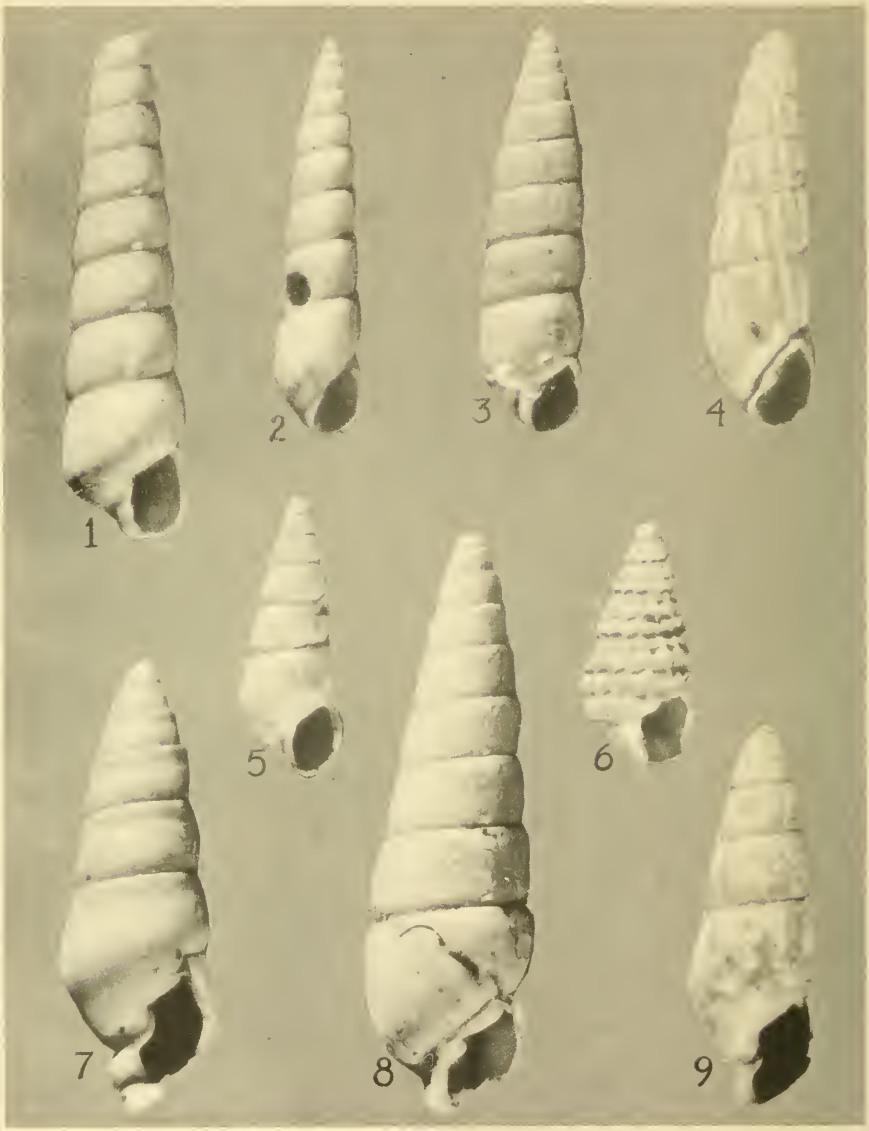

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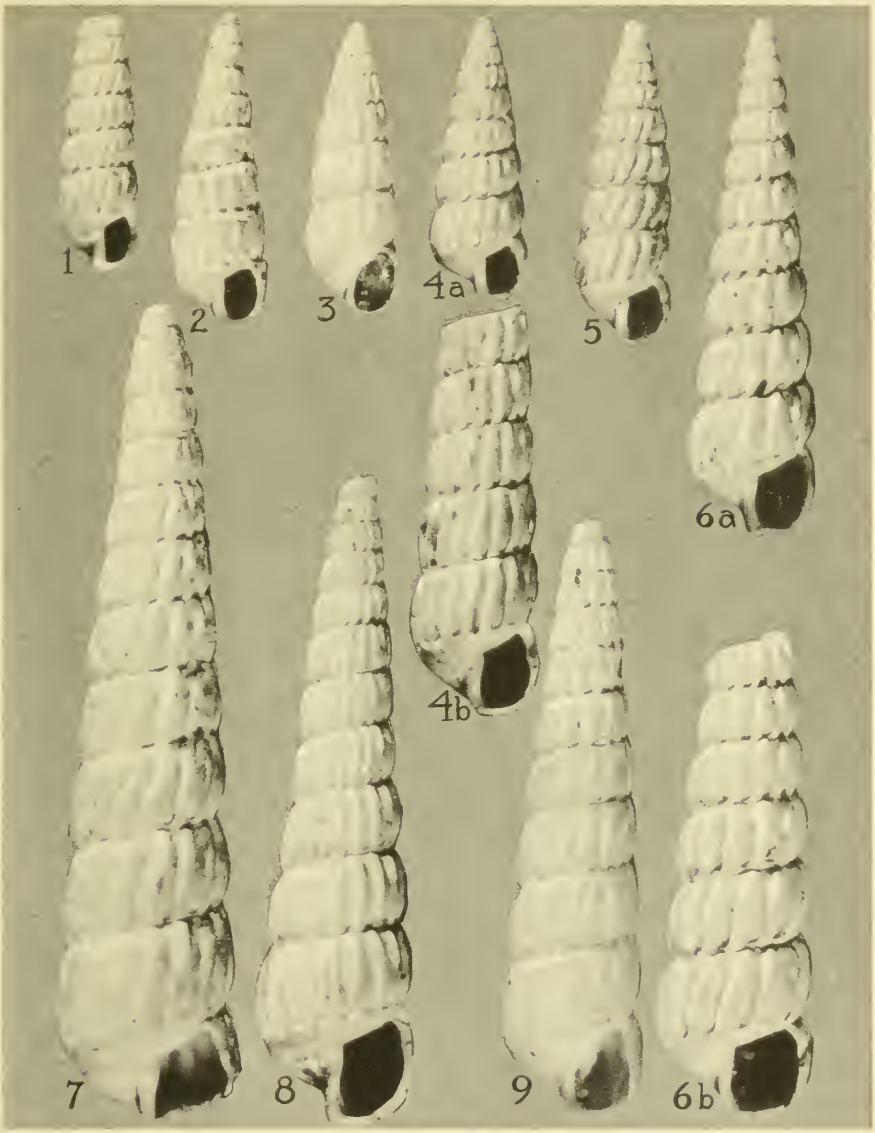

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