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THE CUBAN OPERCULATE LAND MOLLUSKS OF THE  
FAMILY ANNULARIIDAE, EXCLUSIVE OF THE SUB-  
FAMILY CHONDROPOMINAE

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IN THE introduction to our monograph on "The Cuban Operculate Land Shells of the Subfamily Chondropominae"<sup>1</sup> we gave a general historic account of the work preceding our effort. The statements made there apply equally to the present paper. We are considering here the remaining subfamilies of the family Annulariidae known to inhabit Cuba, namely, the Rhytidopominae, Adamsiellinae, and Annulariinae.

The differentiations which the members of this family have undergone in Cuba are extraordinary and offer a field for speculation and theorizing unequalled in any other part of the world. We are confining our attention to the taxonomic side of the question, merely calling attention to demonstrable facts without expressing personal opinions regarding the speculative questions involved.

Following Henderson and Bartsch,<sup>2</sup> we are recognizing four subfamilies in Annulariidae, basing our divisions upon opercular characters.

All annularids have an operculum, consisting of a chondroid basal plate of a varying number of whorls. The whorls composing this plate may be simple, that is, without further differentiation, or they may have a granular calcareous deposit, or bear ribs or lamellae or

<sup>1</sup> Proc. U. S. Nat. Mus., vol. 85, pp. 193-403, figs. 71-101, pls. 7-39, 1938.

<sup>2</sup> Proc. U. S. Nat. Mus., vol. 58, pp. 49-82, 1920.

combinations of these characters, which easily fall into four categories here recognized as subfamilies.

The first of these subfamilies, the Chondropominae, has a simple chondroid plate consisting of a number of whorls, which usually have more or less of a finely granular calcareous deposit on the outside. In the second, the Rhytidopominae, the whorls bear a calcareous deposit, which may consist of simple, retractively curved riblets that may remain distinct or may become fused at the edge into a solid plate. In the third, the Adamsiellinae, which is poorly represented in Cuba, the upturned outer edge of the preceding whorl is strengthened and built into a strongly elevated lamella by the inner edge of the succeeding turn. This lamella has no ribbing or buttressing. In the fourth subfamily, the Annulariinae, the whorls of the operculum are provided with a strong calcified lamella, which rises from the inner edge of the turns; it may be vertically placed or reflected to parallel the basal plate, and it may be smooth or ribbed. It is usually connected with the basal plate by reenforcement.

The presence or absence of breathing devices of definite type is not restricted to any of the subfamilies; they find service in all of them. These breathing devices vary from a mere notch near the posterior angle of the aperture to a puncture in the parietal wall, which puncture may be further emphasized by having a siphon built on the outside of it. This siphon even may be prolonged and deflected through the suture to the umbilicus, which it closes, and breathing is thus effected through the hollow axis of the shell and through the decolated apex. Or, the columellar wall may have a slit at some distance from the peristome, through which breathing communication is established with the hollow axis.

Another feature, the taxonomic value of which we have not definitely decided upon in this work, is the nuclear sculpture. The embryonic whorls, usually about two, are microscopically granulose, that is, smooth under hand-lens magnification. In two groups, *Limadora* and *Limadorex*, they bear strong definite sculpture; in the first this is thimble pitting, and in the second thimble pitting and spiral threads and axial ribs. In the rest of the shell characters they are not unlike other groups, but in these embryonic features they are widely at variance with the other members of the family.

The three subfamilies here discussed confirm our findings in the Chondropominae: that Cuba represents three centers of development, namely, an eastern, a central, and a western province.

Where we have referred in the keys to closely spaced or axial riblets, the statement refers to the later whorls.

We have used brackets around certain names to indicate that the original describer gave credit for the species to the one whose name appears in brackets, for example ([Gundlach] Pfeiffer).

In conclusion, we wish to express again our thanks and appreciation to all the institutions and individuals acknowledged in our former paper. Without their continued help this monograph would have been incomplete.

### Subfamily RHYTIDOPOMINAE Henderson and Bartsch

1920. Rhytidopominae HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, pp. 64-65.

Shell ranging from elongate-conic through ovate to turbinate. Axial ribs are always present; they may vary from mere threads to lamellae; they may terminate simply; they may become expanded at the summit into broad denticles or even fused there into hollow cusps or tufts. Spiral threads may be present on spire, base, and umbilicus, or in the umbilicus only, or they may be even entirely absent. The last whorl may be adnate or solute and the umbilicus may be open or closed. The operculum has as a basis a chondroid plate composed of several whorls, the outer surface of which bears numerous, retractively slanting, raised lamellae, which vary greatly in strength in the different genera. They may extend completely across each whorl or they may cover only a part of it, as in *Opisthosiphon*. These lamellae may or may not be fused on their inner and outer termination. They may be rather distantly spaced or they may be almost fused at their edge. Special devices for breathing when the operculum closes the shell may be present or absent. They show an enormous range of specialized development, which will be discussed under each genus.

*Type genus.*—*Rhytidopoma* Sykes.

#### KEY TO THE GENERA OF THE SUBFAMILY RHYTIDOPOMINAE

Breathing device present.

Breathing siphon present.

Siphon complete.

Lamellae of the operculum extending completely across the whorl..... **Opisthocœlicum**

Lamellae of the operculum not extending completely across the whorl.

Lamellae of the operculum fused at their inner and outer edge to form a spiral keel.

Lamellae between the inner and outer keel as high as the keels..... **Torrella**

Lamellae between the inner and outer keel not as high as the keels, but concave at the free edge..... **Rhytidopoma**

Lamellae of the operculum not fused at their outer edge..... **Opisthosiphon**

Siphon incomplete..... **Dallsiphona**

Breathing siphon absent.

Breathing puncture present.

Breathing pore communicating with the space behind  
the withdrawn operculum----- **Xenopomoides**

Breathing pore communicating with a channel at the  
posterior angle of the aperture connecting with the  
hollow axis somewhere behind the peristome-----  
**Rhytidothyra**

Breathing device absent.

Last whorl of operculum covered by an overarching dome---- **Xenopoma**

Last whorl of operculum not covered by an overarching dome--  
**Parachondria**

### OPISTHOCOELICUM, new genus

In this genus the operculum resembles that of *Rhytidothyra*, i. e., the reinforcements on the outside consist of strongly raised, retractively curved lamellar ribs, which extend completely across the turns (they are not separated by a channel as they are in *Opisthosiphon*). A siphon is present immediately behind the peristome, at the posterior angle of the aperture. This siphon bends into the suture, and it connects with the umbilicus by a channel behind the expanded outer peristome.

*Type*.—*Opisthocoelicum* (*Opisthocoelicum*) *opisthocoele*, new species.

The genus appears to be confined to the provinces of Santa Clara and Camagüey.

We are recognizing three subgenera, which the following key will help to distinguish:

#### KEY TO THE SUBGENERA OF OPISTHOCOELICUM

Operculum too large to be withdrawn into the shell----- **Opisthocoelox**

Operculum not too large to be withdrawn into the shell.

Axial ribs gathered into hollow tufts at the summit----- **Opisthocoelops**

Axial ribs not gathered into hollow tufts at the summit-----  
**Opisthocoelicum**

#### OPISTHOCOELEX, new subgenus

In this subgenus the inner peristome is much exerted and the operculum is much too large to be withdrawn into the shell, which it merely caps. The retractively curved lamellae on the outside of the operculum are fused laterally to form an almost continuous plate, resembling somewhat the operculum of *Colobostylus* of Jamaica. The breathing device is the same as in typical *Opisthocoelicum*. In the present subgenus the axial ribs are thickened at the summit, but they are not gathered into tufts.

*Type*: *Opisthocoelicum* (*Opisthocoelox*) *paradoxum* (Torre and Henderson).

## KEY TO THE SPECIES OF THE SUBGENUS OPISTHOCOELEX

Axial ribs closely spaced.....	<i>paradoxum</i>
Axial ribs distantly spaced.....	<i>simulans</i>

## OPISTHOCOELICUM (OPISTHOCOELEX) PARADOXUM (Torre and Henderson)

Shell elongate-ovate, pale yellow, unicolor or marked by narrow, feebly interrupted spiral bands of brown, the elements of which are arranged in both axial and spiral series. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose. The postnuclear whorls are well rounded, the early ones marked by lamellar, scalloped, distantly spaced axial ribs. These ribs become more approximated on the middle turns and quite closely spaced on the last whorl, where they are separated by spaces not so wide as the ribs. The scallops on the whorls are more strongly developed at the summit than at the periphery, and on the early whorls the scallops at the periphery interlock with those at the summit of the succeeding turn. The scallops are absent on the last turn. Suture well impressed. Periphery strongly rounded. Base rather long, strongly rounded, and marked by the continuations of the axial ribs, which extend into the umbilical area, and by several spiral cords on the parietal wall near the umbilical edge. The last whorl is decidedly solute and the part between the parietal peristome and the preceding turn is covered by a strong callus, which extends also over the umbilicus, which it covers. This callus is pinched in at the edge and is marked by slender, concentric laminae. Aperture subcircular. Peristome simple, thin. The operculum is heavy and large, and it extends beyond the edge of the peristome; it cannot be withdrawn into the aperture. The operculum has an almost subcentral nucleus, and is marked by retractively curved radiating ridges, which extend to the periphery of the whorl, and which become fused with the equivalent sculpture of the succeeding turns. These radiating ridges are also fused laterally to form a solid plate, as in *Colobostylus*. The siphon at the posterior angle of the aperture passes into a varicial thickening behind the aperture, which connects by a channel with the umbilicus, and breathing is established through the hollow axis and the decollated tip of the shell.

This species appears to range along the southern plain of the Cubitas Mountains.

We are recognizing three subspecies as follows:

## KEY TO THE SUBSPECIES OF OPISTHOCOELICUM (OPISTHOCOELEX) PARADOXUM

Shell small, length of decollated shell less than 11 mm.....	<i>paradoxum</i>
Shell larger, length of decollated shell more than 13 mm.....	
Whorls strongly rounded.....	<i>gibbosum</i>
Whorls slightly rounded.....	<i>magnum</i>

**OPISTHOCOELICUM (OPISTHOCOELEX) PARADOXUM PARADOXUM (Torre and Henderson)**

## PLATE 9, FIGURE 2

1921. *Eutudora (Eutudorops) paradoxum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 264, pl. 42, figs. 8, 9.

This race was collected by Dr. de la Torre at Monte de Santa Cruz, Camagüey Province. It is smaller than the other races and has the sculpture very pronounced, in which respect it resembles *O. (O.) paradoxum gibbosum*, but from which it is distinguished by having the axial ribs uniformly developed; that is, there are no groups of 3 or 4 heavier riblets succeeded by an equal number of finer riblets.

The type, U.S.N.M. No. 314964, a female, has 4.3 whorls and measures: Length, 10.8 mm.; greater diameter, 6.0 mm.; lesser diameter, 5.25 mm.

A male from the same lot, a complete specimen having 6.3 whorls, measures: Length, 10.0 mm.; greater diameter, 5.1 mm.; lesser diameter, 4.75 mm.

**OPISTHOCOELICUM (OPISTHOCOELEX) PARADOXUM GIBBOSUM, new subspecies**

## PLATE 9, FIGURE 9

This race was collected by Bartsch at Sitio Afuera, at the south exit of Paso de la Escalera of the Cubitas Mountains, Camagüey Province. It is a large one. The whorls are decidedly inflated and rounded, and the axial ribs on the middle turns are spaced in alternating groups of coarse and fine riblets.

The type, U.S.N.M. No. 535342, has 4.5 whorls remaining and measures: Length, 13.3 mm.; greater diameter, 7.0 mm.; lesser diameter, 6.7 mm.

**OPISTHOCOELICUM (OPISTHOCOELEX) PARADOXUM MAGNUM, new subspecies**

## PLATE 9, FIGURE 3

This is a large race that Bartsch collected at Finca Gertrudis, at the foothills of the Cubitas Mountains, Camagüey Province. It is easily distinguished from the other two by its much less strongly developed sculpture and by its much less rotund whorls. The shell is also marked by very feeble, interrupted spiral bands of brown, which are rather closely spaced, and which are also arranged in very widely spaced axial series.

The type, U.S.N.M. No. 535341, has 5.0 whorls remaining and measures: Length, 13.4 mm.; greater diameter, 6.7 mm.; lesser diameter, 6.0 mm.

## OPISTHOCOELICUM (OPISTHOCOELEX) SIMULANS, new species

## PLATE 9, FIGURE 4

Shell elongate-ovate, of pale orange color, with the nuclear whorls and peristome paler. Nuclear whorls 2, very strongly inflated and very strongly rounded, separated by a very deep suture; smooth, except for microscopic granulations. Postnuclear whorls inflated, strongly rounded, and marked by very strong, rather distantly spaced, lamellar axial ribs, which are rendered slightly scalloped on the early whorls and obsolete nodulose on the last turn. These axial lamellar ribs extend strongly from the summit to the umbilical area. At the summit of the turns they interlock somewhat with the lamellae of the preceding turn. In addition to these strong axial lamellae, of which 25 occur upon the last whorl, the whorls are marked by an occasional intercalated finer axial cord and by numerous exceedingly fine, microscopic, somewhat wavy axial lirations. Suture very strongly constricted. Periphery inflated, strongly rounded. Base short, strongly rounded, and marked by the same axial sculpture that characterizes the spire, which extends into the umbilicus. The umbilicus is bordered by a spiral cord, with a second cord on the umbilical wall halfway between this and the reflected callus. Peristome double, the outer broadly expanded on the posterior portion of the outer lip and the parietal wall, forming a somewhat backward-turned auricle at the posterior angle, narrower on the basal and columellar walls. On the columellar wall the outer lip is reflected backward over the umbilicus and on the parietal wall it extends across a large gap covering the umbilical area and it is pinched in at the outer edge of the umbilicus. The outer peristome is marked by a series of wavy, concentric lamellae; the inner peristome is slightly exerted. There is a puncture in the parietal wall near the posterior angle, which communicates with the short, backward-turned siphon immediately behind the outer lip. The operculum is too large to be withdrawn within the aperture. The lamellae of the early turns are distinct as in *Parachondria*, but they cover the entire whorl. On the last turn these lamellae become fused to form a solid plate, marked by the indications of the lamellae.

The type, U.S.N.M. No. 535343, was collected by Bartsch at Finca Los Cangilones at the foothills of the Cubitas Mountains, Camagüey Province. It has 3.5 whorls remaining and measures: Length, 9.2 mm.; greater diameter, 5.9 mm.; lesser diameter, 5.0 mm.

He found this species also on the paredones on the east side of the Vereda de Los Burros, 1.5 km. north of Finca San Clemente, Cubitas Mountains.

## OPISTHOCOELOPS, new subgenus

In this subgenus the operculum and the breathing device are like those of *Opisthocoelex*. The outer peristome is also broadly expanded, as in *Opisthocoelex*, but it frequently does not completely close the umbilicus. The axial ribs are gathered into conspicuous hollow tufts at the summit.

Type: *Opisthocoelicum (Opisthocoelops) excurrens* ([Gundlach] Pfeiffer).

## KEY TO THE SPECIES OF THE SUBGENUS OPISTHOCOELOPS

Posterior angle of aperture strongly auriculated..... **occultum**  
 Posterior angle of aperture not strongly auriculated..... **excurrens**

## OPISTHOCOELICUM (OPISTHOCOELOPS) OCCULTUM (Torre and Henderson)

## PLATE 9, FIGURE 7

1920. *Opisthosiphon (Opisthosiphona) occultus* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67, *nomen nudum*.  
 1921. *Opisthosiphon (Opisthosiphona) occultum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, pp. 258-259, pl. 41, figs. 4, 6, 7.

Shell elongate-conic, flesh colored, sometimes pale brown with interrupted spiral bands of brown; the elements composing these bands are rather distantly spaced and they are arranged in both axial and spiral series; the peristome is flesh colored, the outer rayed on the outer lip by the spiral bands of brown. Nuclear whorls 1.7, small, well rounded, smooth, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls somewhat inflated, strongly rounded, marked by slender, slightly wavy, retractively curved axial riblets, which are rather distantly spaced on the first turn and which become gradually more closely approximated as the shell increases in size; on the last turn the spaces that separate the riblets are narrower than the riblets. Of these ribs, 30 occur upon the first turn, 62 upon the second, 118 upon the third, and 130 upon the last turn of the type. At more or less regular intervals some of these riblets are gathered into rather poorly developed hollow tufts at the summit. The riblets between these tufts are shorter than the rest. Suture strongly constricted. Periphery well rounded. Base short, strongly rounded, marked by the continuation of the axial ribs, and within the umbilicus by slender spiral cords. Aperture broadly oval; peristome double, the inner slightly exerted and reflected; the outer broadly, somewhat flaringly expanded, deeply notched on the middle of the inner lip; posterior to the notch the outer peristome is reflected over the umbilicus, which it completely covers, on the parietal wall the outer peristome is adnate to the preceding turn, while at the posterior angle it forms a conspicuous auricle, which is rendered somewhat irregular by the siphon immediately behind it; on the outer and basal lip it is a trifle narrower

than on the rest of the aperture; the outer peristome is marked by slender concentric lamellae. Operculum as described for the species.

The type, U.S.N.M. No. 314957, was collected by Mrs. Reed on Loma de Borje, Sierra de Cubitas Mountains, Camagüey Province. It has a little over 4 whorls and measures: Length, 13.8 mm.; greater diameter, 7.9 mm.; lesser diameter, 6.5 mm.

Bartsch also collected this species at Loma La Caridad de Mendoza and Loma de Santa Cruz, near the Central Senado.

The strong auricle and the more rounded whorls will readily distinguish this species from *Opisthocoelicum* (*Opisthocoelops*) *excurrens* ([Gundlach] Pfeiffer).

**OPISTHOCOELICUM (OPISTHOCOELOPS) EXCURRENS** ([Gundlach] Pfeiffer)

PLATE 9, FIGURE 1

1860. *Cyclostoma* (*Tudora*) *excurrens* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 7, p. 29.  
 1861. *Tudora excurrens* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.  
 1890. *Cyclostoma excurrens* CROSSE, Journ. Conchyl., vol. 38, p. 301.  
 1920. *Opisthosiphon* (*Opisthosiphona*) *excurrens* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67.

Shell elongate-conic, pale brown with interrupted spiral bands of chestnut-brown; the elements composing these bands are arranged in both axial and spiral series; interior of the aperture yellowish white, conspicuously rayed by the spiral bands, which also extend faintly upon the yellowish-white outer peristome of the outer lip. Nuclear whorls decollated in all our specimens. Postnuclear whorls almost flattened, marked by slender, somewhat retractively slanting axial riblets, which are distantly spaced on the first of the remaining turns, and which gradually become more closely spaced, until on the last whorl they are separated by spaces which are mere impressed lines. Of these riblets, 38 occur upon the first of the remaining turns, 70 upon the second, 136 upon the third, and 164 upon the last. Some of the riblets extend very prominently to the summit, where some become fused to form tufts or hollow cusps, which are appressed to the expanded basal peripheral portion of the ribs of the preceding turn; some of the riblets do not become expanded, and these usually terminate at some little distance anterior to the stronger expanded ones. On the penultimate turn the axial ribs become conspicuously expanded at the periphery. Suture not very strongly contracted. Periphery moderately rounded. Base rather long, moderately rounded, marked by the continuation of the axial ribs and by 2 strong spiral cords immediately adjacent to the umbilicus, and by 3 others, a little weaker, between the outer of the spiral cords and the periphery. The aperture

is broadly oval; peristome double, the outer broadly expanded, a little more so on the inner lip than on the outer, widest at the umbilicus, over which it is reflected and broadly expanded on the parietal wall, where it is adnate to the preceding turn; an inconspicuous auricle at the posterior angle is made irregular by the siphon, which is reflected backward, and which is appressed to the suture; the inner peristome is slightly exerted and slightly expanded. Operculum paucispiral, with the nucleus halfway between submarginal and subcentral; the turns are marked by retractively slanting, slender lamellae, which are fused on the outer border as well as on the inner one.

The specimen described and figured, U.S.N.M. No. 355467, is one of three received from Poey, collected by Gundlach at Nuevitas. It has a little over 4 whorls and measures: Length, 13.6 mm.; greater diameter, 7.2 mm.; lesser diameter, 5.8 mm.

The much flatter whorls and the weak auriculation at the posterior angle of the aperture will readily distinguish this from *Opisthocoelicum* (*Opisthocoelops*) *occultum* (Torre and Henderson).

#### OPISTHOCOELICUM, new subgenus

This subgenus is distinguished from the subgenus *Opisthocoelex* by having the inner peristome scarcely at all exerted and by having the operculum withdrawable into the aperture, with the lamellae distinct. The umbilicus in adult shells is closed by the reflection of the outer peristome of the inner lip. When the operculum closes the shell, breathing may be accomplished through the puncture at the posterior angle of the aperture, which communicates with the hollow siphon, and which in turn bends into the suture, where it connects with a small channel behind the expanded outer peristome of the parietal wall, which leads to the umbilicus; the hollow axis and the narrow opening at the decollated apex furnish contact with the exterior.

Type: *Opisthocoelicum* (*Opisthocoelicum*) *opisthocoele*, new species.

#### KEY TO THE SPECIES OF THE SUBGENUS OPISTHOCOELICUM

Axial ribs closely spaced..... **opisthocoele**  
 Axial distantly spaced..... **lamellicostatum**

#### OPISTHOCOELICUM (OPISTHOCOELICUM) OPISTHOCOELE, new species

#### PLATE 9, FIGURE 8

Shell moderately large, ovate-conic, ranging from white to pale wax yellow. Nuclear whorls 2, decidedly inflated, strongly rounded, microscopically granulose, forming an almost truncated mammillated apex. Postnuclear whorls well rounded, the early ones marked by rather distantly spaced, lamellar axial riblets, which become expanded at the summit and suture; where summit and suture meet the riblets

interdigitate. These riblets are less elevated on the later turns; they are more distantly spaced on the early turns, and they become increasingly more approximated. Thirty-three are present on the first of the remaining turns, 44 on the second, 69 on the third, 103 on the fourth, and 102 on the last. The early whorls show by their slight waviness and scalloping indications of spiral sculpture, which evanesces on the later turns. Suture moderately constricted. Periphery well rounded. Base rather long, well rounded, and marked by the continuation of the axial riblets and by 4 spiral cords, which are of equal strength and spacing. The third of these marks the periphery of the closed umbilicus, while the last one is on the umbilical wall. These spiral cords render the axial riblets crenulated at their junction. Aperture broadly ovate; peristome double, the outer flaringly expanded, pinched in on the columellar wall to close the umbilicus, and narrower on the parietal wall than on the rest of the peristome; the inner slightly exerted, slightly reflected and appressed to the outer. The siphon and operculum of this species are described under the genus.

The type, U.S.N.M. No. 535480, was collected by Torre at El Purio, Encrucijada, Santa Clara Province. It has 5 whorls remaining and measures: Length, 12 mm.; greater diameter, 15.7 mm.; lesser diameter, 5.1 mm.

A young, half-grown specimen shows a wide-open umbilicus.

This species is rather widely distributed in Santa Clara Province. In addition to the type locality and the regions adjacent to this, we have seen it from Loma Batey del Ingenio Santa Clara, near Calabazar; Cueva Galana, Finca Miradero, Loma Ortiz, La Viruela; La Sierra, Loma Sola, Potrero Penton, Loma Chicharron near Vega Alta, and Las Jumaguas near Sagua.

Description of the animal of specimens collected by Bartsch at Potrero Penton is as follows: The upper portion flesh colored, with many fine dots of gray, with a pinkish area behind the tentacles, which are grayish flesh colored tipped with pale lemon yellow; the sides of the body are pale olivaceous, which is also the color of the tip of the snout and of the deeply cleft sole of the foot. The animal moves either with a direct motion or with a lateral jerk of the shell.

**OPISTHOCOELICUM (OPISTHOCOELICUM) LAMELLICOSTATUM (Torre and Henderson)**

Shell elongate-ovate, ranging in color from pale yellow to pale brown. Nuclear whorls 2, well rounded, microscopically granulose, forming a somewhat truncated apex. Postnuclear whorls inflated, strongly rounded, marked by lamellar or sublamellar axial ribs, which are slightly or decidedly fluted. This fluting is best expressed on the early whorls. The ribs become expanded at the summit into conspicuous auriclelike denticles, which usually touch the axial ribs of the preceding turn. The intercostal spaces are much wider than

the ribs and they are marked by microscopic axial threads; no spiral threads are present on the spire. Suture strongly constricted. Periphery somewhat inflated, well rounded. Base moderately long, well rounded, marked by the continuation of the axial ribs, which extend to the plugged umbilicus. Outside of the umbilical closure there are 3 or 4 spiral cords, which render the axial ribs decidedly scalloped at their junction. Aperture very broadly oval, almost subcircular; peristome double, the inner somewhat exerted, not reflected; the outer broadly expanded and marked by concentric lamellae, deeply notched on the inner lip, posterior to which it is reflected into the umbilicus, which it plugs. Operculum and siphon typically opisthocolid.

We are recognizing two subspecies, which the following key and descriptions will differentiate:

KEY TO THE SUBSPECIES OF OPISTHOCOELICUM (OPISTHOCOELICUM) LAMELLICOSTATUM

Axial ribs decidedly lamellar and decidedly scalloped..... *mabuyense*  
 Axial ribs not decidedly lamellar or decidedly scalloped..... *lamellicostatum*

OPISTHOCOELICUM (OPISTHOCOELICUM) LAMELLICOSTATUM MABUYENSE, new subspecies

PLATE 9, FIGURE 6

This race comes from Mabuya, near Florencia, Camagüey Province. It differs from typical *O. (O.) lamellicostatum lamellicostatum* in being of much darker color and in having the axial ribs decidedly lamellar and decidedly scalloped.

The type, U.S.N.M. No. 535481, has 24 axial ribs on the first of the remaining turns and 34 on the last; it has 4.2 whorls remaining and measures: Length, 11.2 mm.; greater diameter, 6.6 mm.; lesser diameter, 5.0 mm.

OPISTHOCOELICUM (OPISTHOCOELICUM) LAMELLICOSTATUM LAMELLICOSTATUM (Torre and Henderson)

PLATE 9, FIGURE 5

1921. *Opisthosiphon (Opisthosiphon) lamellicostatum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, pp. 263-264, pl. 42, figs. 6, 7.

This, the typical race, was collected by Torre at Boqueron del Jatibonico on the boundary of Santa Clara Province. It is easily distinguished from the other subspecies by its less strongly developed axial ribs, which are also much less scalloped.

The type, U.S.N.M. No. 314963, has 25 axial ribs on the first of the remaining turns and 65 on the last; it has 4.2 whorls remaining and measures: Length, 12.0 mm.; greater diameter, 7.0 mm.; lesser diameter, 5.5 mm.

Genus **TORRELLA** Henderson and Bartsch

1920. *Torrella* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

Shell elongate-conic, marked by sublamellar axial riblets only on the spire, or by sublamellar axial riblets and by obsolete spiral threads. The umbilicus may be marked by weak or strong spiral cords. Peristome double, the outer expanded, simple or fimbriated. Breathing siphons almost straight or decidedly flexed and bent into the umbilicus. Operculum with the ribs occupying only a portion of each whorl and as high as the inner and outer lamellae, which are formed by the fusing of the ribs.

Type: *Torrella (Torrella) torreiana* ([Gundlach] Arango).

## KEY TO THE SUBGENERA OF TORRELLA

Siphon bending into the umbilicus and plugging the hollow axis..... **Torrella**  
 Siphon not bending into the umbilicus or plugging the hollow axis.. **Torrellisca**

Subgenus **TORRELLA** Henderson and Bartsch

1920. *Torrella* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

Shell elongate-conic, marked by slender, sublamellar axial ribs and by obsolete spiral cords. The latter render the ribs somewhat sinuous and slightly foliate at their junction. Umbilicus marked by strong spiral cords. Outer peristome expanded and fimbriated at the edge. Breathing siphon strongly flexed and bent into the umbilicus, which it completely closes. Breathing, when the animal is withdrawn, is effected through the hollow axis of the shell and through the decollated apex. Operculum typically torrellid.

Type: *Torrella (Torrella) torreiana* ([Gundlach] Arango).

## KEY TO THE SPECIES OF THE SUBGENUS TORRELLA

Fimbriations of the outer peristome pronounced.

Inner lip of outer peristome decidedly fimbriated..... **torreiana**  
 Inner lip of outer peristome not decidedly fimbriated..... **deficiens**  
 Fimbriations of outer peristome scarcely indicated..... **immersa**

**TORRELLA (TORRELLA) TORREIANA** ([Gundlach] Arango)

## PLATE 10, FIGURE 1

1878. *Ctenopoma torreianum* [Gundlach] ARANGO, Contribucion a la fauna malacologica Cubana, p. 18.

1920. *Torrella (Torrella) torreiana* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

Shell elongate-conic, milk white. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, marked by very strongly developed, lamellose, slightly retractively slanting,

hollow axial ribs, of which 48 occur on the first, 64 on the second, and 78 on the last of the remaining turns in the cotype described and figured. Most of these axial riblets become expanded into broad auricles at the summit, although occasionally they do not. The spiral sculpture consists of slender threads, of which 7 are present on all the whorls. The spiral threads at their junction with the axial ribs render the latter decidedly wavy and frequently hispid. Suture strongly constricted. The sutural space is crossed by the auricles of the expanded ribs, which become attached to the preceding turn. Base short, broadly rounded, widely umbilicated, marked by the continuation of the axial ribs and by about 7 spiral threads. These threads are much stronger at the outer edge of the umbilicus than they are within the umbilicus or posterior to it. At the umbilical angle they render the axial riblets decidedly scalloped. Last whorl solute for about one-third of a turn. Aperture broadly oval; peristome double, the outer moderately broadly expanded and strongly digitate; 9 digitations about as wide as the spaces that separate them are present on the outer and basal lip; on the inner lip 4 weaker digitations are present, while on the parietal wall they are absent. These digitations show concentric laminae; inner peristome slightly exerted. Operculum typically torrellid. The breathing siphon begins immediately behind the peristome at the posterior angle of the aperture and it is reflected as a slender, twisted, corrugated tube into the umbilicus, which it completely plugs.

A cotype received from Dr. de la Torre, U.S.N.M. No. 355529, comes from El Mogote, near Ceiba Mocha, Matanzas Province. It has 3.5 whorls remaining and measures: Length, 8.0 mm.; greater diameter, 4.8 mm.; lesser diameter, 3.9 mm.

This species can easily be distinguished from the others by the extremely strong digitations of the outer peristome.

**TORRELLA (TORRELLA) DEFICIENS** ([Gundlach] Pfeiffer)

PLATE 10, FIGURE 4

1857. *Cyclostoma deficiens* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 4, p. 42.  
 1858. *Ctenopoma deficiens* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 1, p. 104.  
 1920. *Torrella (Torrella) deficiens* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

Shell elongate-conic, flesh colored. Nuclear whorls 2, strongly inflated, well rounded, microscopically granulose, forming a mammillated apex. Postnuclear whorls inflated, strongly rounded, marked by almost vertical, slender, hollow, retractively curved axial ribs, of which 61 occur upon the first of the remaining turns in the cotype

figured, 102 on the second, and 104 on the last. These ribs are expanded into auricles at the summit. The spiral sculpture consists of slender threads, of which 5 occur on the first and second of the remaining turns, and 6 on the last between the summit and periphery. Suture strongly constricted, bridged over by the auricles of the ribs. Periphery well rounded. Base short, inflated, well rounded, widely umbilicated, marked by the strong continuation of the axial ribs and by spiral threads, of which 5 are present between the periphery and the edge of the umbilicus, and 3 within the umbilicus; those at the edge of the umbilicus are much stronger than the rest and they render the riblets scalloped at the edge. Last whorl solute for about one-third of a turn. Aperture broadly oval; peristome double, the inner moderately exerted and slightly expanded; the outer moderately broadly expanded, strongly fluted at the junction of the inner and basal angle, and less so on the outer and inner lips, marked by concentric laminae. Operculum typically torrellid. The breathing siphon has its origin immediately behind the peristome and it is reflected into the umbilicus as a slightly twisted, tapering tube, which completely plugs the umbilicus.

The specimen described and figured, U.S.N.M. No. 535529, a cotype received from Gundlach, comes from Dos Cecilias, near Coliseo, Matanzas Province. It has almost 4 whorls remaining and measures: Length, 8.0 mm.; greater diameter, 4.9 mm.; lesser diameter, 4.3 mm.

Gundlach states (Malak. Blätter, vol. 4, p. 42, 1857) that the "animal is whitish, head and neck with reddish sheen. Tips of tentacles somewhat greyish."

The species appears to range through the many limestone hills surrounding the region of Coliseo.

**TORRELLA (TORRELLA) IMMERSA** (Gundlach) Pfeiffer

Shell elongate-conic, flesh colored, with or without a brownish tinge. Nuclear whorls 2, inflated, well rounded, microscopically granulose, forming a mammillated apex. Postnuclear whorls strongly inflated, strongly rounded, marked by slender, low, lamellar, hollow axial ribs, which are slightly retractively curved. These ribs are feebly expanded into auricles at the summit. The spiral sculpture consists of feeble threads. Suture very strongly constricted, rendered all the more conspicuous because of the feeble development of the auricles at the summit of the ribs. Periphery strongly rounded. Base short, inflated, broadly umbilicated, well rounded, marked by the continuation of the axial ribs and by rather feeble spiral threads. Last whorl solute for about one-third of a turn. Aperture broadly oval; peristome double, the inner moderately exerted; the outer only

moderately broadly expanded, slightly reflected, and feebly digitated at the outer margin, marked by concentric lines of growth. The operculum is typically torrellid; it has the center depressed, this depression being responsible for the specific name. The breathing siphon begins immediately behind the peristome at the posterior angle of the aperture and it is reflected as a tapering corrugated tube into the umbilicus, which it completely plugs.

The species ranges through northeastern Habana and northwestern Matanzas Provinces. We are recognizing three subspecies, which the following key defines:

KEY TO THE SUBSPECIES OF TORRELLA (TORRELLA) IMMERSA

Fluting of outer peristome rather strong.

Axial ribs gathered into series at the summit..... **camaronensis**

Axial ribs not gathered into series at the summit..... **immersa**

Fluting of outer peristome not strong..... **grillensis**

TORRELLA (TORRELLA) IMMERSA CAMARONENSIS, new subspecies

PLATE 10, FIGURE 3

This race comes from various places in the Sierra Camarones, Matanzas Province. It differs from typical *T. (T.) immersa immersa* in having the axial ribs much more strongly developed at the summit and gathered into series; that is, stronger ribs are separated by narrow spaces occupied by less strongly developed elements. It agrees with *T. (T.) immersa immersa* in having the outer peristome rather strongly fluted, in which respect it differs from *T. (T.) immersa grillensis*.

The type, U.S.N.M. No. 535532, comes from Vista Larga farm, 2 km. west of La Peña del Leon, Sierra de Camarones. It has 4.4 whorls remaining, which bear, respectively, 74 axial ribs on the first whorl, 85 on the second, 110 on the third, and 112 on the last. It measures: Length, 8.8 mm.; greater diameter, 4.5 mm.; lesser diameter, 4.0 mm.

TORRELLA (TORRELLA) IMMERSA IMMERSA ([Gundlach] Pfeiffer)

PLATE 10, FIGURE 2

1857. *Cyclostoma immersum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 4, p. 42.

1858. *Ctenopoma immersum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 1, p. 104.

1920. *Torrella (Torrella) immersa* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

This subspecies was first described by Gundlach from Loma de Simpson, which is at the entrance to the Yumuri Valley. We have it also from the Yumuri Valley, Vista Alegre, and from Pan y Palenque, and

near Ceiba Mocha. This subspecies, like *T. (T.) immersa camaronensis*, has the outer peristome rather strongly fluted, but it differs from *camaronensis* in having the axial ribs not gathered into series.

The specimen described and figured, U.S.N.M. No. 535534, was collected at the type locality. It has a little more than 4 whorls remaining, of which the first has 51 axial ribs, the second 88, the third 90, and the fourth 86. It measures: Length, 9.2 mm.; greater diameter, 4.3 mm.; lesser diameter, 4.0 mm.

**TORRELLA (TORRELLA) IMMERSA GRILLENIS, new subspecies**

PLATE 10, FIGURE 5

We have seen this subspecies from Madruga, Finca El Inglés, Sierra del Grillo, and from Sabana de Robles. It is easily distinguished from the other two subspecies by having the fluting of the outer peristome almost absent.

The type, U.S.N.M. No. 355623, comes from Madruga. It has 4.2 whorls remaining, which bear, respectively, 102 axial ribs on the first whorl, 126 on the second, and 130 on the last. It measures: Length, 8.2 mm.; greater diameter, 4.3 mm.; lesser diameter, 3.7 mm.

**Subgenus TORRELLISCA Henderson and Bartsch**

1920. *Torrellisca* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, pp. 69-70.

Shell elongate-conic, marked only by slender sublamellar axial riblets on the spire. Umbilicus marked by weak spiral cords. Peristome expanded but not fimbriated. Breathing siphon a simple tube but slightly bent, opening on the outside. Operculum typically torrellid.

Type: *Torrella (Torrellisca) simpsoni* Henderson and Bartsch.

**KEY TO THE SPECIES OF THE SUBGENUS TORRELLISCA**

Inner lip of outer peristome very broadly expanded..... *trinidadiansis*  
 Inner lip of outer peristome not very broadly expanded..... *simpsoni*

**TORRELLA (TORRELLISCA) SIMPSONI Henderson and Bartsch**

Shell elongate-conic, white. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly inflated, well rounded, marked by strongly raised, lamellar, rather distantly spaced axial riblets, which become slightly expanded at the summit into slender auricles. The spiral sculpture consists of obsolete threads, which at the most render the riblets slightly wavy. Suture strongly constricted. Periphery well rounded. Base short, well rounded, openly, narrowly umbilicated, marked by the continuation of the axial riblets and by spiral threads, the latter much stronger than those on the spire.

Last whorl solute for almost half a turn. Aperture very broadly oval; peristome double, the inner slightly exerted; the outer rendered irregular at the posterior angle by the breathing siphon, narrowly expanded, usually fluted at the junction of the inner and basal lip, and marked by concentric laminae. Operculum typical of *Torrella*. The breathing siphon consists of a curved, short tube, which has its origin immediately behind the peristome at the posterior angle of the aperture, and which is open at the inbent terminal.

This species appears to be confined to Santa Clara Province, where two subspecies are present. These can be distinguished readily by the following key and descriptions:

KEY TO THE SUBSPECIES OF *TORRELLA (TORRELLISCA) SIMPSONI*

Axial ribs distantly spaced..... **terneroensis**  
 Axial ribs not distantly spaced..... **simpsoni**

*TORRELLA (TORRELLISCA) SIMPSONI TERNEROENSIS*, new subspecies

PLATE 10, FIGURE 7

This race was collected by Henderson at Loma del Ternero, 6 or 8 miles north of Manicaragua, Santa Clara Province. He collected it also at Hoyo de Manicaragua. It is distinguished readily from typical *T. (T.) simpsoni simpsoni* by having the axial ribs much more distantly spaced.

The type, U.S.N.M. No. 355540, has 3.8 whorls remaining, of which the first and second have 32 and the last 43 axial ribs. It measures: Length, 6.5 mm.; greater diameter, 3.5 mm.; lesser diameter, 3.0 mm.

*TORRELLA (TORRELLISCA) SIMPSONI SIMPSONI* Henderson and Bartsch

PLATE 10, FIGURE 6

1920. *Torrella (Torrellisca) simpsoni* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, pp. 80-81.

This subspecies comes from the Soledad plantation, near Cienfuegos, Santa Clara Province. It is distinguished readily from *T. (T.) simpsoni terneroensis* by the fact that the axial ribs are much more closely spaced.

The type, U.S.N.M. No. 314942, has a little more than 4 whorls remaining, of which the first bears 46 axial riblets, the second 60, the third 82, and the last 100. The type measures: Length, 7.4 mm.; greater diameter, 3.7 mm.; lesser diameter, 3.3 mm.

*TORRELLA (TORRELLISCA) TRINIDADENSIS*, new species

PLATE 10, FIGURE 8

Shell elongate-conic, flesh colored. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly rounded and crossed

by lamellar axial riblets, which vary materially in strength; usually a group of several weak elements is succeeded by a strong one. The stronger ribs become expanded at the summit into auricles. The axial riblets are decidedly wavy, which would indicate spiral threads, but these are not apparent in the intercostal spaces. Of these ribs 36 occur on the first whorl, 48 on the second, 83 on the third, and 96 on the last. Suture strongly constricted. Periphery strongly rounded. Base moderately long, strongly rounded, marked by the continuation of the axial ribs, and within the umbilicus by spiral cords, which render the axial ribs decidedly scalloped at their junctions. The base is narrowly, openly umbilicated. The last whorl is solute for about one-tenth of a turn. Aperture subcircular; peristome double, the inner very slightly exerted; the outer very broadly expanded on the parietal and inner lip, less so on the outer lip and narrowest on the basal lip, marked by concentric lamellae. Operculum typically torrellid. The siphon is at the posterior angle of the aperture, short, and flexed into the suture, where it is marked by a series of rings.

The type, U.S.N.M. No. 535536, comes from Magua, Trinidad, Santa Clara Province. It has 4.1 whorls remaining and measures: Length, 7.0 mm.; greater diameter, 3.6 mm.; lesser diameter, 3.3 mm.

This species is readily distinguished from *T. (T.) simpsoni* by the broadly expanded inner lip of the outer peristome.

#### Genus RHYTIDOPOMA Sykes

1901. *Rhytidopoma* SYKES, Journ. Malac., vol. 8, p. 60.

Shell elongate-conic, axial riblets and spiral threads present in all the known species; the axial sculpture is usually stronger than the spiral. A recurved breathing siphon is present a little behind the peristome at the junction of the parietal and the outer wall. Operculum with the ribs not completely covering the whorls, thus showing the basal chondroid plate in a narrow sinus, which marks the outer edge of the turns. Both the inner and outer ends of the retractively curved ribs are fused into lamellae, which are considerably higher than the ribs, which extend in a gentle, retractive curve between the lamellae.

Type: *Rhytidopoma rugulosum* (Pfeiffer).

#### KEY TO THE SPECIES OF THE GENUS RHYTIDOPOMA

Umbilicus closed by the reflected peristome.....	<b>honestum</b>
Umbilicus not closed by the reflected peristome.	
Last whorl adnate.	
Outer peristome fluted.....	<b>coronatum</b>
Outer peristome not fluted.....	<b>nodulatum</b>

Last whorl solute.

Outer peristome expanded.

Outer peristome of inner lip very broad.

Axial ribs sublamellar.

Whorls decidedly inflated..... *occidentale*

Whorls not decidedly inflated..... *rugulosum*

Axial ribs not sublamellar..... *wrightianum*

Outer peristome of inner lip not very broad.

Outer peristome fluted..... *pinense*

Outer peristome not fluted..... *clathratum*

Outer peristome very narrow..... *hespericum*

**RHYTIDOPOMA HONESTUM (Poey)**

Shell elongate-conic, white. Nuclear whorls 2, large, strongly inflated and rounded, microscopically granulose, forming a mammillated apex. Postnuclear whorls well rounded, marked by slender, retractively curved axial ribs, which are expanded into hollow auricles at the summit and which are appressed to the preceding turn. The spiral sculpture is very poorly developed. Suture strongly constricted. Periphery well rounded. Base well rounded, marked by the continuation of the axial ribs and usually by strong spiral threads. Aperture broadly oval; peristome double, the inner slightly exerted, the outer moderately expanded, marked by concentric lines of growth, notched on the middle of the inner lip, the part posterior to the notch reflected over the umbilicus, which it covers. Operculum typically rhytidopomid. The breathing siphon is close to the posterior angle of the aperture behind the peristome, which it renders irregular at this point; it is reflected backward into the suture.

This species appears restricted to Habana Province. We are recognizing three subspecies:

KEY TO THE SUBSPECIES OF RHYTIDOPOMA HONESTUM

Axial ribs rather strong..... *itinerans*

Axial ribs weak.

Axial ribs closely spaced..... *honestum*

Axial ribs not closely spaced..... *nodiferum*

**RHYTIDOPOMA HONESTUM ITINERANS, new subspecies**

PLATE 10, FIGURE 10

This subspecies we collected along stone fences near Guanajay. It differs from the other two subspecies in having the axial ribs much more strongly developed.

The type, U.S.N.M. No. 493413, has 40 axial ribs on the first of the remaining turns and 50 on the last whorl; it has 3.7 whorls remaining and measures: Length, 7.8 mm.; greater diameter, 4.0 mm.; lesser diameter, 3.2 mm.