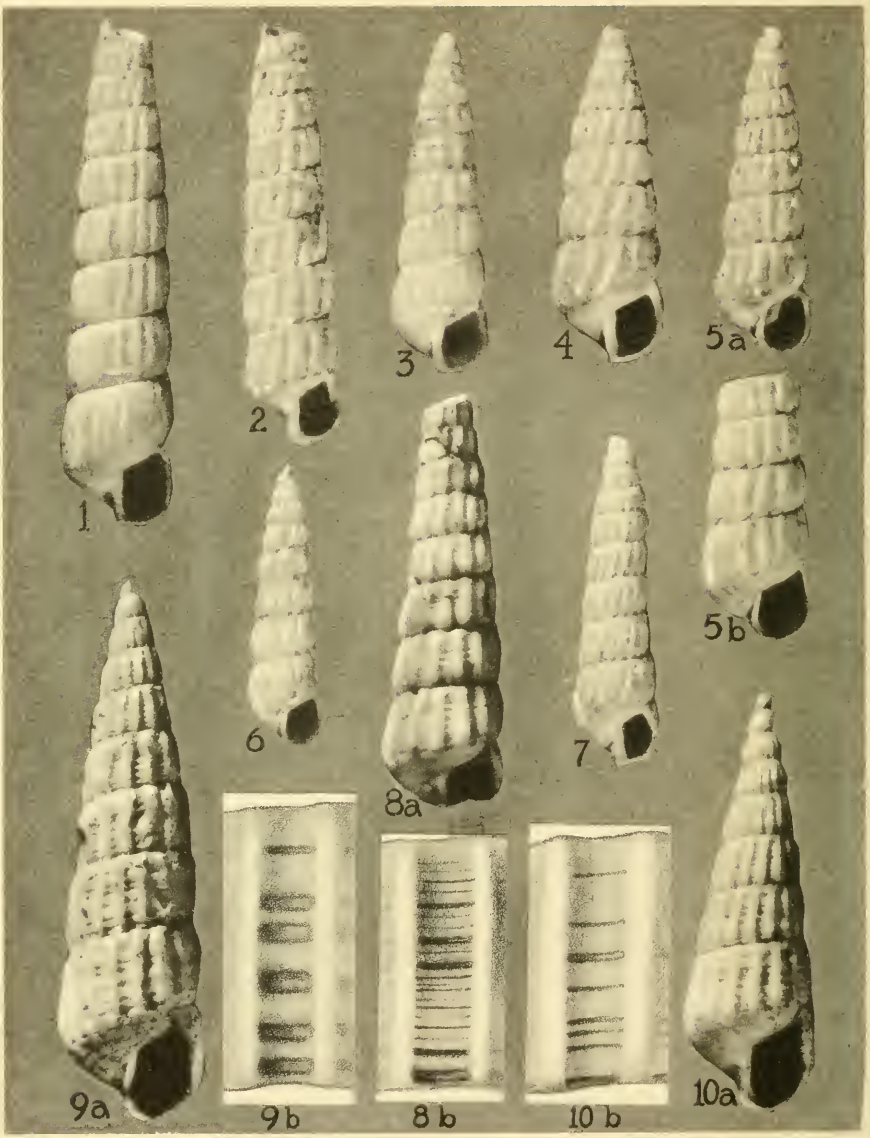

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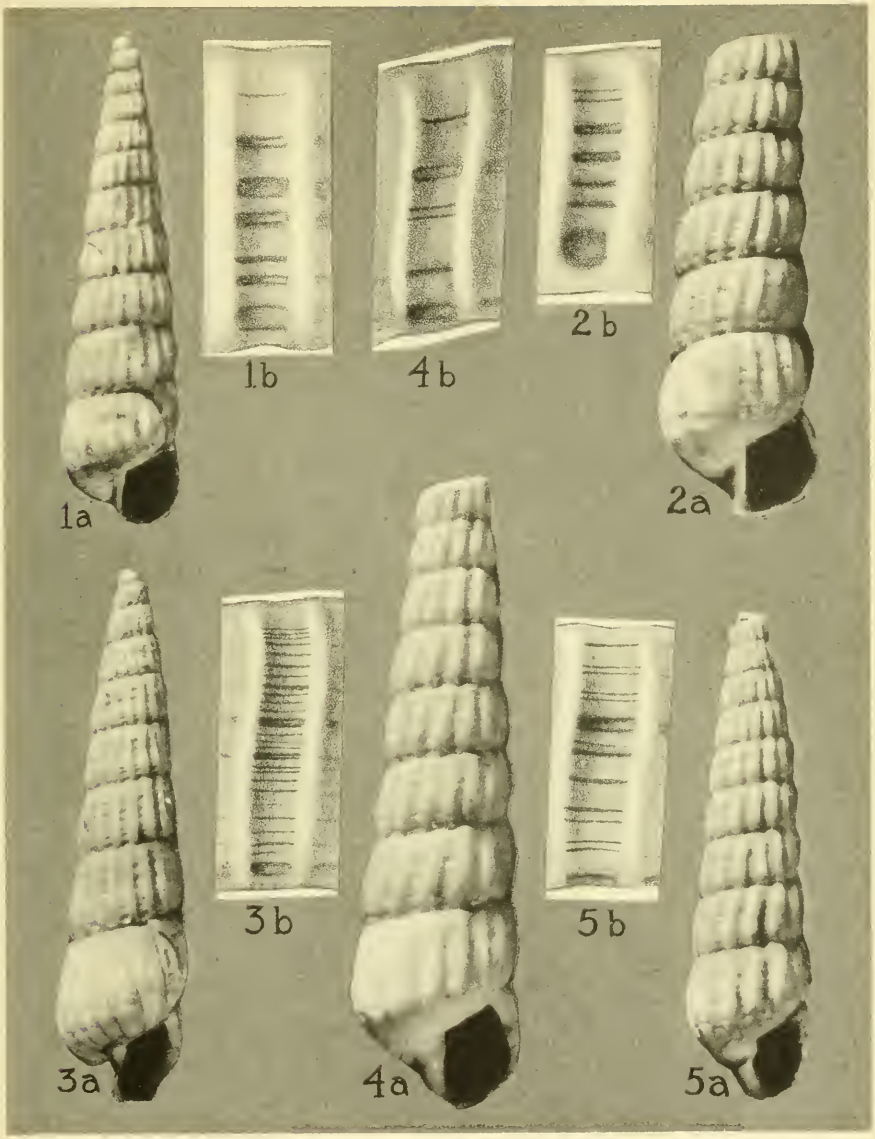