## RHYTIDOPOMA HONESTUM HONESTUM (Poey)

## PLATE 10, FIGURE 13

1851. *Cyclostoma honestum* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 1, p. 103, pl. 7, figs. 1-4.  
 1856. *Ctenopoma honestum* PFEIFFER, Malakozool. Blätter, vol. 3, p. 126.  
 1920. *Rhytidopoma honestum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

This subspecies ranges from Habana to Lomas de Camoa, in Habana Province. It is distinguished from the others in being larger, with the ribs more closely spaced.

The specimen figured, U.S.N.M. No. 57312, was received from Arango. It has 52 axial ribs on the first of the remaining turns and 180 on the last; it has a little more than 4 whorls remaining and measures: Length, 9.4 mm.; greater diameter, 4.8 mm.; lesser diameter, 4.0 mm.

Of the animal of this species Gundlach states: "Animal pale, the sides with a violet sheen; antennae pale orange colored; eyes very black."

## RHYTIDOPOMA HONESTUM NODIFERUM (Arango)

## PLATE 10, FIGURE 11

1881. *Ctenopoma nodiferum* ARANGO, Proc. Acad. Nat. Sci. Philadelphia, p. 16.  
 1920. *Rhytidopoma nodiferum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

This subspecies was described by Arango from Santo Cristo de la Salud, Habana Province. We have also seen it from Managua and Bejucal, Habana Province. It is smaller than the typical race, with the axial ribs much more distantly spaced, but weakly developed as in the typical form.

The specimen figured, U.S.N.M. No. 355567, was received by Dr. de la Torre from Arango. It has 60 axial ribs on the first of the remaining turns and 86 on the last; it has a little more than 3 whorls remaining and measures: Length, 6.7 mm.; greater diameter, 3.8 mm.; lesser diameter, 3.1 mm.

## RHYTIDOPOMA CORONATUM ([Poey] Pfeiffer)

## PLATE 10, FIGURE 14

1856. *Ctenopoma coronatum* [Poey] PFEIFFER, Malakozool. Blätter, vol. 3, pp. 59, 126.  
 1857. *Ctenopoma coronatum* PFEIFFER, Novitates conchologicae, vol. 1, p. 96, pl. 26, figs. 17-19.  
 1858. *Cyclostoma coronatum* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 2, pp. 5, 24, pl. 1, figs. 11, 12.  
 1920. *Rhytidopoma coronatum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

Shell elongate-conic, white. Nuclear whorls decollated. Post-nuclear whorls inflated, well rounded, marked by slightly retractively curved, lamellar, wavy, hollow axial riblets, which are developed into auricles at the summit and into projections that are slightly less pronounced at the periphery. Of these riblets 78 occur upon the first, 104 upon the second, and 108 upon the last of the remaining turns. The spiral sculpture is obsolete on the spire, or it is at least only indicated by the waviness of the axial riblets. Suture strongly constricted. Periphery well rounded. Base short, inflated, well rounded, narrowly, apparently openly umbilicated, although the umbilicus is partly hidden by the reflected outer peristome, marked by the continuation of the axial riblets and 5 moderately strong threads slightly posterior to the umbilical angle. The thread bordering the umbilicus is much stronger than the rest and causes the riblets to expand at that point into strongly raised, clawlike elements; within the umbilicus additional spiral cords also forming scallops are present. These, however, are too much hidden to reveal their actual number. Aperture almost subcircular; peristome double, the outer broadly expanded, more so on the parietal and the inner lip than on the basal and the outer lip, decidedly fluted at the edge and marked by concentric lines of growth; on the parietal wall it becomes attached to the preceding turn; inner peristome slightly exerted. Operculum typically rhytidopomid. The last whorl is adnate. The breathing siphon originates at the posterior angle immediately behind the peristome and is wedged into a chink formed between the preceding turn and the parietal wall, but it does not extend into or plug the umbilicus.

The specimen figured, U.S.N.M. No. 355542, is a cotype collected by Poey at Managua, Potrero Almirante, Habana Province. It has a little over 3 whorls remaining and measures: Length, 8.0 mm.; greater diameter, 4.3 mm.; lesser diameter, 3.6 mm.

Of this Gundlach says (Malakozool. Blätter, vol. 3, p. 126, 1856): "Animal whitish, particularly on the foot. Head and neck suffused with clay yellow. Antennae almost translucent. The region between the antennae, the neck and about the operculum greyish in the extended animal. Animal within the shell clay-yellowish white, brownish at the tip. It covers the shell almost horizontally and moves with alternating wave motion."

#### RHYTIDOPOMA NODULATUM (Poey)

Shell elongate-conic, flesh colored or pale yellowish. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming a very large mammillated apex, which projects conspicuously beyond the outline of the rest of the spire. Postnuclear whorls inflated or at least moderately rounded, marked by retractively slanting axial ribs, which vary considerably in strength and elevation. The axial ribs

are not all of the same strength; that is, some of them are more elevated than others. Some of these ribs develop conspicuous auricles at the summit, which are usually hollow. The spiral sculpture is poorly developed and is merely indicated by the waviness of the axial riblets in some of the forms, while in others it is more strongly developed. Suture strongly constricted. Periphery well rounded. Base short, inflated, well rounded, narrowly umbilicated, the umbilicus usually hidden by the reflected inner peristome of the parietal wall. The base is marked by the continuation of the axial riblets and spiral threads, which vary in strength and number in the different races. Aperture broadly oval; peristome double, the inner slightly exerted; the outer broadly expanded, usually more so on the parietal and the inner lip than on the outer, and marked by concentric lines of growth; the inner peristome is slightly exerted. Operculum typically rhytidopomid. The breathing siphon begins behind the edge of the posterior angle of the aperture and is reflected backward into the suture.

This species ranges over Habana and Matanzas Provinces and breaks up into several races, which the following key and descriptions will help to distinguish:

## KEY TO THE SUBSPECIES OF RHYTIDOPOMA NODULATUM

Outer peristome fluted on the posterior inner lip.....	<b>palenquense</b>
Outer peristome not fluted on the posterior inner lip.	
Whorls inflated and strongly rounded.....	<b>nodulatum</b>
Whorls not inflated or strongly rounded.....	<b>anafense</b>

## RHYTIDOPOMA NODULATUM PALENQUENSE, new subspecies

## PLATE 10, FIGURE 15

This subspecies centers about Matanzas, El Pan, El Palenque, the Yumuri Valley, etc. It can be distinguished readily from the other two races in that the outer peristome of the inner lip is fluted.

The type, U.S.N.M. No. 355548, comes from El Palenque. It has 46 axial ribs on the first of the remaining turns, 70 on the second, 96 on the third, and 112 upon the last. It has a little more than 4 whorls remaining and measures: Length, 7.9 mm.; greater diameter, 3.8 mm.; lesser diameter, 3.3 mm.

## RHYTIDOPOMA NODULATUM NODULATUM (Poey)

## PLATE 10, FIGURE 12

1851. *Cyclostoma nodulatum* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 1, pl. 5, figs. 21-23.
1852. *Cyclostoma nodulatum* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 1, p. 104.
1858. *Ctenopoma rugulosum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 1, p. 103, in part.
1920. *Rhytidopoma nodulatum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

This race occupies the limestone blocks south of Habana, in Habana Province. We have seen it from Cueva de Cotilla, Lomas de Candela, Loma de Coca, San José de las Lajas; Tetas de Managua, Tapaste; Mendoza, Sitio de Bonilla and Sitio Perdido, near Jarueco; San Antonio de los Baños; and Bacuranao and Guanabo east of Cojimar; all in Habana Province. This subspecies differs from *R. nodulatum palenquense* in lacking the fluting of the inner lip. It differs from *R. nodulatum anafense* in having the whorls much more inflated and more rounded, and in having the axial ribs less strong.

The specimen figured, U.S.N.M. No. 355561, comes from Tetas de Managua, Habana Province. It has 78 axial ribs on all the turns. It has 3.5 whorls remaining and measures: Length, 7.3 mm.; greater diameter, 4.0 mm.; lesser diameter, 3.3 mm.

**RHYTIDOPOMA NODULATUM ANAFENSE, new subspecies**

PLATE 10, FIGURE 9

This race comes from the Sierra de Anafe, Habana Province. We have also taken it at Guanajay, Pinar del Rio Province, and Cayajabos, Finca de Francisco Martinez, Pinar del Rio Province. It differs from the typical race in having the whorls larger but less inflated and less rounded, and in having the axial sculpture stronger.

The type, U.S.N.M. No. 355559, has 49 axial ribs on the first of the remaining whorls and 72 on the last turn; it has 3.2 whorls remaining and measures: Length, 7.5 mm.; greater diameter, 4.1 mm.; lesser diameter, 3.5 mm.

**RHYTIDOPOMA OCCIDENTALE, new species**

PLATE 10, FIGURE 16

1878. *Ctenopoma rugulosum* ARANGO, Contribucion a la fauna malacologica Cubana, pp. 15-16, in part.

1890. *Ctenopoma rugulosum* CROSSE, Journ. Conchyl., vol. 38, p. 276, in part.

Shell broadly elongate-conic, flesh colored; the plug at the decollated end shines through the substance of the shell as a reddish line. Nuclear whorls about 2, forming a slightly mammillated apex, strongly rounded, microscopically granulose, with the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls slightly inflated, well rounded, marked by rather distantly spaced, slightly retractively slanting axial riblets which become irregularly expanded at the summit. In the type 62 of these riblets occur upon the first turn, 88 upon the second, and 93 upon the last. The spiral sculpture is obsolete on the spire, only the merest indication of it being present. Suture strongly constricted. Periphery well rounded. Base short, inflated, well rounded, and marked by the continuation of the axial riblets and by 11 feeble spiral threads on the

base and in the umbilicus. Last whorl solute for about half a turn. Aperture broadly ovate; peristome double, the inner moderately well exerted and slightly reflected; the outer broadly, flaringly expanded, somewhat wavy, marked by concentric, feeble lamellae. Operculum typically rhytidopomid. The breathing siphon begins immediately behind the peristome at the posterior angle of the aperture and is reflected as a tapering tube into the umbilicus, which it plugs; the outside of the breathing siphon is marked by strong, coarse spiral rings.

The type, U.S.N.M. No. 355604, was collected near the lighthouse at the entrance to Cabañas Port, on the *Tomas Barrera* Expedition. It has a little over 3 whorls remaining and measures: Length, 8.2 mm.; greater diameter, 4.5 mm.; lesser diameter, 3.8 mm.

RHYTIDOPOMA RUGULOSUM (Pfeiffer)

PLATE 11, FIGURE 8

1839. *Cyclostoma rugulosum* PFEIFFER, Wieg. Archiv Naturg., vol. 1, p. 356.  
 1849. *Cyclostoma rugulosum* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, ed. 2, t. 14, p. 117, figs. 9–11; t. 38, figs. 11–12.  
 1858. *Ctenopoma rugulosum* PFEIFFER, Monographia pneunonopomorum viventium, suppl. 1, p. 103 in part.  
 1920. *Rhytidopoma rugulosum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

Shell elongate-conic, pale yellow. Nuclear whorls 2, moderately inflated, well rounded, microscopically granulose, forming a mammillated apex. Postnuclear whorls moderately strongly rounded, marked by slender, sublamellar, retractively slanting, axial riblets, which are rendered slightly scalloped by obsolete spiral threads, of which 4 are present between the summit and the periphery. The axial riblets are slightly expanded at the summit. At more or less regular intervals several finer axial threads occur, separating groups of the stronger lamellae, which give the sculpture a somewhat interrupted pattern. Of the axial ribs 51 occur on the first of the remaining turns and 96 on the last. Suture strongly constricted. Periphery well rounded. Base rather short, well rounded, marked by the continuation of the axial ribs, which extend into the umbilicus, and by a few obsolete spiral threads; edge of the umbilicus marked by a strong spiral ridge, which renders the axial ribs decidedly scalloped; there is another ridge, which is a little less strong, just within the umbilicus. The last whorl is decidedly solute and deflected. Aperture very broadly oval, almost subcircular; peristome double, the inner slightly exerted, the outer broadly expanded and turned up at the junction of the inner and basal lip, marked by concentric laminae, which are a little narrower on the parietal wall than on the rest. Operculum typically

rhytidopomid. The siphon starts immediately behind the peristome at the posterior angle of the aperture and it extends as a tapering tube into the umbilicus, plugging the hollow axis; it is marked by concentric ridges.

The specimen described and figured, U.S.N.M. No. 386615, is one of a large series collected by Bartsch on the shore of Canimar River at the type locality, Fundador, Matanzas Province. It has 4.2 whorls remaining and measures: Length, 8.4 mm.; greater diameter, 3.8 mm.; lesser diameter, 3.5 mm.

We have it also from the Yumurí Valley at Matanzas.

**RHYTIDOPOMA WRIGHTIANUM** ([Gundlach] Arango)

Shell broadly elongate-conic, flesh colored. Nuclear whorls about 2, forming a somewhat mammillated apex, the whorls of which are strongly rounded and microscopically granulose, with the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by lamellar or sublamellar axial riblets, which vary conspicuously in spacing and strength in the different races. These ribs are strongly expanded at the summit, where they frequently form conspicuous auricles, which, when broken, prove to be hollow. The spiral sculpture is very variable, ranging from obsolete to strongly lirate. Suture strongly constricted. Periphery well rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs and by feeble or rather strong spiral threads, depending again upon the race in question. The last whorl is always solute for about half a turn and is strongly deflected. Aperture broadly oval; peristome double, the inner moderately exerted and scarcely reflected; the outer expanded, the amount of expansion varying in the different subspecies. The breathing siphon has its beginning at the posterior angle behind the peristome, tapering and reflecting into the umbilicus, which it completely plugs; the breathing, therefore, when the operculum is closed, is effected through the pore marking the hollow axis of the shell at the decollated end. Operculum typically rhytidopomid.

This species ranges from Cape San Antonio at the western end of Pinar del Rio Province, eastward to Cayajabos, breaking up into a number of subspecies, which may be distinguished by the following key and descriptions:

KEY TO THE SUBSPECIES OF RHYTIDOPOMA WRIGHTIANUM

Outer peristome broadly expanded.....	<b>wrightianum</b>
Outer peristome not broadly expanded.	
Outer peristome moderately expanded.....	<b>ottonis</b>
Outer peristome very narrow.....	<b>cabrasense</b>

## RHYTIDOPOMA WRIGHTIANUM WRIGHTIANUM ((Gundlach) Arango)

## PLATE 11, FIGURE 1

1881. *Ctenopoma wrightianum* (Gundlach) ARANGO, Proc. Acad. Nat. Sci. Philadelphia, p. 16.

Typical *wrightianum* was described from La Jaula, Pinar del Rio Province. We have seen it also from Cape Cajón and Cape San Antonio, and Valle de San Juan, Guanacabibes, Pinar del Rio Province. Its broadly expanded peristome will readily distinguish it from the other two races.

The specimen figured, U.S.N.M. No. 11045, a cotype, was collected by Wright at La Jaula. It has 85 axial ribs on the first of the remaining turns and 86 on the last whorl; it has 3.8 whorls remaining and measures: Length, 10.7 mm.; greater diameter, 5.6 mm.; lesser diameter, 4.8 mm.

## RHYTIDOPOMA WRIGHTIANUM OTTONIS, new subspecies

## PLATE 11, FIGURE 5

This subspecies comes from the general region of Cayajabos, Pinar del Rio Province. We have representatives from the type locality, Mogote la Tumba and Charco Azul. This subspecies is distinguished readily from typical *R. wrightianum wrightianum* by its much narrower outer peristome, in which respect it stands halfway between the typical subspecies and *R. wrightianum cabrasense*.

The type, U.S.N.M. No. 493414, was collected by Bartsch on Mogote la Tumba. It has 68 axial ribs on the first of the remaining turns and 92 on the last. It has 3.4 whorls remaining and measures: Length, 8.1 mm.; greater diameter, 5.0 mm.; lesser diameter, 4.2 mm.

## RHYTIDOPOMA WRIGHTIANUM CABRASENSE, new subspecies

## PLATE 11, FIGURE 4

This subspecies comes from the mogotes that occur around Kilometer 14 on the highway leading from Pinar del Rio to Luis Lazo, Pinar del Rio Province. It is readily distinguished from the other two subspecies by its extremely narrow outer peristome.

The type, U.S.N.M. No. 355609, comes from the Mogote del Cero de Cabras. On the first of the remaining turns it has 84 axial ribs, 114 on the second and 120 on the last. It has a little more than 4 whorls remaining and measures: Length, 8.9 mm.; greater diameter, 5.0 mm.; lesser diameter, 4.4 mm.

## RHYTIDOPOMA PINENSE, new species

Shell elongate-ovate, thin, flesh colored. Nuclear whorls 2, small, inflated, well rounded, microscopically granulose. Postnuclear whorls slightly inflated, rather strongly rounded and marked

by low, lamellar, somewhat wavy, retractively slanting axial ribs, which increase in numbers on succeeding turns. These ribs become broadly expanded at the summit, where they form auricles which, when broken, prove to be hollow. The spiral sculpture consists of poorly developed threads, which render the riblets slightly wavy. Suture strongly constricted. Periphery somewhat inflated, well rounded. Base slightly inflated, well rounded, and marked by the continuation of the axial ribs and by spiral threads; of the latter, those adjacent to the umbilicus and those on the umbilical wall are much stronger than those on the spire. The last whorl is solute for about half a turn and is decidedly deflected, showing the continuation of the axial riblets on the outside of the parietal wall. The siphon, which begins at the posterior angle a little behind the peristome, is deflected over the parietal wall and into the umbilicus, which it plugs completely. Aperture broadly oval, oblique; peristome double, the inner moderately strongly exerted and slightly reflected; the outer of almost the same width all around, marked by concentric lines of growth. Operculum rhytidopomid.

This species comes from the Isle of Pines and from the mainland of Cuba about Rosario, Ensenada de Cochinos. In the Isle of Pines it breaks up into several races that occupy the distinct limestone ranges. The following key and brief descriptions will help to differentiate them:

KEY TO THE SUBSPECIES OF RHYTIDOPOMA PINENSE

Shell large and stout.....	rosarioense
Shell not large or stout.	
Spiral umbilical cords few, strong.....	colombense
Spiral umbilical cords many and weak.	
Axial ribs closely spaced.....	ergastulum
Axial ribs not closely spaced.....	pinense

RHYTIDOPOMA PINENSE ROSARIOENSE, new subspecies

PLATE 11, FIGURE 14

This race comes from the south coast of Cuba, at Rosario, east side of Ensenada de Cochinos, Santa Clara Province. We do not consider the characters that distinguish it from the Isle of Pines forms sufficient to constitute specific separation. It is distinguished easily from the Isle of Pines forms, however, by its much larger size and stouter outline.

The type, U.S.N.M. No. 355583, has 78 axial ribs on the first of the remaining turns and 104 on the last; it has 3.7 whorls remaining and measures: Length, 12.2 mm.; greater diameter, 6.8 mm.; lesser diameter, 5.6 mm.

**RHYTIDOPOMA PINENSE COLOMBENSE, new subspecies**

## PLATE 11, FIGURE 10

This race comes from the Sierra de Colombo. It is distinguished readily from the other subspecies in that the spiral cords in the umbilicus are few and much stronger than in the other races.

The type, U.S.N.M. No. 355579, has 88 axial ribs on the first of the remaining turns, 118 on the second, and 130 on the last; it has a little more than 4 whorls remaining and measures: Length, 10.3 mm.; greater diameter, 5.5 mm.; lesser diameter, 4.6 mm.

**RHYTIDOPOMA PINENSE ERGASTULUM, new subspecies**

## PLATE 11, FIGURE 16

This race comes from the Presidio side of the Sierra de Caballos. The closely spaced axial ribs, combined with the weak spiral cords in the umbilicus, will differentiate this race from the others.

The type, U.S.N.M. No. 355581, has 82 axial riblets on the first of the remaining turns, 92 on the second, and 114 on the last whorl. It has 3.7 whorls remaining and measures: Length, 9.7 mm.; greater diameter, 5.0 mm.; lesser diameter, 4.3 mm.

**RHYTIDOPOMA PINENSE PINENSE, new subspecies**

## PLATE 11, FIGURE 17

This subspecies comes from the Sierra de Casas, where we collected it from one end of the range to the other. It is distinguished from *R. pinense colombense* in having many more spiral threads in the umbilicus and from *R. pinense ergastulum* in having the axial ribs stronger and more distantly spaced.

The type, U.S.N.M. No. 355576, was collected by Bartsch at the south end of the west side of the Sierra de Casas. There are 52 axial ribs on the first of the remaining turns and 84 on the last whorl; it has 4 whorls remaining and measures: Length, 11.3 mm.; greater diameter, 5.7 mm.; lesser diameter, 5.0 mm.

**RHYTIDOPOMA CLATHRATUM (Gould)**

Shell elongate-conic, flesh colored. Nuclear whorls a little more than 2, inflated, well rounded, microscopically granulose, forming a mammillated apex, the last turn showing the beginning of the post-nuclear sculpture. Postnuclear whorls somewhat inflated, well rounded, marked by sublamellar or cordlike axial ribs. These ribs are much more strongly developed at the summit, where they are rather irregular and slightly retractively slanting. In two of the subspecies, when the whorls are decollated they prove to be hollow and blisterlike. The spiral sculpture consists of obsolete threads, which render the axial ribs slightly wavy. Suture very strongly con-

stricted. Periphery strongly rounded. Base inflated, strongly rounded, marked by the continuation of the axial ribs and by feeble spiral threads, which vary somewhat in number in the different subspecies. Within the umbilicus spiral threads also are present. These are always stronger than those on the rest of the base. The last whorl is slightly solute for about half a turn and is broadly deflected. Aperture broadly ovate; peristome double, the inner moderately exerted and slightly reflected; the outer broadly expanded and reflected, not altogether in one plane but somewhat sinuous and marked on the outside by concentric feeble laminae. The operculum is typically rhytidopomid. The breathing siphon has its beginning a little behind the peristome at the posterior angle and is reflected from there as a slightly tapering tube, which completely plugs the umbilicus; this tube is slightly corrugated.

This species seems to occupy Habana, Matanzas, and Santa Clara Provinces. It breaks up into several subspecies, which can be differentiated by the following key and descriptions:

KEY TO THE SUBSPECIES OF RHYTIDOPOMA CLATHRATUM

Outer peristome of inner lip slightly fluted.....	<i>candelaense</i>
Outer peristome of inner lip not fluted.	
Shell slender.....	<i>jumaguaense</i>
Shell stout.....	<i>clathratum</i>

RHYTIDOPOMA CLATHRATUM CANDELAENSE, new subspecies

PLATE 11, FIGURE 2

This race comes from Loma de Candela and from Loma de Coca. It is distinguished easily from the other two races by having the inner lip of the outer peristome slightly fluted and by having the axial riblets much more strongly developed at the summit than in the other two. The spiral sculpture on the umbilicus is also stronger.

The type, U.S.N.M. No. 355607, comes from Loma de Candela. There are 100 axial riblets on the first of the remaining turns and 120 on the rest; it has 3.5 whorls remaining and measures: Length, 9.6 mm.; greater diameter, 5.3 mm.; lesser diameter, 4.6 mm.

RHYTIDOPOMA CLATHRATUM JUMAGUAENSE, new subspecies

PLATE 11, FIGURE 13

This subspecies is distinguished easily from the other two by its much slenderer form and by its less expanded outer peristome.

The type, U.S.N.M. No. 387502, was collected by Bartsch on the sixth mogote from the east at Jumagua near Sagua la Grande, Santa Clara Province. It has 57 axial ribs on the first of the remaining turns and 150 on the last whorl. It has 4.1 whorls remaining and measures: Length, 9.3 mm.; greater diameter, 4.9 mm.; lesser diameter, 4.4 mm.

## RHYTIDOPOMA CLATHRATUM CLATHRATUM (Gould)

## PLATE 11, FIGURE 15

1842. *Cyclostoma clathratum* GOULD, Boston Journ. Nat. Hist., vol. 4, cover to No. 1.
1856. *Ctenopoma clathratum* PFEIFFER, Malakozool. Blätter, vol. 3, p. 59.
1858. *Cyclostoma denegatum* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 2, pp. 2, 23-24.
1920. *Rhytidopoma clathratum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 69.

This race occupies the region about Retiro, Coliseo, Bellamar, Matanzas, Calimete, and Cardenas; it was described from Retiro. We have selected a specimen from that locality for our figure. This race most nearly resembles *R. clathratum candelaense* but it is distinguished easily from *candelaense* by the much feebler development of the axial ribs at the summit, by the less strongly developed threads in the umbilicus, and by lacking the weak fluting of the inner lip of the outer peristome.

The specimen figured, U.S.N.M. No. 203630, has 80 axial ribs on the first of the remaining turns, 120 on the second, and 122 on the last. It has 3.8 whorls remaining and measures: Length, 10.6 mm.; greater diameter, 5.8 mm.; lesser diameter, 5.0 mm.

Gundlach says of the animal: "Nearly colorless or tinged with violet. Neck orange. Tentacles short, lemon colored."

## RHYTIDOPOMA HESPERICUM, new species

## PLATE 11, FIGURE 3

Shell very elongate-ovate, thin, translucent, horn colored with the plug showing through the substance of the shell as an oblique brown line. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly inflated, well rounded, and marked by very poorly developed, almost vertical axial riblets, of which 78 occur on the first whorl and 77 on the last turn. These riblets become thickened and hollow at the summit, but hardly form what might be termed cusps. The spiral sculpture consists of almost obsolete threads, which are scarcely indicated on the last whorl, while on the early whorls they render the axial riblets slightly nodulose. Suture very strongly constricted. Periphery strongly rounded. Base short, strongly rounded and marked by the feeble continuation of the axial riblets, with scarcely any indication of spiral threads on the umbilical wall. The last whorl is decidedly solute and strongly deflected. Aperture very broadly oval; peristome double, the inner decidedly exerted, almost straight; the outer projecting only a trifle beyond the inner, forming a mere ring about it. Operculum typically rhytidopomid. The siphon has its origin at the posterior angle of the aperture a little

distance behind the peristome, and it becomes attenuated and extends into the hollow axis of the shell, which it plugs.

The type, U.S.N.M. No. 493415, comes from Ceiba del Agua, Pinar del Rio Province. It has 3.3 whorls remaining and measures: Length, 9.6 mm.; greater diameter, 5.2 mm.; lesser diameter, 4.7 mm.

We have seen specimens of this species also from Artemisa.

This species is easily distinguished from the others by its narrower outer peristome and by the almost absent spiral sculpture in the umbilicus.

#### Genus *OPISTHOSIPHON* Dall

1905. *Opisthosiphon* DALL, Proc. Malac. Soc. London, vol. 6, p. 209.

The shell varies from broadly ovate through elongate-ovate to cylindro-conic. The nuclear whorls are microscopically granulose. The early postnuclear turns may be solute or appressed to the preceding whorl. Axial ribs are always present, varying in different groups from slender, hairlike elements to lamellae; their spacing varies widely in different groups. Fine microscopic axial threads may or may not be present between the heavier ribs. The spiral sculpture may consist of strong cords that may be present on all parts of the surface, or it may be restricted to the umbilicus. The last whorl may be solute or adnate to the preceding turn. The umbilicus presents a wide range of variance. It may be narrow or wide, open or closed. The aperture also presents considerable difference, varying from oval to subcircular, with the peristome always double; the inner peristome may be slightly or somewhat exserted; the outer peristome ranges from narrow to broadly expanded in different species and this expansion may extend over the entire lip or it may characterize only part of it. An auricle may or may not be present at the posterior angle. The operculum has the whorls separated by a narrow, deep groove, which on the last whorl constitutes the plain chondroid edge. The parts of the whorls between this inner edge and the groove are crossed by numerous, retractively curved, decidedly strongly raised lamellae separated by narrow spaces. Behind the aperture is the breathing siphon, upon which the generic name is based. This tube communicates by a puncture with the interior of the aperture near the posterior angle, slightly behind the edge of the peristome. The siphonal tube is usually directed upward and backward into the suture, though in a number of species with closed umbilicus the tube does not communicate at once with the free surface, but with a channel situated behind the broadly expanded, adnate parietal peristome of the outer lip, which in turn communicates with the hollow axis of the shell, and through this with the exterior through the decollated apex of the shell.

Type: *Opisthosiphon* (*Opisthosiphon*) *bahamense* Shuttleworth.

## KEY TO THE SUBGENERA OF OPISTHOSIPHON

Spiral sculpture present.

Spiral sculpture present on spire, base, and umbilicus.

Fine axial threads present between the heavy ribs.

Early postnuclear whorls solute..... **Solutapex**

Early postnuclear whorls not solute..... **Mirisiphon**

Spiral sculpture absent on spire and base; present in umbilicus.

Axial ribs with individual cusps at the summit.

Fine axial threads present between the lamellar ribs

**Bermudezsiphona**

Fine axial threads absent between the lamellar ribs

**Opisthosiphona**

Axial ribs without individual cusps at the summit.

Axial ribs fused to form tufts at the summit..... **Cubitasiphona**

Spiral sculpture absent..... **Cylindrosiphona**

## SOLUTAPEX, new subgenus

Shell ovate, with the early postnuclear whorls solute. The postnuclear whorls are marked by lamellar axial ribs and by spiral threads, which form hollow tubercles at their junctions. The axial ribs also become enlarged at the summit, where they form hollow cusps. The spaces between the axial ribs are marked by fine, microscopic axial threads. Operculum typically opisthosiphonid.

Type: *Opisthosiphon (Solutapex) caroli* Aguayo.

## KEY TO THE SPECIES OF THE SUBGENUS SOLUTAPEX

Last whorl solute..... **sainzi**

Last whorl adnate.

Axial ribs closely spaced..... **quesadai**

Axial ribs distantly spaced.

Inner lip of outer peristome inbent in the middle..... **echinatum**

Inner lip of outer peristome not inbent in the middle..... **caroli**

## OPISTHOSIPHON (SOLUTAPEX) SAINZI Aguayo

## PLATE 11, FIGURE 7

1934. *Opisthosiphon sainzi* AGUAYO, Mem. Soc. Cubana Hist. Nat. Felipe Poey, vol. 8, p. 91, figs. 3, 4.

Shell small, elongate-ovate, pale brown, with the axial ribs a little paler. The last whorl also bears interrupted spiral bands of brown. Peristome flesh colored, aperture showing the reflection of the interrupted spiral bands within. Nuclear whorls decollated. Postnuclear whorls inflated, strongly rounded, and marked by sublamellar axial ribs, which are rendered decidedly wavy and somewhat scalloped by low, broad spiral bands. Of these axial ribs 58 are present on the last whorl. In addition to this sculpture, the spaces between the ribs, which are about two and one-half times as wide as the ribs, are marked by fine axial hairlines. Four of the low spiral cords are

present between the summit and suture. The suture is strongly constricted. Periphery strongly rounded. Base short, narrowly, openly umbilicated, well rounded, and marked by the continuations of the axial ribs and by 5 strong spiral cords, which grow consecutively stronger from the periphery toward the umbilicus. The junctions of the axial ribs and the spiral cords become increasingly more strongly scalloped from the periphery toward the umbilicus. The umbilical wall is marked by the continuation of the axial ribs and by feeble spiral cords. The last whorl is decidedly solute. Aperture broadly oval; peristome double, the inner slightly exerted; the outer moderately broadly expanded and marked by strong concentric lamellae. Operculum typically opisthosiphonid. The siphon is at the posterior angle of the aperture. It is expanded at its distal end, and it is marked by concentric ridges, opening toward the suture.

The paratypes before us were collected by Aguayo at Rejondón de Báguanos, Holguín, Oriente. The specimen figured, U.S.N.M. No. 425502, has 3.4 whorls remaining and measures: Length, 8.4 mm.; greater diameter, 5.0 mm.; lesser diameter, 4.7 mm.

**OPISTHOSIPHON (SOLUTAPEX) QUESADAI** Aguayo

PLATE 11, FIGURE 11

1932. *Opisthosiphon quesadai* AGUAYO, Nautilus, vol. 45, pp. 95-96, pl. 6, fig. 5.

Shell rather large, elongate-ovate, pale wax yellow with interrupted spiral bands of brown. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming a mammillated apex. The early postnuclear whorls are marked by rather distantly spaced axial ribs, which become increasingly more closely spaced as the shell increases in size. On the first whorl the ribs are about one-fourth as wide as the spaces that separate them, while on the last turn the ribs are only a trifle narrower than the intercostal spaces. On the early whorls, too, the ribs are much more lamellose than on the last, where they approach rounded cords. Of the axial ribs 150 are present on the last whorl. These axial ribs become expanded at the summit, where they form narrow, hollow cusps. They are also expanded on the middle whorls at the periphery, the two interlocking in this region. On the middle whorls the axial ribs are rendered somewhat scalloped by the 5 low, rounded spiral cords. On the last whorl the scalloping is obsolete. In addition to the axial ribs the spaces between them show the fine axial hairlines characteristic of the group. Suture strongly constricted. Periphery well rounded. Base short, well rounded, openly umbilicated. The umbilicus shows the continuation of the axial sculpture and 7 strong spiral cords, of which the first is the strongest and it marks the edge of the umbilicus, the rest gradually becoming narrower. The junctions of these spiral cords

with the axial riblets render the riblets conspicuously scalloped. Aperture very broadly oval. Peristome double, the outer broadly expanded and adnate to the preceding turn at the parietal wall, a little wider on the parietal and inner wall than on the rest, forming a slight auricle at the posterior angle, and marked by a series of concentric lamellae; inner peristome slightly exerted. Operculum typically opisthosiphonid. The siphon is immediately behind the peristome, short and directed backward into the suture.

The specimen figured, U.S.N.M. No. 535348, is a paratype, which was collected by Quesada on Loma de la Calera, San Germán. It is a complete specimen having 6.2 whorls measuring: Length, 11.8 mm.; greater diameter, 6.6 mm.; lesser diameter, 5.3 mm.

**OPISTHOSIPHON (SOLUTAPEX?) ECHINATUM** ([Gundlach] Pfeiffer)

PLATE 11, FIGURE 6

1857. *Cyclostoma echinatum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 4, p. 176.

1858. *Ctenopoma echinatum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 1, p. 103.

1920. *Opisthosiphon (Opisthosiphon) echinatum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 68.

Shell elongate-conic, flesh colored, unicolor or faintly spirally banded; peristome flesh colored. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, appressed at the summit, marked by strong, lamellose, scalloped axial ribs, of which 24 occur upon the first of the remaining turns in the specimen described and figured, 32 upon the second, 36 upon the third, and 48 upon the last whorl. The spiral sculpture consists of feeble broad threads, which render the riblets scalloped. Of these spiral threads, 5 occur upon the first, 6 upon the second, 9 upon the third, and 10 upon the last whorl between the summit and the suture. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, openly umbilicated, marked by the continuation of the axial riblets and by 5 spiral cords, which also render the ribs scalloped; within the umbilicus 6 or more additional scalloped cords are present. Aperture broadly oval; peristome double, the outer very strongly expanded, partly inbent on the inner lip to cover part of the umbilicus, marked by a series of concentric lamellae; outer peristome adnate to the preceding turn on the parietal wall, forming a conspicuous auricle at the posterior angle, behind which the breathing siphon is present; inner peristome exerted and slightly reflected. Operculum paucispiral with the nucleus halfway between subcentral and submarginal, marked by numerous, retractively slanting, strongly raised, calcareous lamellae, which are fused both on their inner and outer borders.

U.S.N.M. No. 493362 contains a cotype collected at Cabo Cruz by Gundlach and presented to the National Museum by Dr. de la Torre.

It has slightly more than 4 whorls and measures: Length, 9.6 mm.; greater diameter, 5.8 mm.; lesser diameter, 4.4 mm.

OPISTHOSIPHON (SOLUTAPEX) CAROLI Aguayo

PLATE 11, FIGURES 9, 12

1932. *Opisthosiphon caroli* AGUAYO, Nautilus, vol. 45, p. 94, pl. 6, figs. 2, 3.

1932. *Opisthosiphon rivorum* AGUAYO, Nautilus, vol. 45, p. 95, pl. 6, fig. 4.

Shell elongate-ovate. Nuclear whorls 2, inflated, strongly rounded, smooth, except for microscopic granules. The first 1.5 postnuclear whorls are decidedly solute, strongly rounded, showing the beginning of the sculpture characteristic of the later postnuclear turns. The postnuclear whorls are moderately rounded and they are crossed by slender, sublamellar axial ribs, of which 53 are present upon the last turn in the specimen figured. These axial ribs expand at the summit, where they form delicate hollow cusps, which project materially above the suture. The axial ribs are marked by slender tubercles having their long axis parallel with the axial sculpture; 4 of these are present between the summit and the suture. The spaces between the lamellar axial ribs are crossed by exceedingly fine, microscopic, closely spaced axial lirations. Suture moderately impressed. Periphery strongly rounded. Base short, well rounded, narrowly umbilicated, and marked by the continuation of the axial ribs and by 3 broad low spiral cords, which render the axial ribs scalloped. The umbilical wall is marked by the feeble continuation of the axial ribs and by 4 strong spiral series of cusps. Aperture broadly oval; peristome double, the outer broadly, flaringly expanded, a little wider at the posterior angle, where it forms a slight auricle, marked by a series of wavy, concentric lamellae; the inner is slightly exerted. There is a puncture on the parietal wall near the posterior angle of the aperture, which communicates with the short siphon; the siphon is reflected backward into the suture. Operculum typically opisthosiphonid.

The specimen figured, U.S.N.M. No. 535346, was collected by Dr. Aguayo in Loma de la Caridad, Calabazas, Holguín, Oriente Province. It has 3.5 whorls remaining and measures: Length, 9.3 mm.; greater diameter, 5.8 mm.; lesser diameter, 4.5 mm.

An examination of topotypes of *Opisthosiphon rivorum* Aguayo, received from Dr. Aguayo, shows that the early postnuclear whorls of this shell are also solute. A comparison of all the other characters in our estimation yields no data to render the two even subspecifically distinct. Their identity is also proclaimed by their habitat, since both species come from the same hill, separated by a distance of only about 2 kilometers.

## MIRISIPHON, new subgenus

Shell cylindro-conic, marked by slender, rounded, closely spaced, axial ribs. Between these ribs fine microscopic axial threads are present. The spiral sculpture consists of slender threads, whose junctions with the axial ribs form fine nodules. Siphon a little behind the peristome, directed backward into the suture. Operculum typically opisthosiphonid.

Type: *Opisthosiphon (Mirisiphon) sculptum* ([Gundlach] Pfeiffer).

## OPISTHOSIPHON (MIRISIPHON) SCULPTUM ([Gundlach] Pfeiffer)

## PLATE 12, FIGURE 8

1857. *Cyclostoma sculptum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 4, pp. 176-77.
1858. *Ctenopoma sculptum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 1, p. 103.
1920. *Opisthosiphon (Opisthosiphon) sculptum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 68.

Shell elongate-conic, flesh colored with a yellowish tinge, marked by 3 broad spiral bands of brown between summit and suture, and a fourth a little anterior to the periphery. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, marked by very regular and very regularly spaced, wavy and slightly retractively slanting axial riblets, of which 34 occur upon the first, 44 upon the second, 76 upon the third, and 104 upon the last turn. These riblets are distantly spaced on the early turns and become more closely approximated as the shell increases in size; almost every other one of these riblets develops into a small sharp cusp at the summit. The spiral sculpture consists of slender threads about equaling the riblets in strength. Of these, 4 are present on the first whorl, 5 on the second, 10 upon the third, and 12 upon the last. They render the axial sculpture slightly nodulose and slightly wavy. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, broadly, openly umbilicated, and marked by the continuation of the axial riblets and by 5 spiral threads; within the umbilicus 9 additional threads are present. Aperture oval; peristome double, the outer broadly expanded, of almost the same width all around, adnate to the preceding turn on the parietal wall; at the posterior angle it forms an auricle, which is appressed and attached to the breathing siphon immediately behind it; the inner peristome is slightly exerted and slightly reflected. Operculum typically opisthosiphonid.

The specimen described and figured, U.S.N.M. No. 493369, is one of four collected at Cabo Cruz, Oriente Province. It has a little over 4 whorls and measures: Length, 7.3 mm.; greater diameter, 4.2 mm.; lesser diameter, 3.3 mm.

Bartsch collected it also at the mouth of the Rio Ojo del Toro in Oriente Province.

BERMUDEZSIPHONA, new subgenus

In this subgenus the spiral sculpture is confined to the umbilicus. (Sometimes there is an indication of it on the early postnuclear whorls.) The intercostal spaces are marked by microscopic axial threads.

Type: *Opisthosiphon* (*Bermudezsiphona*) *bermudezi*, new species.

KEY TO THE SPECIES OF THE SUBGENUS BERMUDEZSIPHONA

Umbilicus closed.

- Outer peristome erect..... cucullatum
- Outer peristome not erect.
  - Outer peristome suberect..... palmeri
  - Outer peristome not suberect.
    - Outer peristome horizontally expanded.
      - Outer peristome broad.
        - Shell ovate..... greenfieldi
        - Shell elongate-ovate.
          - Axial ribs of last whorl strongly developed.
            - Basal peristome broadly expanded. lamellosum
            - Basal peristome only moderately expanded..... plateroense
          - Axial ribs of last whorl not strongly developed..... prominulum
      - Outer peristome narrow.
        - Shell ovate.
          - Axial ribs very closely spaced..... banaoense
          - Axial ribs not closely spaced..... obturatum
        - Shell elongate-ovate..... obtectum
        - Shell not elongate-ovate.
          - Shell subcylindric..... insulanum

Umbilicus open.

- Last whorl decidedly solute.
  - Axial ribs sublamellar..... salustii
  - Axial ribs not sublamellar..... evanidum
- Last whorl not decidedly solute.
  - Last whorl subsolute..... subobturatum
  - Last whorl not subsolute.
    - Last whorl adnate to preceding turn.
      - Inner lip of outer peristome strongly notched or folded.
        - Axial ribs distantly spaced..... torrei
        - Axial ribs not distantly spaced.
          - Shell elongate-ovate..... caguanense
          - Shell ovate or pupoid..... subobtectum
      - Inner lip of outer peristome not notched or folded.
        - Shell elongate-ovate..... aguilerianum
        - Shell ovate or pupoid.
          - Axial ribs closely spaced..... detectum
          - Axial ribs distantly spaced..... bermudezi
    - Outer peristome narrow.
      - Outer peristome broad..... andrewsi

## OPISTHOSIPHON (BERMUDEZSIPHONA) CUCULLATUM, new species

## PLATE 12, FIGURE 7

Shell elongate-ovate, pale yellow with faint interrupted spiral bands of brown. Nuclear whorls 1.5, small, inflated, strongly rounded, microscopically granulose, forming an almost cylindrical, truncated apex. Postnuclear whorls well rounded, the first marked by slender, rather closely spaced, hairlike, decidedly retractively slanting axial ribs. On the succeeding turns these ribs become more distantly spaced and they develop into slender lamellae, which again become less highly elevated and more rounded toward the last whorl. On the early whorls these ribs are finely scalloped. On the later turns this sculpture disappears. On all the turns the ribs become expanded at the summit into narrow cusps, which extend across the suture to touch the preceding turn. Of these ribs 48 occur upon the last whorl in the type. The spaces separating the axial ribs are much wider than the ribs and are marked by slender, somewhat sinuous axial threads; they are free of spiral sculpture. The suture, while well impressed, is rendered less conspicuous by the cusps of the ribs at their summit. Periphery well rounded. Base short, marked by the continuation of the axial ribs and within the exposed portion of the umbilicus by 3 spiral threads, which render the axial ribs decidedly scalloped at their junction. Aperture broadly oval, almost subcircular; peristome double, the inner erect and slightly exerted, the outer broadly expanded, the expanded portion also erect or even inbent partly over the aperture, forming a decided hoodlike auricle at the posterior angle. On the inner lip the outer peristome is deeply notched and the portion posterior to the notch is reflected over the umbilicus, which it plugs; the plug appears decidedly pinched in. On the parietal wall the outer peristome is reflected over the preceding turn. The outer peristome is covered with slender, concentric laminae. The operculum is typically opisthosiphonid. The siphon is short and directed into the suture and communicates through the channel behind the parietal lip with the hollow axis of the shell, breathing being accomplished through the hollow axis and through the decollated apex when the operculum closes the aperture.

The type, U.S.N.M. No. 535433, has 4.8 whorls remaining and measures: Length, 10.4 mm.; greater diameter, 5.8 mm.; lesser diameter, 4.7 mm. A large series of specimens was collected by Bartsch on the north slope of the Sierra de Meneses, east of Yaguajay, Santa Clara Province.