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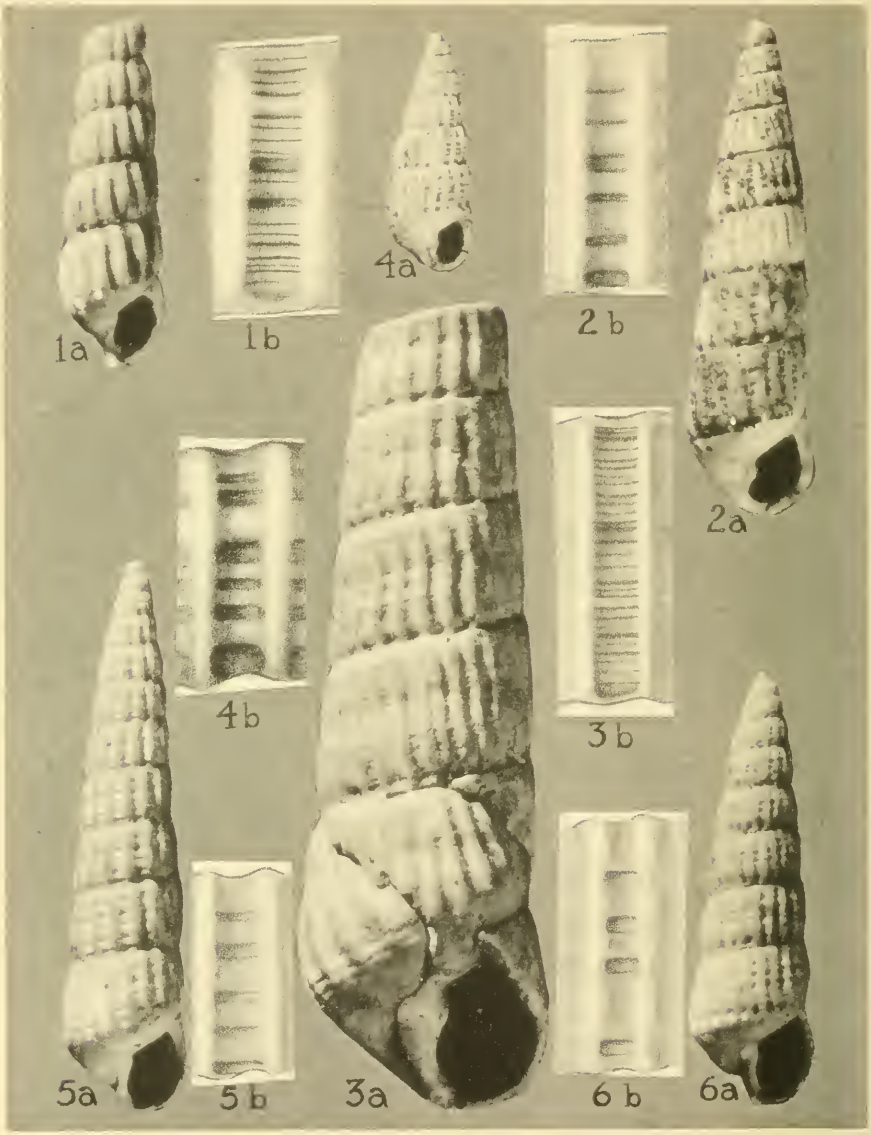

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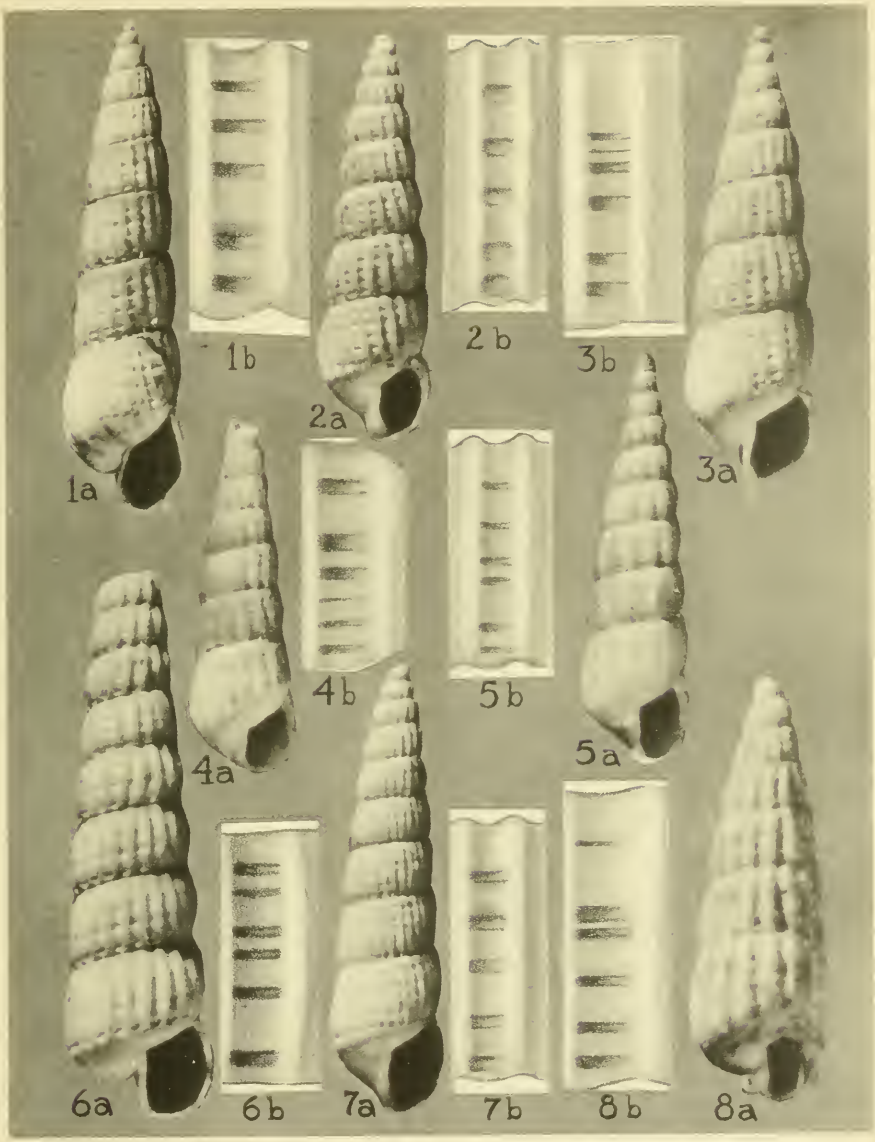