Bartsch collected specimens also opposite Jungalito, on the north slope of the Sierra de Meneses, and Bermudez found it at Urbaza and El Yigre, Yaguajay.

The fact that the outer peristome is erect and forms a strong hood at the posterior angle of the aperture distinguishes this species from all the other Opisthosiphons.

Animals collected in the Sierra de Meneses opposite Kilometers 42 and 43 were described by Bartsch as follows: Pale buff with a smoky tinge and a pinkish area at the base of the dark gray tentacles. There is a median dorsal diffused longitudinal stripe. Sides of the body a little paler than the dorsal part, with the sole of the foot paler than the sides and deeply cleft. The animal at rest suspends itself by a mucous thread.

**OPISTHOSIPHON (BERMUDEZSIPHONA) PALMERI, new species**

Shell clongate-ovate, thin, small. Nuclear whorls decollated in all our specimens. The early postnuclear whorls with strongly raised, lamellar axial ribs, which beyond the second turn become decidedly reduced and which are replaced by ill-defined, low, rounded axial ribs. Some of the axial ribs develop into hollow cusps at the summit, which extend across the well-impressed suture and which touch the preceding whorl. Periphery well rounded. Base moderately long, marked by the continuation of the axial sculpture of the last turn and by a spiral thread, limiting the outer edge of the umbilicus, which renders the ribs decidedly scalloped. Aperture broadly oval; peristome double, the inner exerted and erect; the outer broadly expanded, sloping at an angle of  $45^\circ$  from the inner peristome, marked by numerous slender, concentric lamellae. On the inner lip the peristome is deeply notched, the portion posterior to the notch being reflected over the umbilicus, which it plugs. Operculum typically opisthosiphonid. The siphon is at the posterior angle of the aperture behind the peristome and it is directed backward into the suture, where it connects through a channel behind the parietal wall with the hollow axis, breathing being accomplished through the decollated tip.

This species is distinguished from *O. (B.) cucullatum* by its much less erect outer peristome and by the much enfeebled axial sculpture of the later turns.

We are recognizing two subspecies, which the following key will help to differentiate:

**KEY TO THE SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) PALMERI**

Axial ribs of last whorls well developed.....	<b>palmeri</b>
Axial ribs of last whorls almost obsolete.....	<b>camajanense</b>

**OPISTHOSIPHON (BERMUDEZSIPHONA) PALMERI PALMERI, new subspecies**

**PLATE 12, FIGURE 3**

This subspecies is known from Guainabo, and Pie Valdes, near Yaguajay, Santa Clara Province. It differs from *O. (B.)*

*palmeri camajanense* in having the axial ribs well developed on the last whorl.

The type, U.S.N.M. No. 535436, was collected by Dr. Bermudez at Guainabo, Yaguajay. It has almost 4 whorls remaining and measures: Length, 13.4 mm.; greater diameter, 7.3, mm; lesser diameter, 6.0 mm.

**OPISTHOSIPHON (BERMUDEZSIPHONA) PALMERI CAMAJANENSE, new subspecies**

PLATE 12, FIGURE 1

This subspecies differs from typical *O. (B.) palmeri palmeri* in having the axial sculpture reduced to almost the vanishing point on the later turns, and in having the denticles at the summit much stronger. It was collected by Bermudez at Camaján, Yaguajay, Santa Clara Province.

The type, U.S.N.M. No. 535439, has 3.8 whorls remaining and measures: Length, 15.0 mm.; greater diameter, 8.2 mm.; lesser diameter, 6.8 mm.

This subspecies varies greatly in size, as does the typical species; the smallest specimen before us has 3.7 whorls remaining and measures: Length, 11.0 mm.; greater diameter, 6.7 mm.; lesser diameter, 5.6 mm.

**OPISTHOSIPHON (BERMUDEZSIPHONA) GREENFIELDI, new species**

PLATE 12, FIGURE 11

Shell broadly ovate, ranging from flesh colored to pale yellow to chestnut-brown, unicolor, or with a parietal band of darker brown. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming an almost cylindric truncated apex. The initial part of the nuclear turns is brown, the rest white. Postnuclear whorls inflated, strongly rounded, marked by slightly retractively slanting sublamellar axial ribs, which are more distantly spaced on the early turns than on the later whorls. At irregular intervals these ribs form hollow cusps at the summit. The spaces between the axial ribs are marked by microscopic axial threads. Of the axial ribs 86 are present on the last whorl in the type. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs, which extend undiminished to the umbilicus. The outside of the closed umbilicus is marked by 4 spiral cords, which render the axial ribs strongly scalloped at their junctions. Aperture broadly oval; peristome double, the inner slightly expanded, reflected and appressed to the outer; the outer broadly expanded, forming a decided auricle at the posterior angle, deeply notched on the middle of the inner lip. Posterior to the notch the outer peristome is reflected over the umbilicus, which it completely covers. It also extends as a broad flap adnate to the

preceding turn at the parietal wall. The entire outer peristome is marked by numerous slender, concentric lamellae, which are particularly emphasized at the posterior angle. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture, reflected backward and toward the suture behind the peristome, connecting with a channel behind the parietal peristome, communicating with the hollow axis of the spire, breathing being accomplished through this by means of the truncated apex when the operculum closes the shell.

The type, U.S.N.M. No. 535441, and a series of specimens were collected by Bartsch on rocks at Sitio Afuera, at the south end of the Paso de la Escalera, Cubitas Mountains, Camagüey Province.

The type has 4.5 whorls remaining and measures: Length, 14.7 mm.; greater diameter, 9.3 mm.; lesser diameter, 7.3, mm. It is a medium-sized specimen; in the collection there are larger and smaller individuals.

**OPISTHOSIPHON (BERMUDEZSIPHONA) LAMELLOSUM, new species**

Shell very elongate-ovate, flesh colored, unicolor or banded. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, and marked by retractively slanting, sublamellar axial ribs, which are much more distantly spaced on the early turns than on the last. These ribs form hollow cusps at the summit at more or less regular intervals; they vary materially in strength in the two races here recognized. The spaces separating the axial ribs are microscopic axial threads. Suture strongly constricted. Periphery of the last whorl strongly rounded. Base short, inflated, strongly rounded, and marked by the continuation of the axial ribs and immediately outside of the closed umbilicus by several spiral threads, which render the axial ribs conspicuously scalloped. Aperture broadly oval; peristome double, the inner moderately exerted; the outer broadly expanded, reflected, and auriculated at the posterior angle, and deeply notched on the inner lip, the portion posterior to the notch being reflected into the umbilicus, which it plugs. The outer peristome is marked by fine, concentric lamellae. Operculum typically opisthosiphonid. The siphon is situated at the posterior angle of the aperture behind the peristome; it is reflected into the suture and communicates through a channel behind the parietal wall with the hollow axis and the decollated apex.

We are recognizing two subspecies, which the following key and descriptions will help to differentiate:

**KEY TO THE SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) LAMELLOSUM**

Shell with interrupted spiral bands of brown..... **lamellosum**  
 Shell without interrupted spiral bands of brown..... **lowei**

## OPISTHOSIPHON (BERMUDEZSIPHONA) LAMELLOSUM LAMELLOSUM, new subspecies

## PLATE 12, FIGURE 4

This race comes from Espinosa, Chambas, Camagüey Province. It differs from *O. (B.) lamellosum lowei* in being conspicuously banded with interrupted zones of brown. These markings extend to the outer peristome where the ribs are also much more distantly spaced and a little more strongly sublamellose than in the other subspecies. There is also a tendency toward a line of nodules on the ribs below the cusps at the summit, which gives a false aspect of having a spiral cord. This is not true of the other race. The type has 39 ribs on the last whorl.

The type, U.S.N.M. No. 535442, has 4.0 whorls remaining and measures: Length, 12.0 mm.; greater diameter, 6.6 mm.; lesser diameter, 5.1 mm.

## OPISTHOSIPHON (BERMUDEZSIPHONA) LAMELLOSUM LOWEI, new subspecies

## PLATE 12, FIGURE 6

Bartsch collected this subspecies in various places in the Dos Sierras, Santa Clara Province. It differs from typical *O. (B.) lamellosum lamellosum* in being unicolor, therefore lacking the rays on the outer peristome; in being larger and a little more elongate with more inflated whorls; and in having the axial ribs much more closely spaced and more numerous, with less conspicuous cusps at the summit; 84 axial ribs are present on the last turn in the type.

The type, U.S.N.M. No. 535444, is a complete specimen having 6.4 whorls and measures: Length, 12.0 mm.; greater diameter, 6.2 mm.; lesser diameter, 5.2 mm.

We have seen it also from Loma Esperanza, Zaza del Medio, Santa Clara Province.

## OPISTHOSIPHON (BERMUDEZSIPHONA) PLATEROENSE, new species

## PLATE 12, FIGURE 10

Shell elongate-ovate, thin, pale brown, with interrupted spiral bands of darker brown, of which 6 are present on the last turn between summit and suture, and 3 are on the posterior half of the base in the type. Peristome yellow. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming an almost cylindrical truncated apex. Postnuclear whorls strongly inflated, rounded, and marked by distantly spaced, sublamellar, slightly retractively slanting axial ribs, which become expanded near the summit into slender cusps, which extend up on the preceding whorl. Not infrequently these cusps are hollow. In addition to this, the axial ribs bear slight scallops; these scallops give the shell a somewhat spirally sculptured

effect, which, however, is not apparent in the intercostal spaces. The broad spaces between the axial ribs are marked by microscopic axial threads. Suture strongly constricted. Periphery of the last whorl inflated, strongly rounded. Base short, inflated, strongly rounded, and marked by the continuation of the axial ribs, and on the exposed portion of the umbilicus by 3 prominent spiral cords, which render the axial ribs at their junction decidedly scalloped. Aperture broadly oval; peristome double, the inner rather conspicuously exerted; the outer broadly expanded, slightly auriculate at the posterior angle, and deeply notched on the middle of the inner lip, the portion posterior to the notch being reflected to plug the umbilicus. The outer peristome is marked by numerous, strongly developed, concentric lamellae. Operculum typically opisthosiphonid. The siphon at the posterior angle of the aperture, behind the peristome, is reflected into the suture and communicates with the channel behind the parietal wall, which is connected with the hollow axis and the decollated apex.

The type, U.S.N.M. No. 387920, has 4 whorls remaining and measures: Length, 13.0 mm.; greater diameter, 8.0 mm.; lesser diameter, 6.5 mm.

A large series of specimens was collected by Bartsch on the north slope of Loma Platero, near Jagüey, Santa Clara Province.

**OPISTHOSIPHON (BERMUDEZSIPHONA) PROMINULUM, new species**

PLATE 12, FIGURE 2

Shell very elongate-ovate, moderately thin, pale yellowish brown. Nuclear whorls decollated. Postnuclear whorls somewhat inflated, strongly rounded, and marked by retractively slanting ribs, which are more pronounced and more widely separated on the early turns than on the succeeding whorls. On the last two whorls they become decidedly reduced and they are here but slightly elevated. The spaces between the axial riblets are crossed by microscopic axial threads. Of the axial riblets 82 occur upon the last turn. Some of these axial riblets become expanded at the summit to form hollow cusps at more or less regular intervals. Suture well impressed. Periphery of the last whorl inflated, strongly rounded, and marked by the continuation of the weak axial ribs, which extend to the closed umbilicus. The exposed portion of the umbilicus shows 3 spiral cords, which render the axial riblets somewhat scalloped. Base short, well rounded. Aperture broadly oval, peristome double, the inner slightly exerted, the outer broadly expanded, forming an auricle at the posterior angle and being notched on the middle of the inner lip; the portion posterior to the notch is reflected to plug the umbilicus. On the parietal wall the outer lip extends over and is adnate to the

preceding turn. Operculum typically opisthosiphonid. The siphon at the posterior angle of the aperture behind the outer peristome is reflected into the suture, communicating with the channel behind the parietal wall, connecting with the hollow axis and the decollated tip.

The type, U.S.N.M. No. 535446, was collected by Bermudez at Cambao, Yaguajay, Santa Clara Province. It has 3.7 whorls remaining and measures: Length, 12.0 mm.; greater diameter, 6.9 mm.; lesser diameter, 5.7 mm.

We have seen specimens also collected by Bermudez at Vereda del Resbalillo, Yaguajay and at Vereda El Guajaco, Cambao, Yaguajay, Santa Clara Province.

**OPISTHOSIPHON (BERMUDEZSIPHONA) BANAEOENSE** Torre and Henderson

Shell varying from ovate to broadly ovate and ranging in color from white to flesh color to pale yellow to orange and brown to unicolor or with a band of dark brown at the periphery. Nuclear whorls 2, small, inflated, strongly rounded, microscopically granulose. Postnuclear whorls inflated, strongly rounded, and marked by numerous closely spaced, almost vertical axial ribs, which are stronger and more distantly spaced on the early turns than on the later. These ribs develop at more or less regular intervals into hollow cusps at the summit, which are also of varying size, suture well constricted. Periphery inflated, strongly rounded. Base short, strongly rounded, and marked by the continuation of the axial ribs, which extend undiminished into the umbilicus. The exposed portion of the umbilicus shows several spiral threads, which render the axial riblets scalloped at their junctions. Aperture broadly ovate; peristome double, the inner moderately exerted on the inner lip and reflected over and appressed to the outer peristome of the outer lip. The outer peristome is narrowly expanded on the outer and basal lip, and broadly expanded to form an auricle at the posterior angle. On the inner lip the outer peristome is also expanded and deeply notched; the broad flap posterior to the notch is reflected over and plugs the umbilicus, while on the parietal wall it is adnate to the preceding turn. The outer peristome is marked by fine concentric lamellae. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture bends into the suture, connecting with the hollow axis through a channel behind the outer peristome of the parietal wall.

This species appears to be confined to the southwestern portion of the Cubitas Mountain region. We are recognizing two subspecies, which the following key and descriptions will help to distinguish:

**KEY TO THE SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) BANAEOENSE**

Shell broadly ovate..... banaeoense  
 Shell ovate..... trincerasesense

## OPISTHOSIPHON (BERMUDEZSIPHONA) BANAEOENSE BANAEOENSE Torre and Henderson

## PLATE 12, FIGURE 5

1921. *Opisthosiphon (Opisthosiphona) obturatum banaoense* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 253.

This subspecies was described from Banao off the southwestern part of the Cubitas Mountains, is shorter than *O. (B.) banaoense trinceracense*, and usually has the umbilicus more deeply plugged by the reflected inner lip of the outer peristome. The first remaining whorl in the type bears 72 riblets; 152 are present upon the last one.

The type, U.S.N.M. No. 314950, has a little over 3 whorls remaining and measures: Length, 11.0 mm.; greater diameter, 8.7 mm.; lesser diameter, 6.4 mm.

## OPISTHOSIPHON (BERMUDEZSIPHONA) BANAEOENSE TRINCERASENSE, new subspecies

## PLATE 12, FIGURE 9

1920. *Opisthosiphon (Opisthosiphona) trinceracensis* (Torre and Henderson MS.) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67, *nomen nudum*.

This race was collected by Torre in the Paso de las Trincheras, western end of the Cubitas Mountain. It is more elongate than the typical race and it is usually of darker color.

The type, U.S.N.M. No. 355473, has 3 whorls remaining and measures: Length, 14.0 mm.; greater diameter, 9.9 mm.; lesser diameter, 7.3 mm. It has 56 axial riblets on the first of the remaining turns and 142 upon the last whorl.

## OPISTHOSIPHON (BERMUDEZSIPHONA) OBTURATUM Torre and Henderson

Shell ovate, varying from flesh color to horn color, buff to orange or even to brown. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose. Postnuclear whorls well rounded, and marked by retractively slanting, sublamellar axial ribs, the early ribs bearing slender elongated thickenings resembling nodules that would indicate spiral sculpture, which, however, is not present in the intercostal spaces. The slight spiral sculptured effect, therefore, is a false one. These ribs at irregular intervals become strongly developed at the summit, where they form hollow cusps, which extend up on the preceding turn and which are adnate to it. The spaces separating the axial ribs are much wider than the ribs. Suture well constricted. Periphery well rounded. Base moderately long, marked by the continuation of the axial ribs and several inconspicuous spiral threads on the exposed portion of the umbilical wall. Aperture broadly oval; peristome double, the inner slightly exerted and reflected, particularly so on the outer lip; the outer peristome is broadly ex-

panded at the posterior angle to form a conspicuous auricle. It is narrower on the outer and basal lip where it is again expanded on the inner lip, which is deeply notched. Posterior to the notch it forms a very broad flap, which extends over the umbilicus and covers it. The outer peristome is marked by conspicuous concentric lamellae. Operculum typically opisthosiphonid. The siphon is at the posterior angle of the aperture behind the peristome, directed into the suture, where it connects with the slender tube connecting with the umbilicus and, through the hollow axis, with the decollated end of the shell.

The species is restricted to the Cubitas Mountains. We are recognizing two subspecies from this locality, which the following key will help to distinguish:

KEY TO THE SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) OBTURATUM

Whorls inflated..... *sulcosum*  
Whorls well rounded..... *obturatum*

OPISTHOSIPHON (BERMUDEZSIPHONA) OBTURATUM SULCOSUM, new subspecies

PLATE 13, FIGURE 12

This subspecies is more elongated than *O. (B.) obturatum obturatum*. It has the axial ribs on all the whorls much more distantly spaced. Of these, 18 are present on the first whorl and 51 are upon the last in the type. The ribs also show the nodules referred to in the specific description much more emphasized than in the other subspecies.

The type, U.S.N.M. No. 535450, was collected by Bartsch at Salto del Paso Tinaja, about 1.5 km. from the north entrance to the pass. It has 5.0 whorls remaining and measures: Length, 13.8 mm.; greater diameter, 8.9 mm.; lesser diameter, 7.0 mm.

OPISTHOSIPHON (BERMUDEZSIPHONA) OBTURATUM OBTURATUM Torre and Henderson

PLATE 13, FIGURE 11

1920. *Opisthosiphon (Opisthosiphona) obturatus* (Torre and Henderson) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67, *nomen nudum*.  
1921. *Opisthosiphon (Opisthosiphona) obturatum obturatum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 252, pl. 39, figs. 3-6.

This race, which comes from Paso de Lesca, Cubitas Mountains, is much more rotund than *O. (B.) o. sulcosum* and has broader whorls. The axial ribs are much more numerous, more closely spaced, and more conspicuously cusped at the summit. Of the axial ribs, 34 are present on the first of the remaining turns and 92 are upon the last in the type.

The type, U.S.N.M. No. 314948, has a little more than 4 whorls remaining and measures: Length, 14.5 mm.; greater diameter, 10.0 mm.; lesser diameter, 7.7 mm.

## OPISTHOSIPHON (BERMUDEZSIPHONA) OBTECTUM Torre and Henderson

Shell elongate-ovate, rather thin, horn colored, unicolor, or banded with interrupted spiral zones of brown. Nuclear whorls 2, small, inflated, well rounded, microscopically granulose. Postnuclear whorls inflated, strongly rounded, and marked by slender, slightly retractively curved axial ribs, which are more distantly spaced on the early turns than on the later and which in some of the races become decidedly reduced on the last whorl. Some of these ribs develop into slender cusps at the summit at more or less regular intervals; these cusps are not infrequently hollow. The intercostal spaces are marked by microscopic axial threads. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, and marked by the continuation of the axial ribs and, in the exposed portion of the umbilicus, by spiral threads. Aperture broadly oval, almost subcircular, peristome double, the inner exerted and slightly reflected on the outer lip but free from the outer, which is narrowly expanded on the outer lip, a little more expanded on the inner, and which forms a moderately conspicuous auricle at the posterior angle. The outer peristome of the inner lip is deeply notched, and the portion posterior to the notch is reflected into the umbilicus, which it plugs. The outer peristome is marked by slender, concentric lamellae. The operculum is typically opisthosiphonid. The siphon, situated at the posterior angle of the aperture behind the peristome, connects with the channel behind the parietal portion of the outer peristome and in turn with the hollow axis and the decollated apex.

The species seems to be fairly widely distributed in Santa Clara Province. We are recognizing four subspecies, which the following key and descriptions will help to differentiate:

## KEY TO THE SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) OBTECTUM

Denticles at the summit distantly spaced.....	seibaboense
Denticles at the summit not distantly spaced.	
Axial ribs distantly spaced.....	obtectum
Axial ribs not distantly spaced.	
Whorls gibbose.....	tenuicostum
Whorls not gibbose.....	guayosense

## OPISTHOSIPHON (BERMUDEZSIPHONA) OBTECTUM SEIBABOENSE, new subspecies

## PLATE 13, FIGURE 4

This race, which was collected by Dr. Bermudez at Vereda de Herrera, Seibabo, Yaguajay, Santa Clara Province, is distinguished from the other three by having all the ribs much more distantly spaced and by having the denticles at the summit stronger and more distantly spaced. In the type there are 30 axial ribs on the first of the remaining whorls and 64 on the last whorl.

The type, U.S.N.M. No. 535452, has 3.2 whorls remaining and measures: Length, 12.0 mm.; greater diameter, 7.3 mm.; lesser diameter, 6.0 mm.

**OPISTHOSIPHON (BERMUDEZSIPHONA) OBTECTUM OBTECTUM** Torre and Henderson

PLATE 13, FIGURE 1

1920. *Opisthosiphon (Opisthosiphona) obtectus* (Torre and Henderson MS.) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 68, *nomen nudum*.  
 1921. *Opisthosiphon (Opisthosiphon) obtectum obtectum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, pp. 262-263, pl. 42, figs. 2, 3.

This subspecies, which was described from El Palenque de Taguayabon, near Remedios, Santa Clara Province, and which we have also found at Rojas, Remedios, differs from *O. (B.) obtectum seibaboense* in being slenderer, in having the whorls a little more inflated, and in having the axial ribs more pronounced, more closely spaced, and much more numerous. The ribs also have faint indications of obsolete nodules. In the type the first of the remaining whorls has 26 axial ribs, while on the last there are 68.

The type, U.S.N.M. No. 314961, has a little more than 3 whorls remaining and measures: Length, 12.3 mm.; greater diameter, 7.9 mm.; lesser diameter, 5.8 mm.

**OPISTHOSIPHON (BERMUDEZSIPHONA) OBTECTUM TENUICOSTUM** Torre and Henderson

PLATE 13, FIGURE 6

1921. *Opisthosiphon (Opisthosiphon) obtectum tenuicostum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 263, pl. 42, figs. 4, 5.

This race comes from Cerro de la Puntilla near Remedios, Santa Clara Province. It differs from *O. (B.) obtectum obtectum* in being more chubby, with the whorls more inflated, the ribs much less strongly developed, and the denticles even more numerous. The outer peristome is also less expanded. In the weakness of the axial ribs it resembles *O. (B.) obtectum seibaboense*. In the type there are 32 axial ribs on the first of the remaining whorls and 80 on the last whorl.

The type, U.S.N.M. No. 314962, has a little more than 3 whorls remaining and measures: Length, 10.2 mm.; greater diameter, 6.7 mm.; lesser diameter, 5.5 mm.

Animals of this subspecies collected by Bartsch on La Puntilla August 5, 1928, were described by him as being dark olivaceous with numerous lighter dots on the papillae. Tentacles pale orange tipped at the slightly expanded end with black, which coloring produces a very striking effect. The animal suspends with a mucous thread when at rest.

## OPISTHOSIPHON (BERMUDEZSIPHONA) OBTECTUM GUAYOSENSE, new subspecies

## PLATE 13, FIGURE 2

This race comes from the caves near Guayos, in Santa Clara Province. We have also seen it from Las Damas, near Guayos. It differs from the other three subspecies in being much more slender, with the whorls a little less inflated. The ribs are about as strongly developed as those of typical *O. (B.) obtectum obtectum*, stronger than in the other two races. The denticulations at the summit also resemble those of typical *obtectum*. In the type there are 30 ribs on the first of the remaining turns and 104 on the last.

The type, U.S.N.M. No. 355514, has a little more than 4 whorls remaining and measures: Length, 12.2 mm.; greater diameter, 6.2 mm.; lesser diameter, 5.2 mm.

## OPISTHOSIPHON (BERMUDEZSIPHONA) INSULANUM, new species

Shell subeylindric, rather thin, pale straw colored, with interrupted spiral bands of brown. The early whorls are decollated in all our specimens. Those remaining are very strongly inflated and rounded, and crossed by slightly retractively slanting axial ribs, which are more distantly spaced on the early whorls than on the later, where they are rather closely approximated. These riblets at rather close intervals form slender minute cusps at the summit. The intercostal spaces are marked by microscopic axial threads. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, strongly rounded, and marked by the continuation of the axial ribs and in the exposed portion of the umbilicus by a number of spiral cords, which render the axial ribs feebly nodulose at their junctions. Aperture broadly oval; peristome double, the inner exerted, erect; the outer forming a conspicuous auricle at the posterior angle, narrower on the outer and basal lip, and again expanded on the inner lip, where it is strongly notched; the portion posterior to the notch is bent into and plugs the umbilicus. The outer peristome is marked by slender, concentric lamellae. Operculum typically opisthosiphonid. The siphon situated at the posterior angle of the aperture immediately behind the peristome bends into the suture and connects through a slender channel behind the parietal wall of the outer peristome with the umbilicus, the hollow axis, and the decollated apex.

The species appears to be confined to the small islands lying off the Santa Clara coast near Caibarien.

We are recognizing two subspecies, which the following key and descriptions will help to differentiate:

## KEY TO THE SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) INSULANUM

Suture strongly constricted.....	<b>scopulorum</b>
Suture enormously constricted.....	<b>insulanum</b>

## OPISTHOSIPHON (BERMUDEZSIPHONA) INSULANUM SCOPULORUM, new subspecies

## PLATE 13, FIGURE 7

This race was collected by Dr. Bermudez on Cayo de la Salina, east of Caibarien. It is distinguished from *O. (B.) insulanum insulanum* by having the suture much less strongly constricted, with the denticles at the summit much more pronounced and less abundant. The outer lip is much more expanded and the interrupted spiral bands are less pronounced. In the type 43 axial ribs are on the first of the remaining turns and 115 are on the last whorl.

The type, U.S.N.M. No. 535454, has 3.5 whorls remaining and measures: Length, 8.4 mm.; greater diameter, 6.1 mm.; lesser diameter, 4.7 mm.

## OPISTHOSIPHON (BERMUDEZSIPHONA) INSULANUM INSULANUM, new subspecies

## PLATE 13, FIGURE 5

This race was collected by Dr. Bermudez on Cayo de la Aguada, east of Caibarien. It is distinguished from *O. (B.) insulanum scopulorum* in having the suture much more strongly constricted, with the denticles at the summit less feeble. The strong constriction gives to the shell an almost pupoid appearance. The type has 35 axial ribs on the first of the remaining turns and 105 on the last whorl.

The type, U.S.N.M. No. 535453, has 3.5 whorls remaining and measures: Length, 10.0 mm.; greater diameter, 5.6 mm.; lesser diameter, 4.7 mm.

## OPISTHOSIPHON (BERMUDEZSIPHONA) SALUSTII Torre and Henderson

## PLATE 13, FIGURE 9

1920. *Opisthosiphon (Opisthosiphona) salustii* (Torre and Henderson) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67, *nomen nudum*.

1921. *Opisthosiphon (Opisthosiphona) salustii* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, pp. 256-257, pl. 40, figs. 5, 7.

Shell very broadly elongate-conic, flesh colored, with 4 interrupted spiral bands of brown on the spire and 3 on the base. The umbilical wall is pale brown and the outer lip of the outer peristome is rayed with brown. Nuclear whorls 2, small, well rounded, microscopically granulose, with the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded and marked by slightly retractively slanting axial ribs, which are very distantly spaced on the early turns and which become gradually more closely approximated as the shell increases in size; on the last turn they are separated by spaces as wide as the riblets. In the type, 32 of these riblets occur upon the first of the remaining turns, 38 upon the second, 66 upon the third, and 108 upon the last.

Some of these riblets become expanded at rather regular intervals at the summit, where they project as slender hollow cusps. The intercostal spaces are marked by microscopic axial threads. Suture strongly constricted. Periphery strongly rounded. Base short, inflated, openly umbilicated, marked by the continuation of the axial riblets and by 3 spiral threads on the edge of the umbilicus, and by 10 within the umbilicus. Last whorl solute for about one-eighth of a turn. Aperture broadly oval; peristome double, the inner exerted and slightly reflected; the outer moderately broadly expanded, a little more so on the inner and the parietal wall than on the rest, and reflected as a broad backward-turned auricle at the posterior angle, which covers the backward-directed siphon. Operculum typically opisthosiphonid.

The type, U.S.N.M. No. 314954, comes from Finca Santa Rita near El Cercado, Cubitas Mountains, Camagüey Province. It has a little more than 3 whorls and measures: Length, 10.9 mm.; greater diameter, 8.0 mm.; lesser diameter, 5.9 mm.

The collection also includes a large series of specimens collected by Bartsch at Finca Gertrudis, a little east of the type locality.

**OPISTHOSIPHON (BERMUDEZSIPHONA) EVANIDUM** Torre and Henderson

Shell elongate-conic, flesh colored except for the plug at the decollated end, which is brown. Nuclear whorls decollated. Postnuclear whorls inflated, strongly rounded, and marked by slender, retractively curved axial riblets, which are very distantly spaced on the early turns and which become gradually more closely approximated. On the last whorl the spaces that separate them are only about twice as wide as the riblets. The intercostal spaces are marked by microscopic axial threads. At more or less regular intervals some of these riblets become expanded and thickened at the summit, where they form conspicuous white hollow denticles. Suture strongly constricted. Periphery strongly inflated, well rounded. Base short, openly umbilicated, inflated, well rounded, and marked by the continuation of the axial riblets and feeble spiral threads on the bend of the umbilicus, and by stronger spiral threads on the umbilical wall. Last whorl solute for about one-fourth of a turn. Aperture broadly oval; peristome double, the outer moderately expanded on the inner lip and at the posterior angle, where it forms a conspicuous auricle that is reflected over the siphon. On the outer and basal lip it extends but slightly beyond the inner peristome; inner peristome slightly exerted and reflected. Operculum typically opisthosiphonid.

The species appears to be confined to the south side of the Cubitas Mountains, Camagüey Province.

We are recognizing two subspecies. These may be differentiated by the following key and descriptions:

KEY TO THE SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) EVANIDUM

Spiral cords of umbilical wall moderately strong----- *evanidum*  
 Spiral cords of umbilical wall feeble----- *degeneratum*

OPISTHOSIPHON (BERMUDEZSIPHONA) EVANIDUM EVANIDUM Torre and Henderson

PLATE 13, FIGURE 10

1921. *Opisthosiphon (Opisthosiphona) evanidum evanidum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 258, pl. 41, figs. 1, 2.

This subspecies was collected by Torre and Sifontes at Finca La Loma, on the south-central side of the Cubitas Mountains. It differs from *O. (B.) evanidum degeneratum* in being larger, more robust, more inflated, and apparently lacking the faint interrupted spiral band of brown which is usually present in that race. In the type there are 40 axial riblets on the first of the remaining turns and 136 on the last.

The type, U.S.N.M. No. 314950, has a little more than 4 whorls remaining and measures: Length, 12.2 mm.; greater diameter, 8.3 mm.; lesser diameter, 6.1 mm.

OPISTHOSIPHON (BERMUDEZSIPHONA) EVANIDUM DEGENERATUM Torre and Henderson

PLATE 13, FIGURE 3

1921. *Opisthosiphon (Opisthosiphona) evanidum degeneratum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 258, pl. 41, figs. 3, 8.

This subspecies was collected by Torre and Sifontes on Monte de Santa Cruz, at the right of Los Cangilones. It differs from the typical race in being always smaller, less inflated, more regularly conic, and in usually having indications of interrupted spiral bands of brown. In the type there are 40 axial ribs on the first of the remaining whorls and 130 on the last turn.

The type, U.S.N.M. No. 314956, has 4.0 whorls remaining and measures: Length, 11.0 mm.; greater diameter, 7.3 mm.; lesser diameter, 5.8 mm.

OPISTHOSIPHON (BERMUDEZSIPHONA) SUBOBTURATUM Torre and Henderson

Shell varying from broadly ovate to elongate-ovate in shape and varying in color from horn colored to pale brown, unicolor or with a broad spiral band of darker brown at the periphery; peristome white. Nuclear whorls 2, inflated, strongly rounded, forming an almost cylindrical truncated apex. Postnuclear whorls inflated, strongly rounded, and marked by retractively slanting axial ribs, which are distantly spaced on the early turns and which are much more closely

approximated on the later whorls. These riblets at irregular intervals form small, more or less rounded, white, hollow cusps at the summit. The intercostal spaces are marked by microscopic axial hairlines. Suture well constricted. Periphery decidedly inflated, well rounded. Base short, inflated, well rounded, openly umbilicated, and marked by the continuation of the axial ribs and by a series of low equal spiral threads within the umbilicus. The last whorl is solute for about one-fifth of a turn, the outer peristome of the parietal wall sometimes touching the preceding whorl. Aperture broadly ovate; peristome double, the inner exerted, reflected, and appressed to the outer lip, free on the inner lip; the outer peristome is narrow on the outer lip and decidedly expanded on the inner and parietal wall. There is a deep notch on the inner lip, posterior to which the peristome is reflected over the umbilicus, which it partially shields. Operculum typically opisthosiphonid. Siphon behind the posterior angle of the aperture directed backward and free.

The species appears restricted to the western end of the Cubitas Mountains. We are recognizing two subspecies, which the following key and descriptions will differentiate:

KEY TO THE SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) SUBOBTURATUM  
 Shell ovate..... subobturatum  
 Shell very broadly ovate..... tinajaense

OPISTHOSIPHON (BERMUDEZSIPHONA) SUBOBTURATUM SUBOBTURATUM  
 Torre and Henderson

PLATE 13, FIGURE 8

1920. *Opisthosiphon (Opisthosiphona) subobturatus* HENDERSON and BARTSCH,  
 Proc. U. S. Nat. Mus., vol. 58, p. 67, MS.  
 1921. *Opisthosiphon (Opisthosiphona) obturatum subobturatum* TORRE and HEN-  
 DERSON, Proc. U. S. Nat. Mus., vol. 59, p. 253, pl. 39, figs. 7-11.

This race was collected by Torre, Henderson, and Simpson in the Paso de las Trincheras, in a cave known as Los Indios, Camagüey Province. It is distinguished from *O. (B.) subobturatum tinajaense* in being much less rotund; that is, it is more elongate-ovate and is nearer unicolor. The type has 34 axial ribs on the first of the remaining turns and 130 on the last.

The type, U.S.N.M. No. 314949, has a little more than 4 whorls remaining and measures: Length, 13.5 mm.; greater diameter, 9.2 mm.; lesser diameter, 6.9 mm.

OPISTHOSIPHON (BERMUDEZSIPHONA) SUBOBTURATUM TINAJAENSE, new subspecies

PLATE 13, FIGURE 13

This race was collected in large numbers at many stations in Paso de la Tinaja, Cubitas Mountains, the pass west of Trincheras, Camagüey Province. It is distinguished from *O. (B.) subobturatum subobturatum* by its more rotund shape and by its much more conspic-

uous banding. On the first of the remaining turns in the type there are 47 axial ribs, with 133 on the last whorl.

The type, U.S.N.M. No. 535455, comes from the paredones 2.5 km. from the north entrance to Paso de la Tinaja. It has 4.0 whorls remaining and measures: Length, 13.8 mm.; greater diameter, 10.4 mm.; lesser diameter, 8.0 mm.

OPISTHOSIPHON (BERMUDEZSIPHONA) TORREI Welch

PLATE 14, FIGURE 4

1929. *Opisthosiphon torrei* WELCH, Nautilus, vol. 42, p. 98, pl. 5, fig. 3.

1934. *Opisthosiphon (Opisthosiphon) torrei* WELCH, Nautilus, vol. 47, p. 131, pl. 11, fig. 6.

Shell elongate-ovate, thin, pale brown with the axial ribs almost white; peristome pale yellow. Nuclear whorls unknown. Post-nuclear whorls strongly rounded, marked by rather distantly spaced, slender, lamellar axial ribs, which are feebly nodulose, the nodules at the summit and those adjacent to the summit being more pronounced than those on the rest of the turn. At the summit the ribs form slender hollow cusps, which extend up against the wall of the preceding turn. The intercostal spaces are marked by microscopic hairlines. Of these ribs, 27 are present on the last turn of the specimen figured. The spaces between the axial ribs are marked by many microscopic threads. Suture well constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, moderately widely umbilicated, and marked in the outer portion of the umbilicus by 2 feeble spiral threads, which render the axial ribs somewhat spinose at their intersection. Aperture very broadly oval; peristome double, the inner exerted and slightly reflected; the outer broadly expanded and marked by strongly elevated concentric lamellae. The outer peristome is folded on the middle of the inner lip; posterior to the fold it is reflected over the umbilicus. It is adnate to the preceding turn on the parietal wall. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture behind the peristome bent into the suture, evidently communicating with the umbilicus.

The specimen figured, U.S.N.M. No. 425682, is one of two; it has 3.6 whorls remaining and measures: Length, 9.8 mm.; greater diameter, 6.3 mm.; lesser diameter, 4.9 mm. It was collected by Drs. Pilsbry and Welch on a hill east of Chambas River, Florencia, Camagüey Province.

OPISTHOSIPHON (BERMUDEZSIPHONA) CAGUANENSE, new species

PLATE 14, FIGURE 12

Shell elongate-ovate, ranging from pale yellow to brown, unicolor, or interruptedly spirally banded; the dots composing the bands are usually distantly spaced and are arranged in both axial and spiral

series; these dots may be present on both spire and base. Nuclear whorls decollated. Postnuclear whorls inflated, strongly rounded, marked by slightly retractively slanting, sublamellar axial ribs, of which 29 are present on the first whorl and 86 on the last. Almost every other one of these ribs is expanded at the summit into a hollow cusp. The intercostal spaces are wider than the ribs and they are marked by microscopic hairlines. Suture well impressed. Periphery inflated, well rounded. Base moderately long, well rounded, and marked by the continuation of the axial ribs which extend into the umbilicus. The umbilicus is narrowly open and it is marked by a series of concentric spiral threads, which render the axial ribs decidedly nodulose at their junction. Aperture broadly oval; peristome double, the inner slightly exerted, scarcely reflected; the outer broadly expanded, forming somewhat of an auricle at the posterior angle of the aperture, deeply notched on the inner lip, the portion posterior to the notch expanded as a broad flap, which is reflected over the umbilicus, which it partly conceals. The outer peristome is marked by slender concentric lamellae. Operculum typically opisthosiphonid. Siphon situated behind the peristome at the posterior angle of the aperture, directed into the suture.

The type, U.S.N.M. No. 535456, comes from Cayo Caguanes, Yaguajay, Santa Clara Province. It has 4.2 whorls remaining and measures: Length, 13.8 mm.; greater diameter, 8.7 mm.; lesser diameter, 6.2 mm. The type is a little larger than additional specimens before us from the same locality.

**OPISTHOSIPHON (BERMUDEZSIPHONA) SUBOBTECTUM, new species**

Shell ovate, rather thin, varying in color from pale yellow to brown, unicolor, or with faint interrupted spiral bands of brown. Nuclear whorls about 2, small, inflated, strongly rounded, forming a slender truncated apex. Postnuclear whorls inflated, strongly rounded, marked by retractively slanting axial ribs, which are only a trifle more distantly spaced on the early turns than on the last. Most of these ribs expand into tiny cusps at the summit. Intercostal spaces marked by microscopic axial hairlines. Suture strongly constricted. Periphery inflated, well rounded. Base short, inflated, strongly rounded and openly umbilicated, marked by the continuation of the axial ribs and by a series of spiral threads within the umbilicus. These threads render the axial riblets weakly nodulose. Aperture broadly oval, almost subcircular; peristome double, the inner exerted and very slightly expanded; the outer expanded, narrow on the outer and the basal lip, broader at the posterior angle, widest on the inner lip, at the middle of which it is deeply infolded and reflected over the umbilicus. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture behind the peristome directed into the suture.

This species centers about Remedios, Santa Clara Province.  
Four subspecies may be differentiated by the following key:

KEY TO THE SUBSPECIES OF *OPISTHOSIPHON* (*BERMUDEZSIPHONA*) *SUBOBTECTUM*

Axial ribs moderately strongly developed.

Shell short and pupoid.

Reflected portion of the inner lip of the outer peristome

broad..... *subobtectum*

Reflected portion of the inner lip of the outer peristome

not broad..... *puntillense*

Shell not short and pupoid, but elongate..... *guajabanense*

Axial ribs feeble..... *quintanense*

*OPISTHOSIPHON* (*BERMUDEZSIPHONA*) *SUBOBTECTUM SUBOBTECTUM*,  
new subspecies

PLATE 14, FIGURE 2

This subspecies comes from Rojas, near Remedios, Santa Clara Province. It has the suture strongly constricted, which gives it a pupoid aspect. The axial ribs are fairly strongly developed and the outer peristome is very broadly expanded on the inner lip, where it is bent in rather than out. This alone will differentiate it from the other pupiform member, *O. (B.) subobtectum puntillense*. In the type there are 22 axial ribs on the first of the remaining turns and 67 on the last whorl.

The type, U.S.N.M. No. 535458, has 3.5 whorls remaining and measures: Length, 9.5 mm.; greater diameter, 6.2 mm.; lesser diameter, 5.3.

*OPISTHOSIPHON* (*BERMUDEZSIPHONA*) *SUBOBTECTUM PUNTILLENSE*, new  
subspecies

PLATE 14, FIGURE 3

In this race also the shape is pupiform, in which respect it resembles typical *O. (B.) subobtectum subobtectum*, from which it is easily distinguished by the much less expanded outer peristome of the inner lip. Like typical *subobtectum*, the spiral threads in the umbilicus are feebly expressed. *O. (B.) subobtectum puntillense* comes from La Puntilla, a block of limestone 2 miles southwest of Remedios, Santa Clara Province. In the type 30 axial ribs are present on the first of the remaining turns and 62 are on the last.

The type, U.S.N.M. No. 535457, has 3.2 whorls remaining and measures: Length, 8.2 mm.; greater diameter, 5.7 mm.; lesser diameter, 4.7 mm.

Animals of this subspecies collected by Bartsch at La Puntilla August 7, 1928, were described by him as being of smoke gray ground color, with a pinkish area about the base of the tentacles; sides with an olivaceous tinge with numerous small, low papillae having many

grayish dots. Sole of the foot a little paler than the sides, deeply medially cleft. The motion may be direct or jerky. The animal suspends by a mucous thread when at rest.

**OPISTHOSIPHON (BERMUDEZSIPHONA) SUBOBTECTUM GUAJABANENSE, new subspecies**

PLATE 14, FIGURE 13

A large series of specimens of this subspecies were taken by Bartsch on Cerro de Guajabana, near Caibarién. It is most nearly related to *O. (B.) subobtectum quintanense*, but it is readily distinguished from that by its darker color, interrupted spiral bands, and stronger sculpture. There are 46 axial ribs on the first of the remaining whorls and 61 on the last turn.

The type, U.S.N.M. No. 535459, has 3.5 whorls remaining and measures: Length, 12.5 mm.; greater diameter, 7.9 mm.; lesser diameter, 6.0 mm.

Animals of this subspecies, collected by Bartsch at Guajabana August 8, 1928, were described by him as having the dorsal parts sooty, a little paler about the base of the tentacles and eyes. Entire body, except the sole of the foot, covered by numerous flattened papillae, which are made up of many whitish dots. Tentacles sooty with a dusky orange ring about the base. Sole of the foot deeply, medially cleft, smoke gray, with an olivaceous tinge. The animal when at rest suspends by a mucous thread. In this subspecies the male is smaller than the female.

**OPISTHOSIPHON (BERMUDEZSIPHONA) SUBOBTECTUM QUINTANENSE, new subspecies**

PLATE 14, FIGURE 14

This race was collected by Bartsch at Loma de Quintana, a limestone block about 4 miles slightly southwest of Caibarién, and an equal distance a little east and north of Remedios. This is one of the elongate-ovate members. The shell is pale and the ribs are very poorly developed. In size it approaches *O. (B.) subobtectum guajabanense*, but it is easily distinguished from *guajabanense* by its pale color and feeble sculpture. There are 34 axial ribs on the first of the remaining turns and 68 are on the last whorl.

The type, U.S.N.M. No. 535460, has 3.4 whorls remaining and measures: Length, 11.8 mm.; greater diameter, 7.3 mm.; lesser diameter, 5.9 mm.