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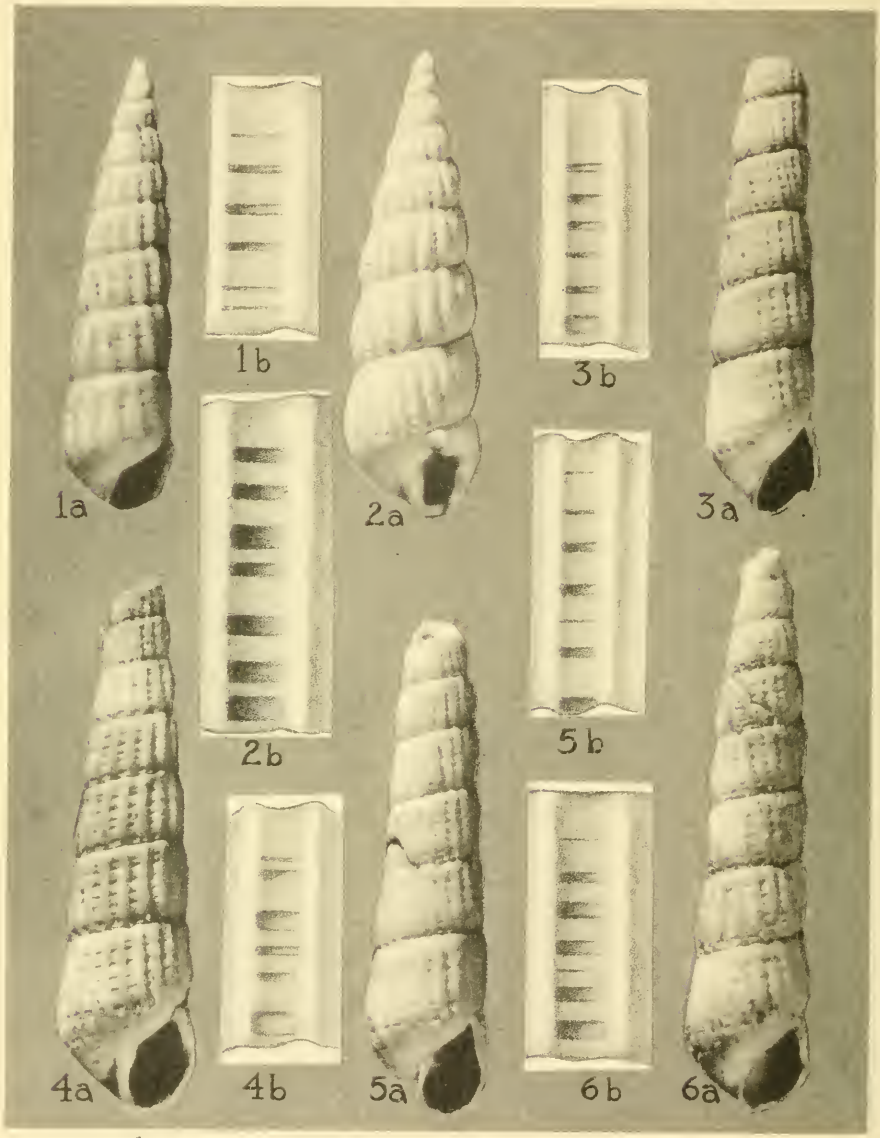

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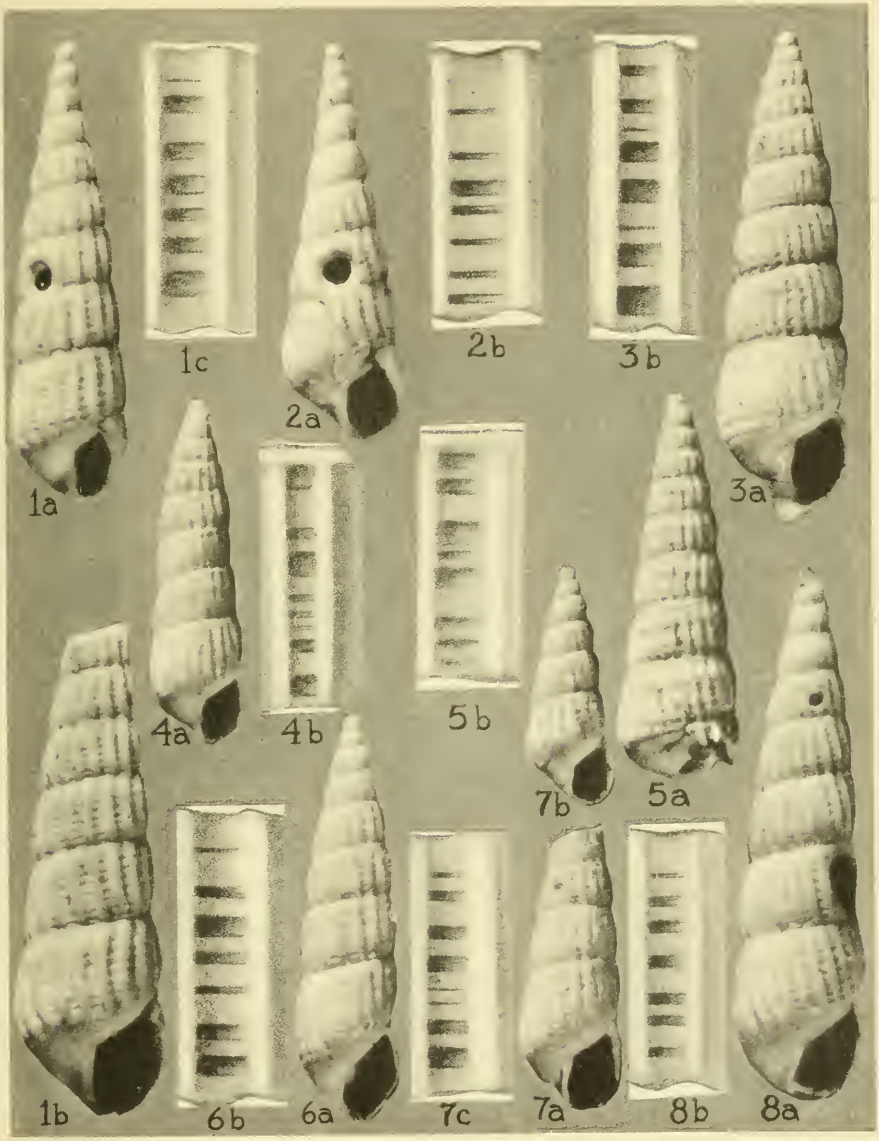

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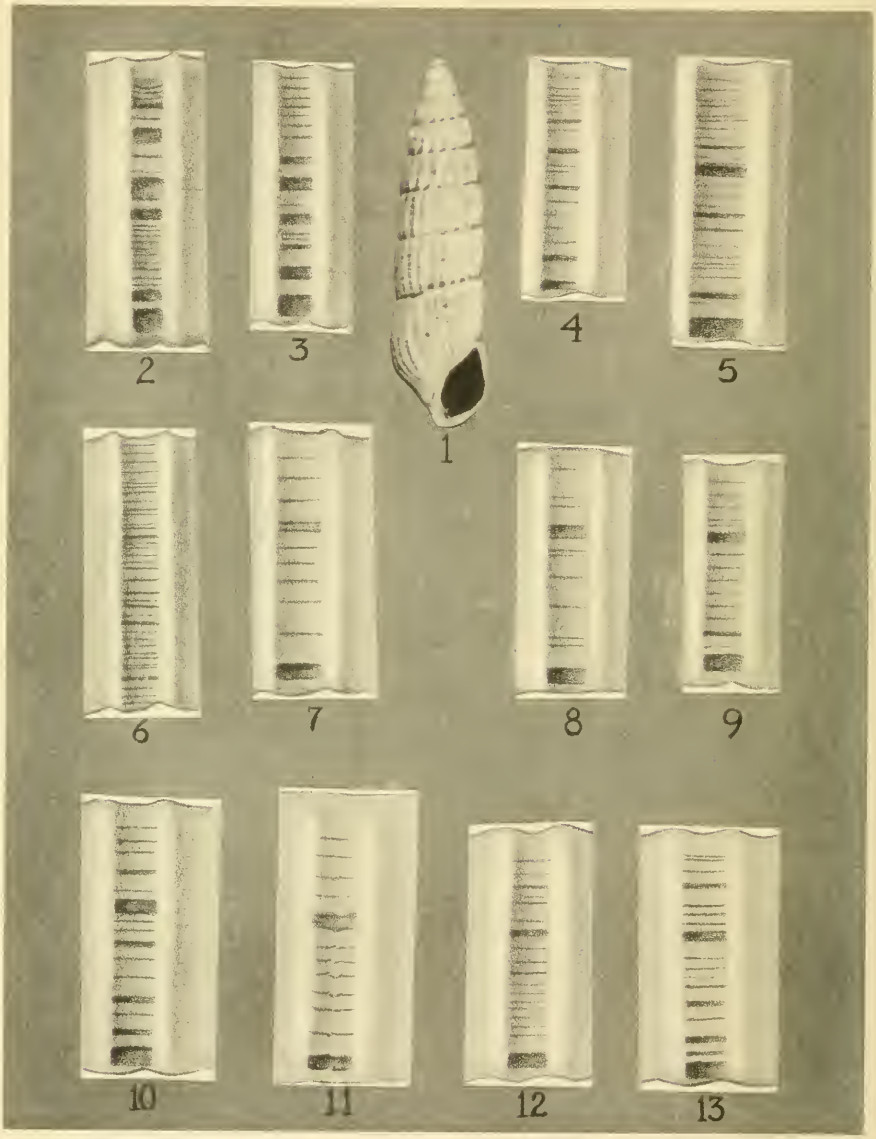

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