Animals of this subspecies were collected by Bartsch at Loma de Quintana on August 9, 1928, and were described by him as having the upper part of smoke-gray color, paler on the forehead, with a pinkish area above the base of the tentacles, which are pale orange tipped with

dark bluish gray, almost black. There are numerous fine dots and streaks on the forehead and dorsum. Sides of the body dark smoky gray with olivaceous suffusion. The numerous flattened papillae are marked by many fine white dots. Sole of the foot smoke gray, deeply medially cleft. Motion direct. The animal suspends by a mucous thread when at rest.

**OPISTHOSIPHON (BERMUDEZSIPHONA) AGUILERIANUM (Arango)**

Shell very elongate-ovate, straw colored, with or without faint interrupted spiral bands of brown. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming an apex that is in perfect continuation of the rest of the spire. Postnuclear whorls rather high between summit and suture, well rounded, marked by slender sublamellar axial ribs, which form hollow cusps at the summit. The intercostal spaces are marked by microscopic axial hairlines. Suture well impressed. Periphery inflated, strongly rounded. Base rather long, well rounded, and marked by the continuation of the axial ribs, which extend into the moderately broadly open umbilicus, and by several spiral threads in the umbilicus, which render the axial riblets scalloped at their junction. Aperture broadly oval; peristome double, the inner somewhat exerted, slightly reflected; the outer broadly expanded, a little narrower on the basal lip than on the rest, neither notched nor inbent on the inner lip, marked by slender concentric lamellae. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture bent backward into the suture.

This species, as far as known, is restricted to Oriente Province. We are recognizing two subspecies, which the following key and descriptions will help to differentiate.

**KEY TO THE SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) AGUILERIANUM**

Hollow cusps at the summit very strongly developed..... *aguilerianum*  
 Hollow cusps at the summit weakly developed..... *holguinense*

**OPISTHOSIPHON (BERMUDEZSIPHONA) AGUILERIANUM AGUILERIANUM (Arango)**

PLATE 14, FIGURE 9

1876. *Cyclostoma aguilerianum* ARANGO, An. Acad. Cienc. Med., Fis. Nat. Habana, vol. 12, p. 280.

1878. *Tudora? aguileriana* ARANGO, Contribucion a la fauna malacologica Cubana, p. 21.

1932. *Opisthosiphon aguilerianum* AGUAYO, Nautilus, vol. 45, pp. 92-93.

The typical subspecies was originally described by Arango with no more specific locality than that it was collected in Cuba by Wright. This race was lost for a long time. It was rediscovered by Torre at Gibara. We are figuring Arango's type, U.S.N.M. No. 535461, and a complete specimen of Torre's collecting.

This subspecies may be distinguished from *O. (B.) aguilarianum holguinense* in having the ribs more distantly spaced and the cusps at the summit much stronger. There appears also to be a lesser tendency to banding.

The complete specimen, U.S.N.M. No. 535462, has 21 axial ribs on the first turn and 44 on the last. It has 7.3 whorls and measures: Length, 12.3 mm.; greater diameter, 6.0 mm.; lesser diameter, 4.9 mm.

OPISTHOSIPHON (BERMUDEZSIPHONA) AGUILERIANUM HOLGUINENSE Aguiayo

PLATE 14, FIGURE 11

1932. *Opisthosiphon aguilarianum holguinense* AGUAYO, Nautilus, vol. 45, p. 93, pl. 6, fig. 1.

This subspecies comes from Cerro San Juan, Sao Arriba, Holguin, Oriente Province. It differs from the typical race in having the axial ribs more numerous, more closely spaced, and less strongly cusped at the summit.

The specimen figured, U.S.N.M. No. 535463, has 35 axial ribs on the first of the remaining turns and 57 on the last. It has 4.4 whorls remaining and measures: Length, 11.8 mm.; greater diameter, 6.0 mm.; lesser diameter, 5.3 mm.

OPISTHOSIPHON (BERMUDEZSIPHONA) DETECTUM Torre and Henderson

Shell small, ovate, rather thin, varying in color from pale yellow to pale brown, unicolor, or interruptedly spirally banded. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, and marked by retractively slanting axial riblets, which in the subspecies *murinum* are rather conspicuously nodulose on the posterior portion of the whorls, much less so in the other races where the nodules are scarcely indicated. The intercostal spaces are marked by microscopic axial hairlines. Most of the axial ribs develop into slender hollow cusps at the summit. These vary in strength in the various races. Suture strongly constricted. Periphery of the last whorl inflated, strongly rounded. Base short, moderately openly umbilicated, strongly rounded, marked by the continuation of the axial ribs and within the umbilicus marked by spiral threads, which are also of varying strength and number in the different races. Aperture broadly oval; peristome double, the inner moderately exerted and very slightly reflected; the outer rather broadly expanded, slightly inbent in the middle of the inner lip in two of the races, adnate to the preceding turn at the parietal wall, and marked by concentric laminae. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture behind the peristome directed backward into the suture.

We are recognizing three subspecies, which the following key and descriptions will help to characterize:

KEY TO THE SUBSPECIES OF *OPISTHOSIPHON* (*BERMUDEZSIPHONA*) *DETECTUM*

Inner lip of outer peristome slightly inbent in the middle.

Shell unicolor..... **murinum**

Shell interruptedly spirally banded with brown..... **lucasense**

Inner lip of outer peristome not inbent in the middle..... **detectum**

***OPISTHOSIPHON* (*BERMUDEZSIPHONA*) *DETECTUM MURINUM*, new subspecies**

## PLATE 14, FIGURE 8

This subspecies was collected by Dr. Bermudez on Cayo Ratones, east of Caibarien, Santa Clara Province. It is white or pale yellow and it has the inner lip of the outer peristome slightly flexed and the axial ribs rather conspicuously denticulated. There are no signs of spiral threads in the intercostal spaces.

The type, U.S.N.M. No. 535464, has 39 axial ribs on the first of the remaining turns and 77 on the last. The type has 3.2 whorls remaining and measures: Length, 9.0 mm.; greater diameter, 5.7 mm.; lesser diameter, 4.5 mm.

***OPISTHOSIPHON* (*BERMUDEZSIPHONA*) *DETECTUM LUCASENSE*, new subspecies**

## PLATE 14, FIGURE 7

This race was collected by Dr. Bermudez on Cayo Lucas, east of Caibarien. It lacks the denticulations of the ribs of *O. (B.) detectum murinum* and the ribs are much more closely spaced than in *O. (B.) detectum detectum*. It likewise has scarcely any indications of flexing of the inner lip of the outer peristome.

The type, U.S.N.M. No. 535465, has 22 axial ribs on the first of the remaining turns and 60 upon the last whorl; it has 4.2 whorls remaining and measures: Length, 10.4 mm.; greater diameter, 6.3 mm.; lesser diameter, 5.0 mm.

***OPISTHOSIPHON* (*BERMUDEZSIPHONA*) *DETECTUM DETECTUM* Torre and Henderson**

## PLATE 14, FIGURE 10

1920. *Opisthosiphon* (*Opisthosiphona*) *detectus* (Torre and Henderson) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 68, *nomen nudum*.

1921. *Opisthosiphon* (*Opisthosiphon*) *detectum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, pp. 261-262, pl. 42, fig. 1.

The typical subspecies was collected by Torre at Casimbas de las Llanadas, Sierra de Canoa, Mayajigua, Santa Clara Province. It differs from the other two subspecies in having the axial ribs much more closely spaced, with the denticles at the summit finer. The indication of nodules on the axial ribs occurs only on the early whorls near the summit. There is a slight flexing on the middle of the outer lip.

The type, U.S.N.M. No. 314960, has 39 axial ribs on the first of the remaining turns and 84 on the last whorl; it has 3.8 whorls remain-

ing and measures: Length, 10.3 mm.; greater diameter, 6.0 mm.; lesser diameter, 5.0 mm.

**OPISTHOSIPHON (BERMUDEZSIPHONA) BERMUDEZI, new species**

PLATE 14, FIGURE 6

Shell small, ovate, thin, pale brown, with yellowish peristome. Nuclear whorls 2, strongly rounded, microscopically granulose. Post-nuclear whorls inflated, strongly rounded, and marked by almost vertical sublamellose axial ribs, which are rather distantly spaced, of which 22 occur on the first and 47 on the last of the remaining turns in the type. These ribs form slender denticles at the summit. Intercostal spaces broad, marked by microscopic axial threads. Suture very strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, and marked by the continuation of the axial ribs and by several strong spiral cords at the outer edge of the umbilicus and feebler ones within. These cords render the axial ribs scalloped. Umbilicus rather large. Aperture broadly oval; peristome double, the inner exerted and slightly reflected; the outer rather broadly expanded, forming a slight auricle at the posterior angle of the aperture, marked by concentric lamellae. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture behind the peristome directed into the suture.

This species appears rather widely distributed among the hills about Vega Alta, Santa Clara Province. We have seen it from Vereda del Abra, Lomas Murciélagos, Sinaloa, and Sola.

The type, U.S.N.M. No. 535466, comes from Loma Murciélagos; it has 3.5 whorls remaining and measures: Length, 8.6 mm.; greater diameter, 5.6 mm.; lesser diameter, 4.7 mm.

Animals of this species, collected by Bartsch at Loma Murciélagos, near Vega Alta, on August 16, 1928, were described by him as being buff above with a decidedly rosy tinge behind the tentacles. Snout a little paler at the tip. Tentacles bright buff, tipped with bluish black. Sides of the body and the deeply cleft sole of the foot pale olivaceous. The motion is steady.

**OPISTHOSIPHON (BERMUDEZSIPHONA) ANDREWSI Welch**

PLATE 14, FIGURE 1

1929. *Opisthosiphon andrewsi* WELCH, Nautilus, vol. 42, p. 98, pl. 5, fig. 6.

1934. *Opisthosiphon andrewsi* WELCH, Nautilus, vol. 47, p. 130, pl. 11, fig. 5.

Shell small, ovate, thin, pale brown with pale yellow peristome. Nuclear whorls decollated in our specimens. Postnuclear whorls strongly rounded, marked by very distantly spaced lamellose axial ribs, which bear feeble indications of scallops, 17 of which occur on the first and 23 on the last of the remaining turns. These ribs are expanded at the summit into narrow, low cusps. The intercostal spaces

are very broad and they are marked by numerous microscopic axial threads. Suture strongly constricted. Periphery inflated, well rounded. Base short, openly umbilicated, inflated, strongly rounded, and marked by the continuation of the axial ribs and within the umbilicus and its outer edge by low spiral threads, which render the axial ribs nodulose. Aperture broadly oval; peristome double, the inner slightly exerted and reflected, but not adnate to the outer; the outer broadly, flaringly expanded, marked by numerous concentric lamellae, broadest on the inner lip, where it is partly reflected over the umbilicus, and at the posterior angle of the aperture. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture reflected backward into the suture.

The specimen figured, U.S.N.M. No. 425684, is one of 3 paratypes received from Dr. Welch, collected by him on the south slope of Loma de Florencia, Camagüey. It has 4.5 whorls remaining and measures: Length, 12.0 mm.; greater diameter, 7.0 mm.; lesser diameter, 6.1 mm. The extremely distant spacing of the ribs combined with the notch in the inner lip will easily distinguish this from the other Bermudez-siphonas.

#### Subgenus OPISTHOSIPHONA Henderson and Bartsch

1920. *Opisthosiphona* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67.

Opisthosiphons without spiral sculpture on spire and base, the spiral threads being present in the umbilicus only, and with the axial ribs terminating individually without fusing at the summit. There are no microscopic axial lines between the axial ribs.

Type: *Opisthosiphon (Opisthosiphona) moreletianum* (Petit).

#### KEY TO THE SPECIES OF THE SUBGENUS OPISTHOSIPHONA

Umbilicus closed.....	pupoides
Umbilicus open.	
Last whorl decidedly solute.....	moreletianum
Last whorl slightly solute.....	plicatum
Last whorl not solute.....	turiguanoense

#### OPISTHOSIPHON (OPISTHOSIPHONA) PUPOIDES (Morelet)

Shell elongate-conic, varying from flesh colored to pale brown, marked by interrupted spiral bands of brown, the elements composing these bands being arranged in both axial and spiral series. Nuclear whorls 2, inflated, well rounded, microscopically granulose. Post-nuclear whorls inflated, strongly rounded, marked by retractively slanting axial riblets, which extend very prominently to the summit, where they become expanded into hollow cusps, usually weaker ones alternating with stronger ones. Suture strongly constricted, crenulated by the denticles at the summit. Periphery inflated, well rounded.

Base strongly rounded, with closed umbilicus, marked by the continuation of the axial ribs and by several spiral threads within the umbilicus. Last whorl adnate to the preceding turn. Aperture broadly oval; peristome double, the inner slightly exerted and reflected; the outer broadly expanded and reflected, somewhat sinuous, marked by concentric lamellae, notched on the middle of the inner lip, the part posterior to the notch reflected over the umbilicus, which it closes. Operculum typically opisthosiphonid, rather large—too large to be withdrawn within the aperture. Siphon at the posterior angle of the aperture directed backward into the suture, from which it communicates by a channel behind the parietal outer lip with the umbilicus, the hollow axis, and the decollated tip.

We are recognizing three subspecies, all from the Isle of Pines, which the following key and descriptions will help to differentiate:

KEY TO THE SUBSPECIES OF OPISTHOSIPHON (OPISTHOSIPHONA) PUPOIDES

Suture decidedly channeled.....	<b>pupoides</b>
Suture not decidedly channeled.	
Axial ribs of last whorl very closely spaced.....	<b>velazquezi</b>
Axial ribs of last whorl not very closely spaced.....	<b>bibijaguaense</b>

**OPISTHOSIPHON (OPISTHOSIPHONA) PUPOIDES PUPOIDES, new subspecies**

PLATE 15, FIGURE 4

1849. *Cyclostoma pupoides* MORELET, Testacea novissima insulae Cubana et Americae Centralis, p. 23.  
 1852. *Tudora pupoides* PFEIFFER, Catalogue of Phaneropneumona . . . in the British Museum, p. 180.  
 1920. *Opisthosiphon (Opisthosiphona) pupoides* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67.

Bartsch collected this subspecies in large numbers at many stations in the Sierra de Casas. It closely resembles typical *O. (O.) pupoides velazquezi* but may be differentiated by the deeply channeled suture.

The specimen figured, U.S.N.M. No. 535467, came from the south end of the west side of the Sierra de Casas. It has 44 axial ribs on the first remaining postnuclear whorl and 112 on the last; it has 7.0 whorls remaining and measures: Length, 17.8 mm.; greater diameter, 9.5 mm.; lesser diameter, 7.0 mm.

**OPISTHOSIPHON (OPISTHOSIPHONA) PUPOIDES VELAZQUEZI, new subspecies**

PLATE 15, FIGURE 6

We have seen this subspecies from many stations in the Sierra de Caballos. It is differentiated from *O. (O.) pupoides casasense* in having the suture not conspicuously channeled, with the outer peristome more strongly, obliquely reflected.

The type figured, U.S.N.M. No. 392000, is one of a series collected by Bartsch. It has 27 axial ribs on the first whorl and 147 on the last;

it is a complete specimen having 7.0 whorls and measuring: Length, 17.2 mm.; greater diameter, 9.2 mm.; lesser diameter, 7.0 mm.

**OPISTHOSIPHON (OPISTHOSIPHONA) PUPOIDES BIBIJAGUAENSE, new subspecies**

PLATE 15, FIGURE 3

Bartsch collected this subspecies in the Sierra de Bibijagua, Isle of Pines. It is decidedly smaller than the other two, and it has the channeling of the suture about halfway between the two.

The type, U.S.N.M. No. 535432, has 42 axial ribs on the first of the remaining turns and 95 on the last; it has 4.4 whorls remaining and measures: Length, 13.8 mm.; greater diameter, 8.0 mm.; lesser diameter, 5.8 mm.

**OPISTHOSIPHON (OPISTHOSIPHONA) MORELETIANUM (Petit)**

Shell elongate-conic, varying from flesh color through buff to pale brown, unicolor, or interruptedly spirally banded. The elements making up the spiral bands are usually arranged in both axial and spiral series. Nuclear whorls 2, well rounded, microscopically granulose, with the last portion of the last turn showing faint indications of the postnuclear axial sculpture. Postnuclear whorls strongly rounded, marked by retractively curved, slender axial riblets, which are about one-third as wide as the spaces that separate them. The axial riblets become expanded at the summit to form slender denticles. Suture moderately constricted, rendered crenulated by the denticles at the summit. Periphery inflated, well rounded. Base strongly rounded, openly umbilicated, marked by the continuation of the axial riblets, which extend into the umbilicus. Within the umbilicus and just outside of it a number of spiral threads are present. The last whorl is decidedly solute. The parietal peristome may almost touch the preceding whorl, but there is always at least a small slit between them. Aperture oval; peristome double, the inner moderately exerted and very slightly expanded; the outer is broadly expanded and marked by slender, raised, concentric lamellae; the outer peristome also forms a conspicuous auricle at the posterior angle where it is slightly reflected. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture immediately behind the reflected peristome.

This species comes from the Isle of Pines.

We are recognizing two subspecies, which the following key and descriptions will help to differentiate:

KEY TO THE SUBSPECIES OF OPISTHOSIPHON (OPISTHOSIPHONA) MORELETIANUM

Axial ribs of last whorl closely spaced..... columbense  
 Axial ribs of last whorl not closely spaced..... moreletianum

## OPISTHOSIPHON (OPISTHOSIPHONA) MORELETIANUM COLUMBENSE, new subspecies

## PLATE 15, FIGURE 5

This subspecies was collected by Bartsch at the Mogote Columbia, a limestone block southeast of the Sierra de Caballos. It differs from the typical *O. (O.) moreletianum moreletianum* in being much smaller and in having the axial ribs much more closely approximated.

In the type, U.S.N.M. No. 535468, the first postnuclear whorl has 30 axial ribs, while the last has 102. This is a complete specimen having 6 whorls and measuring: Length, 12.5 mm.; greater diameter, 7.2 mm.; lesser diameter, 5.3 mm.

## OPISTHOSIPHON (OPISTHOSIPHONA) MORELETIANUM MORELETIANUM (Petit)

## PLATE 15, FIGURE 2

1849. *Cyclostoma disjunctum* MORELET, Testacea novissima insulae Cubana et Americae Centralis, p. 23. Not *Cyclostoma disjunctum* Matheron, Ann. Sci. Midi France, vol. 3, p. 59, 1832.
1850. *Cyclostoma moreletiana* PETIT, Journ. Conchyl., vol. 1, p. 46, February 15.
1850. *Cyclostoma moreleti* PFEIFFER, Zeitschr. Malakozool., vol. 7, pp. 88-89, August.
1852. *Tudora moreletiana* PFEIFFER, Catalogue of Phaneropneumona . . . in the British Museum, p. 180.
1920. *Opisthosiphon (Opisthosiphona) moreletiana* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67.

The typical race comes from the Sierra de Casas where we found it on both the northern and southern half. It is differentiated from *O. (O.) moreletianum columbense* in being larger and in having the axial ribs more distantly spaced.

The specimen figured, U.S.N.M. No. 391711, has 35 axial ribs on the first postnuclear whorl and 71 on the last turn. It is a complete specimen of 6.8 whorls and measures: Length, 14.0 mm.; greater diameter, 8.2 mm.; lesser diameter, 5.7 mm.

The shell grows considerably larger than this, but we selected it because it was nearly complete. A specimen having 5 whorls remaining measures: Length, 17.3 mm.; greater diameter, 10.2 mm.; lesser diameter, 7.0 mm.

## OPISTHOSIPHON (OPISTHOSIPHONA) PLICATUM, new species

## PLATE 15, FIGURE 1

Shell elongate-ovate, thin, pale brown with interrupted spiral bands of darker brown. Nuclear whorls almost 2, strongly inflated and well rounded, microscopically granulose, forming a truncated apex. The last of the nuclear turns shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, and marked by retractively curved axial ribs, which are sublamellar on the early turns, but which are reduced to rounded threads on the last whorl.

The type has 46 of these ribs on the first postnuclear whorl and 104 on the last turn. These ribs almost alternately, though irregularly, form hollow cusps at the summit. Sometimes a second nodule appears on the ribs below the cusp at the summit. Suture strongly constricted. Periphery inflated, well rounded. Base short, well rounded, openly umbilicated, marked by the continuation of the axial ribs and by 5 spiral threads, within the umbilicus; these threads grow consecutively stronger toward the outer edge of the umbilicus. Umbilicus open. Last whorl solute for a fraction of a turn, although the outer peristome at the parietal wall usually touches or is adnate to the preceding turn. Aperture broadly oval; peristome double, the inner slightly exerted; the outer broadly expanded, more so on the inner lip than on the outer, marked by concentric laminae. The outer peristome is deeply infolded on the middle of the inner lip, hence the name. It forms a slight auricle at the posterior angle of the aperture. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture directed into the suture.

The type, U.S.N.M. No. 493371, comes from the Sierra de Caballos, Isle of Pines. It has 4.4 whorls remaining and measures: Length, 14.6 mm.; greater diameter, 8.7 mm.; lesser diameter, 6.3 mm.

The plication of the inner lip of the outer peristome will readily distinguish this species from *O. (O.) moreletianum*.

**OPISTHOSIPHON (OPISTHOSIPHONA) PLICATUM** subspecies?

On the Isle of Pines, off Punta Colombo, on a small island known as Morrillo del Diablo, Bartsch collected a lot of dead shells, U.S.N.M. No. 391972, which are too poor to serve for description. These appear to be a distinct subspecies of *plicatum*. The place was so heavily infested with spinose cacti that collecting was next to impossible.

**OPISTHOSIPHON (OPISTHOSIPHONA) TURIGUANOENSE**, new species

PLATE 15, FIGURE 7

Shell elongate-ovate, pale chestnut-brown, the peristome white with a brownish flush. Nuclear whorls 2, somewhat inflated, well rounded, microscopically granulose, forming a blunt apex. The first postnuclear whorls with rather distantly spaced, sublamellar axial ribs, which on the succeeding turns become reduced and more approximated, and which become rather feebly expressed on the last turn. These ribs become expanded at the summit into broad, white, hollow cusps. Of these ribs, 27 are present on the first whorl and 120 are on the last. Suture moderately constricted, rendered conspicuous by the white cusps of the axial ribs. Periphery slightly inflated, well rounded. Base moderately long, well rounded, and marked by the

continuation of the axial ribs and marked within the umbilicus by several whitish threads, which render the axial ribs feebly nodulose. The umbilicus is moderately wide but is shielded largely by the reflected peristome. Aperture broadly oval; peristome double, the inner exerted and slightly reflected; the outer forming a conspicuous auricle at the posterior angle, narrow on the basal half of the outer lip and the basal lip, and broadly expanded on the inner lip, on the middle of which it is somewhat inbent. On the parietal wall it forms a broad flap, which is adnate to the preceding turn. The entire outer peristome is marked by slender, constricted laminae. Operculum typically opisthosiphonid. Siphon at the posterior angle reflected backward into the suture.