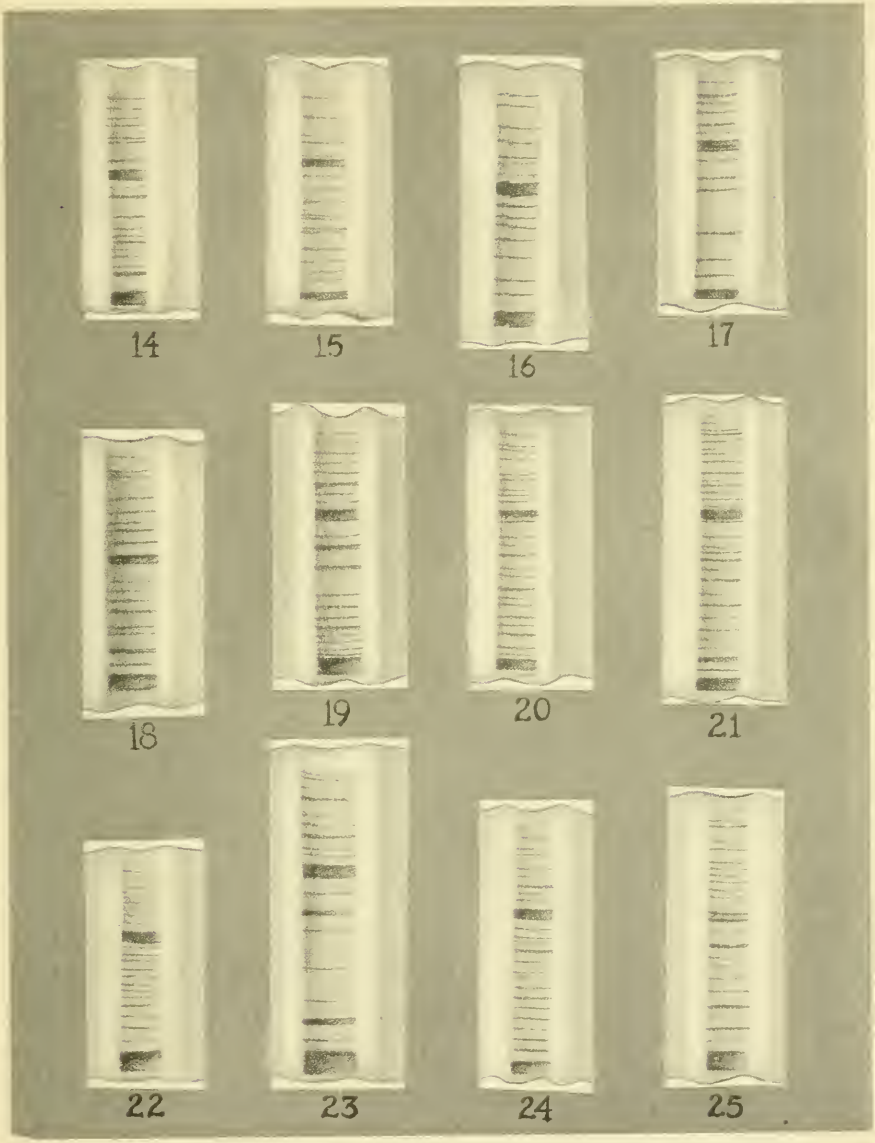

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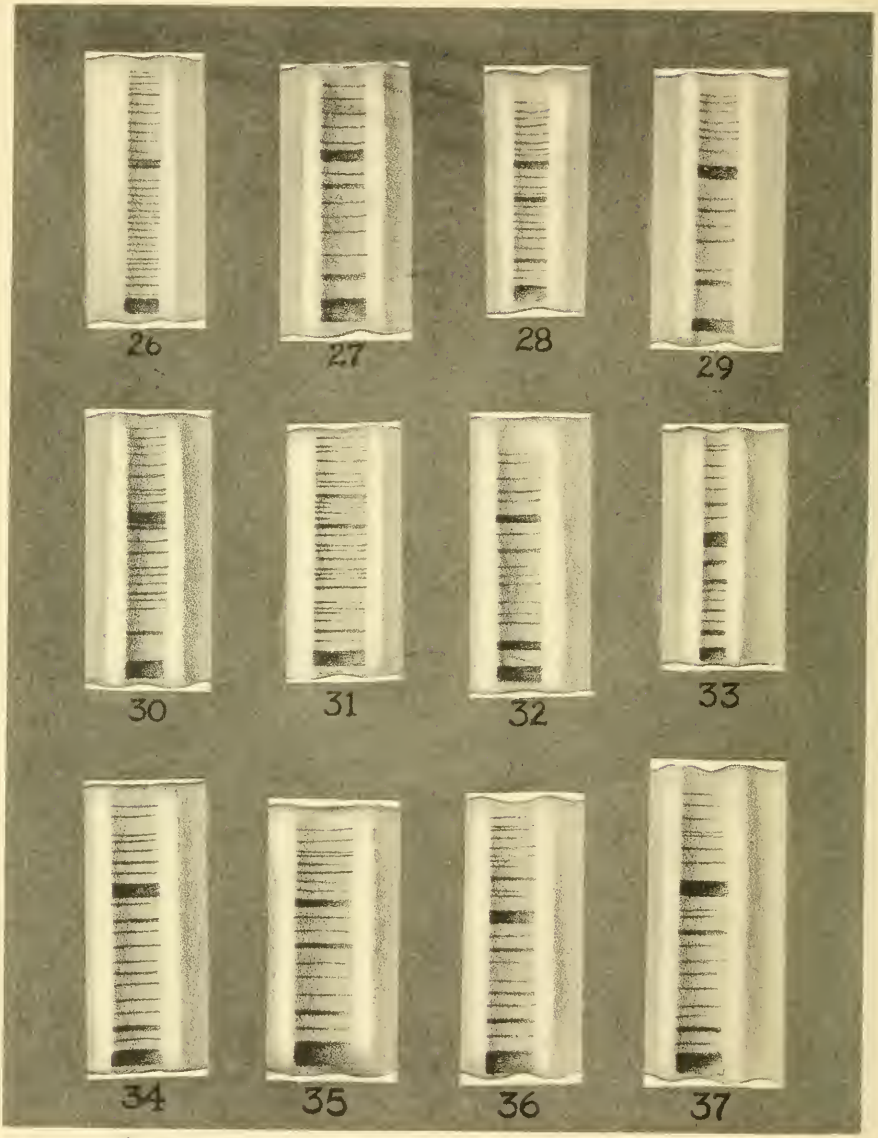

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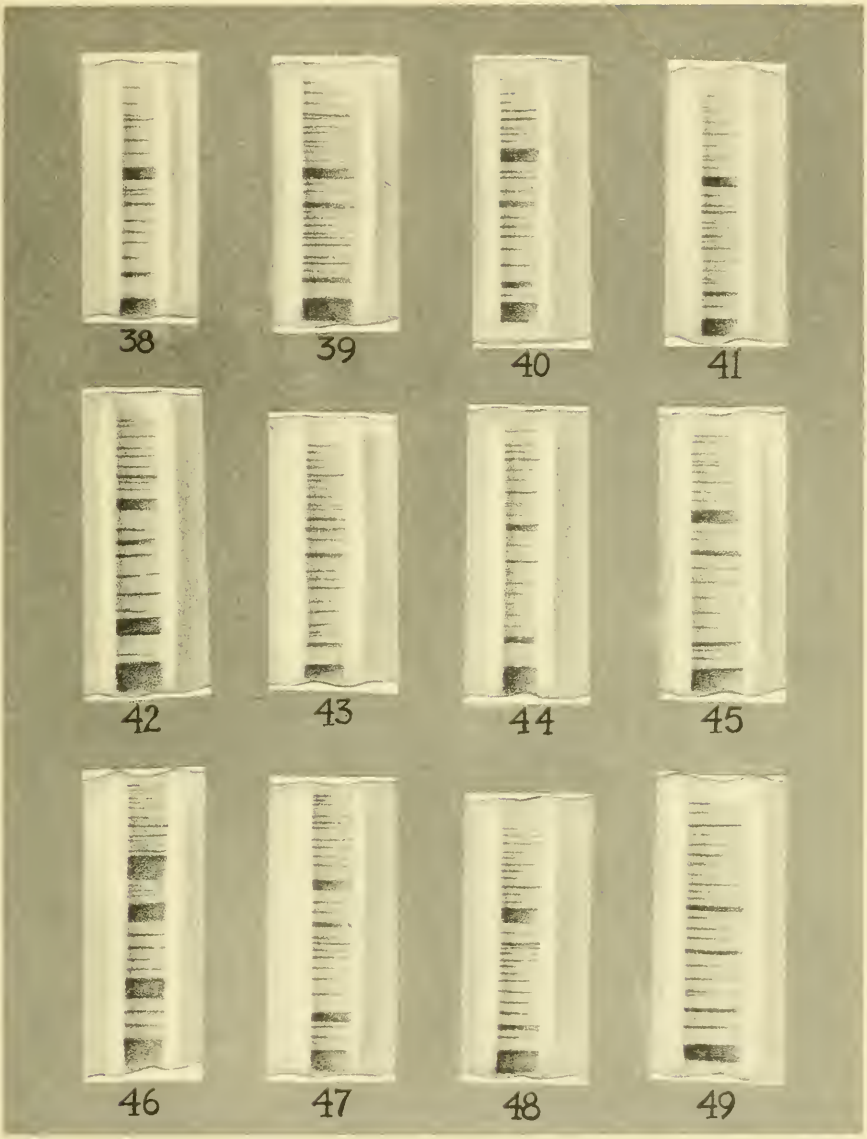

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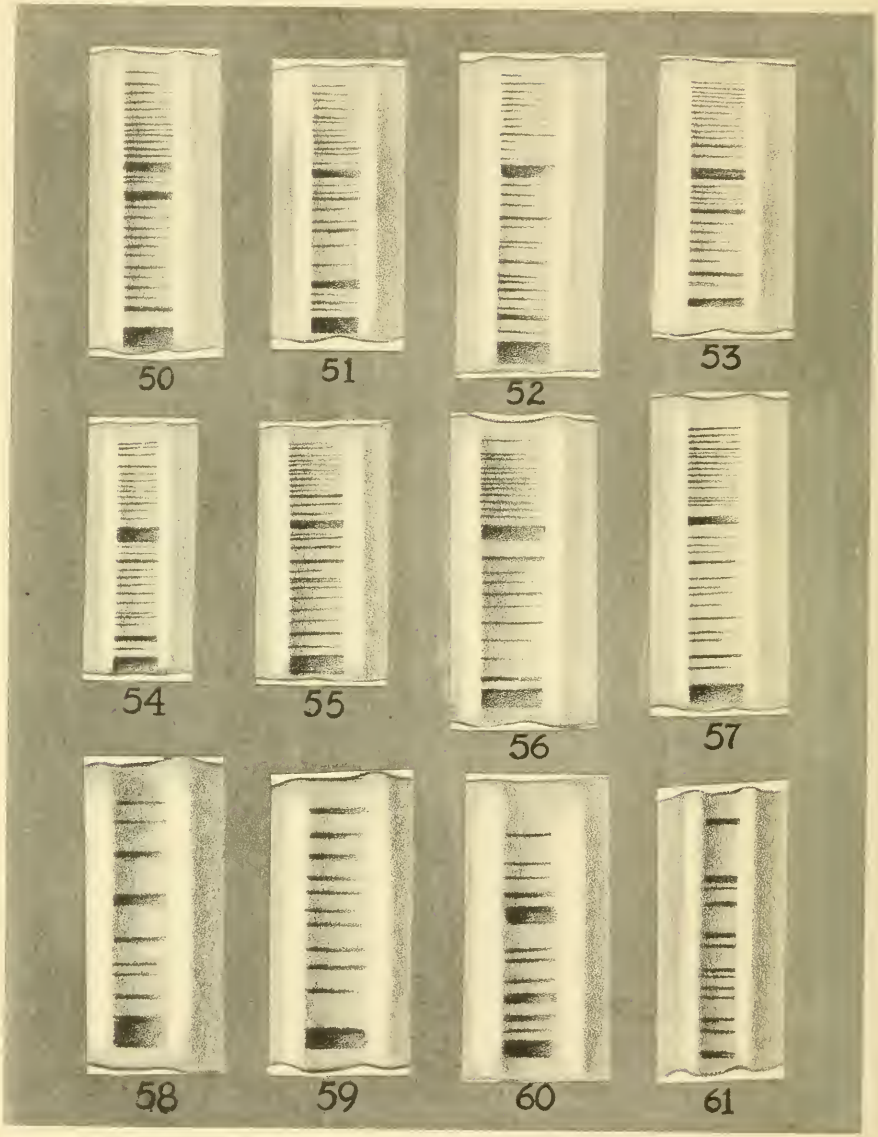

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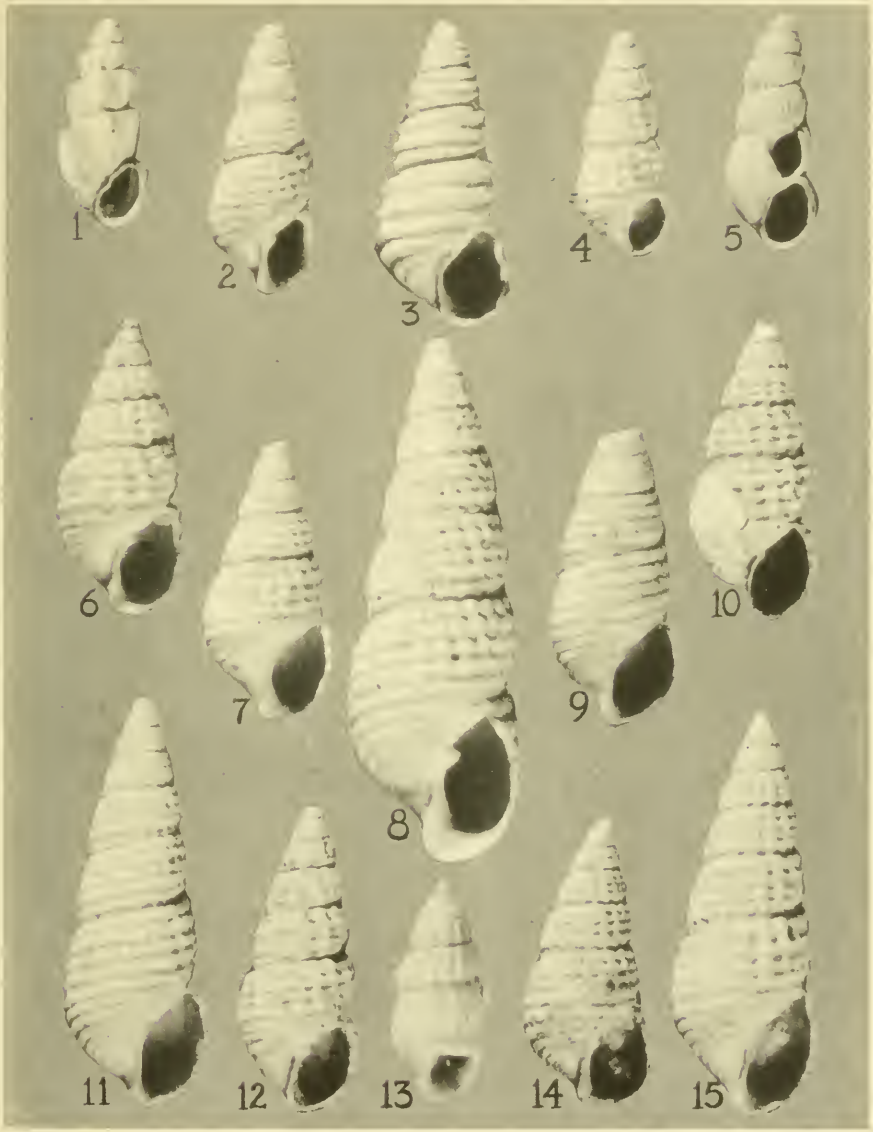

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