A large series of specimens were collected on Signal Hill and the other hilltop on Turiguanó Island.

The type, U.S.N.M. No. 535469, has 4.4 whorls remaining, and measures: Length, 13.8 mm.; greater diameter, 7.8 mm.; lesser diameter, 6.0 mm.

CUBITASIPHONA, new subgenus

The members of this subgenus have axial ribs which at more or less regular intervals are gathered into tufts or cusps at the summit. No fine axial threads are present in the intercostal spaces. The spiral sculpture is confined to the umbilicus. In some species there is a tendency toward nodulation or vertebration of the axial ribs, particularly on the early whorls; this condition lends a false appearance of spiral threads, but in every such instance the intercostal spaces fail to show even a trace of spiral sculpture.

Type *Opisthosiphon (Cubitasiphona) poeyi*, new species.

KEY TO THE SPECIES OF THE SUBGENUS CUBITASIPHONA

Umbilicus closed.

Axial ribs very fine..... **poeyi**

Axial ribs not very fine.

Inner peristome very strongly protracted..... **protractum**

Inner peristome not very strongly protracted.

Suture strongly constricted..... **claudens**

Suture not strongly constricted..... **guanajaense**

Umbilicus not closed.

Last whorl adnate to preceding turn.

Axial ribs stout and coarse.

Nodulation on axial ribs conspicuous..... **quinti**

Nodulation on axial ribs absent.

Middle of inner lip of outer peristome slightly notched..... **manatiense**

Middle of inner lip of outer peristome not slightly notched..... **bioscai**

Axial ribs not stout and coarse.

Inner lip of outer peristome flexed or notched.

Shell elongate-ovate.

Inner lip of outer peristome flexed in the middle..... cunaguae

Inner lip of outer peristome notched in the middle..... judasense

Shell not elongate-ovate.

Shell ovate-conic.

Tufts at the summit regular and strong.. sanchezii

Tufts at the summit irregular and feeble.... sosai

Shell not ovate-conic.

Shell ovate.

Umbilicus very wide..... litorale

Umbilicus only moderately wide..... berryi

Inner lip of outer peristome not flexed or notched..... tersum

Last whorl not adnate to the preceding turn, but solute.

Outer peristome of inner lip flaringly expanded..... apertum

Outer peristome of inner lip not flaringly expanded.

Outer peristome of inner lip reflected backward..... deviatum

Outer peristome of inner lip not reflected backward.. paredonense

**OPISTHOSIPHON (CUBITASIPHONA) POEYI, new species**

PLATE 15, FIGURE 8

Shell moderately large, ovate, varying in color from pale straw color to chestnut-brown, unicolor or interruptedly spirally banded. Nuclear whorls 2, inflated, strongly rounded, microscopically granu-lose, forming a rather blunt apex. Postnuclear whorls inflated, strongly rounded, marked by numerous, closely spaced, slender axial riblets which are as wide as or a little narrower than the spaces that separate them. In the type 62 of these ribs are present on the first of the remaining turns and 255 are on the last whorl. Groups of these riblets, which are somewhat irregularly spaced, are gathered into hollow tufts at the summit; the riblets between the tufts terminate normally. Suture well constricted. Periphery inflated, strongly rounded. Base short, well rounded, marked by the continuation of the axial ribs. Aperture broadly oval; peristome double, the inner somewhat exerted and reflected, particularly so on the basal lip; on the parietal and outer lip it projects materially. The outer peristome forms an auricle at the posterior angle; it is narrow on the outer and basal lip and it becomes expanded on the inner lip and very widely expanded on the parietal wall. It is notched on the middle of the inner lip, and the broad flap posterior to the notch covers the umbilicus and part of the base. On the parietal wall the outer peristome expands materially over the preceding whorl, to which it is adnate. Operculum typically opisthosiphonid.

The type, U.S.N.M. No. 535470, was collected by Bartsch on paredones 2.5 km. from the north entrance of Paso de la Tinaja, Cubitas Mountains, Camagüey Province. It has 4.3 whorls remaining and measures: Length, 13.9 mm.; greater diameter, 8.1 mm.; lesser diameter, 7.0 mm. A large series of specimens were collected at various stations through this pass.

This species is named for Federico Poey, grandson of the great Felipe Poey. Federico Poey is a chemist at the Central Jaronú. In 1928 he assisted Bartsch materially in making his explorations of the Cubitas Mountains.

OPISTHOSIPHON (CUBITASIPHONA) PROTRACTUM Torre and Henderson

PLATE 15, FIGURE 9

1920. *Opisthosiphon (Opisthosiphona) protractus* (Torre and Henderson) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 68, *nomen nudum*.

1921. *Opisthosiphon (Opisthosiphon) protractum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, pp. 259-260, pl. 41, figs. 5, 11.

Shell elongate-conic, varying from flesh color to pale brown, marked by interrupted spiral bands of brown, the interior of the aperture varying with the external color; the peristome is flesh colored or tinged with pale brown. Nuclear whorls 2, small, well rounded, microscopically granulose, with the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls well rounded, marked by slender, retractively slanting axial riblets, which are distantly spaced on the early turns and which become more closely approximated as the shell increases in size; on the last turn they are separated by mere impressed lines. In the type 42 of these riblets occur upon the first of the remaining turns, 82 upon the second, 150 upon the third, and 164 upon the last. At irregular intervals several of these riblets are gathered into hollow tufts at the summit, those between them terminating normally; these tufts are best developed on the last turn and they become feebler toward the early whorls. Suture well constricted. Periphery strongly rounded. Base rather long, well rounded, marked by the continuation of the axial riblets and by several spiral threads within the umbilicus. The umbilicus itself is covered by a reflection of the outer peristome. Aperture broadly oval; peristome double, the inner very strongly exerted and slightly expanded on the outer lip; the outer rather broadly expanded on the parietal wall, less so on the inner lip, and only narrowly so on the outer lip, forming a conspicuous auricle at the posterior angle, which is rendered irregular by the siphon at the posterior angle of the aperture. Operculum typically opisthosiphonid.

The type, U.S.N.M. No. 314958, was collected by Dr. Thomas Barbour at Moron, San Juan de los Perros, Camagüey Province. It

has a little over 4 whorls remaining and measures: Length, 15.7 mm.; greater diameter, 9.1 mm.; lesser diameter, 6.9 mm.

Specimens collected by Bartsch at Punta Alegre west of the gypsum mines, on August 25, 1928, enabled him to describe the animal as being pale olivaceous, with the top of the head and the area behind the tentacles a little lighter with a pinkish flush. The entire dorsal part is marked with numerous fine dots. Sides of the body pale olivaceous, with numerous whitish papillae. Tentacles gray, with the base the same shade as the body, the extreme tip a little paler. Sole of the foot deeply cleft, of the same shade as the sides. The animal when at rest suspends itself by a mucous thread.

OPISTHOSIPHON (CUBITASIPHONA) CLAUDENS, new species

PLATE 16, FIGURE 9

Shell elongate-ovate, white, with interrupted spiral bands of brown. Nuclear whorls decollated in all our specimens. The early postnuclear whorls are marked by distantly spaced lamellose axial riblets, which show faint indications of feeble nodulations. On the last two turns these nodulations disappear. The axial riblets become more closely spaced and rounded on the early turns, where they are gathered into hollow tufts at the summit at more or less regular intervals. In the type 27 of these ribs are present on the first of the remaining turns and 176 are on the last. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs and in the exposed portion of the umbilicus by 4 slender, spiral threads, which render the axial riblets nodulose. Aperture broadly oval; peristome double, the inner rather strongly exerted; the outer narrow on the outer and basal lip, wider on the inner lip and parietal wall, forming a moderately strong auricle at the posterior angle of the aperture, marked by concentric laminae. The outer peristome is notched on the middle of the inner lip, and the portion posterior to the notch is reflected over the umbilicus, which it plugs. All our specimens are dead; we have not seen an operculum but all the other characters are typical of *Cubitasiphona*. The siphon is at the posterior angle of the aperture and is reflected backward into the suture. It appears to connect with the hollow axis behind the parietal peristome, and through it with the decollated apex.

The type, U.S.N.M. No. 355510, was collected by A. Rojas in the Sierra de Judas, Mayajigua, Santa Clara Province. It has 5.5 whorls remaining and measures: Length, 14.0 mm.; greater diameter, 7.1 mm.; lesser diameter, 6.1 mm.

## OPISTHOSIPHON (CUBITASIPHONA) GUANAJAENSE, new species

## PLATE 16, FIGURE 2

Shell elongate-ovate, thin, pale brown, marked with interrupted spiral bands of chestnut-brown; aperture flesh colored rayed with brown. The plug at the truncated apex is chestnut-brown. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly rounded and marked by retractively slanting axial riblets, which are a little more distantly spaced on the first turn than on the succeeding whorls. Here, too, they are rather conspicuously nodulose; the nodules would lead one to believe that this part of the shell possessed spiral sculpture. There are, however, no indications of spiral threads in the intercostal spaces. On the second turn the nodulation becomes much enfeebled and there is only one set of scallops anterior to the summit. This condition is also true of the last turn. These ribs are gathered into rather coarse, conspicuous, hollow tufts at the summit; 44 axial ribs are present on the first of the remaining turns, and 120 are on the last whorl in the type. Suture not strongly constricted. Periphery inflated, well rounded. Base moderately long, well rounded marked by the continuation of the axial ribs and by 6 spiral threads on the exposed portion of the umbilicus, where they render the axial ribs conspicuously scalloped. Aperture broadly oval; peristome double, the inner moderately exerted; the outer flaringly expanded, forming a moderately strong auricle at the posterior angle, narrower at the junction of the basal and outer lip, and deeply notched on the middle of the inner lip, the portion posterior to the notch being reflected over the umbilicus, which it plugs. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture directed into the suture, connecting through a channel with the umbilicus, the hollow axis, and the truncated apex of the shell.

The type, U.S.N.M. No. 535471, was collected by Bartsch in Paso de la Guanaja, Cubitas Mountains, Camagüey Province. It has 3.5 whorls remaining and measures: Length, 11.9 mm.; greater diameter, 7.5 mm.; lesser diameter, 5.3 mm.

## OPISTHOSIPHON (CUBITASIPHONA) QUINTI, new species

## PLATE 16, FIGURE 10

Shell elongate-ovate, of flesh-colored or yellowish ground color, marked by interrupted spiral bands of brown. Peristome flesh colored showing the brown bands as rays on the outer peristome. Nuclear whorls 2, small, well rounded, microscopically granulose, forming a truncated conic spire, the outline of which corresponds with the rest of the shell. Postnuclear whorls moderately strongly rounded, marked by numerous, almost vertical or slightly retractively slanting, sub-

lamellar axial ribs, which are separated by spaces a little wider than the ribs. Some of these ribs become fused to form hollow cusps at the summit. Of these ribs 118 are present on the last whorl. These ribs have indications of fine scallops, which would lead one to believe that spiral threads were present. Under the microscope the fact is revealed that the intercostal spaces are free of spiral threads. Of these scallops 15 are present between summit and periphery on the last turn and 5 are on the base. In the latter place they become increasingly stronger from the periphery toward the umbilicus. Within the umbilicus stronger spiral threads are present, which render the axial ribs decidedly scalloped. Suture strongly impressed. Periphery well rounded. Base rather short, well rounded, narrowly, openly umbilicated. Aperture very broadly oval, almost subcircular; peristome double, the inner rather strongly exerted and straight; the outer broadly expanded and obliquely reflected, notched in the middle of the inner lip and reflected over the peristome posterior to the notch as a broad flap, which extends over and is adnate to the preceding turn at the parietal wall. The outer peristome forms a fairly conspicuous auricle at the posterior angle, and it is marked by concentric lamellae. The siphon is at the posterior angle, behind the peristome, and is reflected into the suture.

The type, U.S.N.M. No. 535472, has 4.3 whorls remaining and measures: Length, 14.1 mm.; greater diameter, 8.8 mm.; lesser diameter, 7.0 mm.

This species was collected by Bartsch on Signal Hill, Turiguanó Island, on the north coast of Camagüey. It is named for A. A. Quint, who was very helpful to him during his stay on Turiguanó.

*OPISTHOSIPHON (CUBITASIPHONA) MANATIENSE*, new species

PLATE 16, FIGURE 4

Shell elongate-ovate; early whorls pale brown, the rest almost white in the type, which is a dead specimen. Nuclear whorls decollated. Postnuclear whorls well rounded, marked by slightly retractively curved axial ribs, which are sublamellar and rather distantly spaced on the first turn, and which gradually change as the whorls progress to low, rounded, closely approximated elements. These ribs are gathered into hollow tufts at the summit, at irregular intervals. There are 52 on the first of the remaining turns and 93 are on the last whorl. Suture strongly constricted. Periphery inflated, well rounded. Base moderately long, well rounded, marked by the continuation of the axial ribs and by several spiral threads. Spiral threads apparently are also present within the umbilicus. These spiral threads render the axial riblets scalloped at their junctions. Aperture broadly oval; peristome double, the inner well exerted; the outer expanded, being a

little narrower at the junction of the outer and basal lip, forming a moderately strong auricle at the posterior angle. On the middle of the inner lip the outer peristome is somewhat inbent. The entire surface of the outer peristome is marked by concentric laminae. Operculum? Siphon at the posterior angle of the aperture directed backward into the suture.

The type, U.S.N.M. No. 535473, was collected by Torre at Mono Ciego, on the west side of the entrance of the port of Manati, Oriente. It has 3.5 whorls remaining and measures: Length, 10.0 mm.; greater diameter, 5.5 mm.; lesser diameter, 4.7 mm.

OPISTHOSIPHON (*CUBITASIPHONA*) *BIOSCAI* Torre and Henderson

PLATE 16, FIGURE 8

1920. *Opisthosiphon* (*Opisthosiphona*) *bioscai* (Torre and Henderson) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67, *nomen nudum*.  
 1921 *Opisthosiphon* (*Opisthosiphona*) *bioscai bioscai* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 256, pl. 40, figs. 4, 6.

Shell elongate-ovate, flesh colored with a brownish tinge, sometimes pale brown, marked by interrupted spiral bands of brown, the elements composing these bands being arranged in both axial and spiral series; the interior of the aperture is flesh colored; the peristome is flesh colored with a yellowish tinge. Nuclear whorls 1.5, very small, well rounded, microscopically granulose, with the last portion of the last turn showing the beginning of the axial ribs. Postnuclear whorls well rounded, marked by retractively curved axial ribs, which are rather feebly developed on the early turns, becoming broad, low, and rounded on the succeeding whorls. In the type 72 of these ribs occur upon the first of the remaining turns, 102 upon the second, and 124 upon the last. Some of these ribs at irregular intervals are fused and expanded at the summit into hollow cusps, while others terminate a little short of the summit. Suture moderately constricted. Periphery well rounded. Base moderately long, well rounded, openly umbilicated, marked by the axial ribs and 2 strong, spiral cords on the outside of the umbilicus, and by 2 more strong, spiral cords anterior to these, which are much less conspicuous, while the umbilical wall on the inside is marked by a number of feeble, spiral lines of nodules. The junction of the axial ribs and the spiral threads in the umbilicus causes the axial ribs to become expanded into clawlike elements. Aperture broadly oval; peristome double, the inner slightly exerted and slightly expanded; the outer very broadly expanded on the parietal wall and very broadly reflected over the umbilicus, which it completely hides when viewed squarely; it is reflected over the preceding turn on the parietal wall and is adnate to it. The outer peristome is much narrower on the outer lip, but it is conspicuously expanded at the

posterior angle, where it is rendered irregular by the siphon, which bends backward at the suture behind the peristome. Operculum typically opisthosiphonid.

The type, U.S.N.M. No. 314952, was collected by Torre and Henderson at El Cercado, Sierra de Cubitas, Camagüey Province. It has a little over 4 whorls remaining and measures: Length, 14.3 mm.; greater diameter, 9.3 mm.; lesser diameter, 7.1 mm.

Bartsch also collected specimens of this species at La Caridad de Cangilonos and Finca Gertrudis, places near the type locality.

The animals of this species, collected by Bartsch at El Cercado de Mendoza, near Senado, September 2, 1928, were described by him as being flesh colored with a faint olivaceous flush. The dorsal parts are marked with fine dots and with short streaks, and there is a pinkish area behind the tentacles. Sides with many white flattened papillae, which are made up of many fine white dots. Tentacles smoke gray with olivaceous tip. Sole of the foot the same color as the sides, minus the white dots.

OPISTHOSIPHON (CUBITASIPHONA) CUNAGUAE Welch

PLATE 16, FIGURE 3

1929. *Opisthosiphon cunaguae* WELCH, Nautilus, vol. 42, p. 98, pl. 5, figs. 4, 5.

1934. *Opisthosiphon (Opisthosiphon) cunaguae* WELCH, Nautilus, vol. 47, p. 132, pl. 11, fig. 7.

Shell elongate-ovate, varying in color from flesh color through pale yellow to dark chestnut-brown, unicolor or with interrupted spiral bands. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming a blunt apex. Postnuclear whorls inflated, strongly rounded, the early ones more so than the later, marked by retractively curved axial riblets, of which those on the early turns are lamellar and thickened at intervals to form elongated nodules. These nodules gradually become reduced and disappear on the last turn, where the ribs are well rounded and narrower than the spaces that separate them. The axial ribs are gathered into hollow tufts at the summit at rather close intervals. The specimen figured has 36 of these ribs present on the first whorl and 122 on the last turn. Suture well constricted. Periphery well rounded. Base rather short, well rounded, marked by the continuation of the axial ribs and by strong spiral cords, which cover the umbilical wall and which render the axial ribs decidedly scalloped at their junctions. Aperture broadly oval; peristome double, the inner strongly exerted and slightly reflected at the outer edge; the outer expanded, less so on the basal half of the outer lip, forming a rather conspicuous auricle at the posterior angle; very broadly expanded on the upper portion of the inner lip, on the middle

of which there is an infolding, posterior to which the broad flap is reflected over the umbilicus. The outer peristome is marked by concentric lamellae. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture directed backward into the suture.

The specimen figured, U.S.N.M. No. 535474, a topotype, was collected by Drs. Pilsbry and Welch at Loma Cunagua, Camagüey Province. It has 3.6 whorls remaining and measures: Length, 13.0 mm.; greater diameter, 8.0 mm.; lesser diameter, 6.1 mm.

Bartsch collected a large series on the same limestone block but on the other side. These specimens also show the color variation described for the species.

OPISTHOSIPHON (CUBITASIPHONA) JUDASENSE Torre and Henderson

PLATE 16, FIGURE 1

1920. *Opisthosiphon* (*Opisthosiphona*) *judacensis* (Torre and Henderson) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 68, *nomen nudum*.  
 1921. *Opisthosiphon* (*Opisthosiphon*) *judasense* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, pp. 260-261, pl. 41, figs. 9, 10.

Shell elongate-conic, ranging from pale brown to darker brown, marked by interrupted spiral bands of dark brown. These bands are almost continuous, and the elements composing them are arranged in both axial and spiral series; interior of the aperture varying with the color of the outside, but always paler than the outside; peristome yellowish white, the outer rayed by the brown bands. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly rounded, marked by retractively slanting, somewhat sinuous axial riblets, which are distantly spaced on the early turns and which become more closely approximated as the shell increases in size. In the type 42 of these riblets are present upon the first of the remaining turns, 88 upon the second, 148 upon the third, and 186 upon the last. At more or less regular intervals a number of these riblets extend prominently above the rest and become fused to form a hollow cusp. Suture well constricted. Periphery strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs and within the umbilicus by a series of slender, spiral threads. Aperture very broadly oval, almost subcircular; peristome double, the inner slightly exerted and slightly reflected; the outer broadly, flaringly expanded, a little wider on the inner lip than on the outer, deeply notched on the middle of the inner lip, the portion posterior to the notch being reflected over the umbilicus which it completely overshadows; on the parietal wall the peristome is adnate to the preceding turn; it also forms a conspicuous auricle at the posterior angle of the aperture, which is rendered somewhat

irregular by the siphon immediately behind it. The outer peristome is marked by a series of wavy, concentric lines. Operculum typically opisthosiphonid.

The type, U.S.N.M. No. 314959, was collected by Dr. Thomas Barbour near Mayajigua, in the Sierra de Judas, Santa Clara Province. It has a little over 3 whorls remaining and measures: Length, 13.5 mm.; greater diameter, 9.1 mm.; lesser diameter, 6.1 mm.

OPISTHOSIPHON (CUBITASIPHONA) SANCHEZI, new species

PLATE 16, FIGURE 5

Shell ovate-conic, yellowish white, with a somewhat watered-silk effect. Nuclear whorls 1.5, small, somewhat inflated, well rounded, microscopically granulose. Postnuclear whorls strongly inflated, marked by slightly retractively curved, sublamellar axial ribs, which are more distantly spaced on the early turns than on the later, becoming closely approximated on the last whorl. Of these ribs, 30 are present on the first of the remaining turns and 222 are on the last. Some of these ribs at quite regular intervals are gathered into bold, hollow tufts at the summit. Suture moderately constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs and by feeble spiral threads, which become intensified within the umbilicus. Aperture broadly oval; peristome double, the inner slightly exerted; the outer broadly expanded, forming a very conspicuous auricle at the posterior angle and deeply infolded on the middle of the inner lip. Posterior to the fold a broad expanded flap almost covers the umbilicus. The outer peristome is marked by numerous concentric lamellae. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture behind the peristome directed into the suture.

The type, U.S.N.M. No. 535475, and a large series of specimens were collected by Bartsch on Loma de Santa Cruz near Central Senado, Camagüey Province. The type has almost 4 whorls remaining and measures: Length, 12.4 mm.; greater diameter, 8.8 mm.; lesser diameter, 6.2 mm.

This species is very variable in size. An adult specimen of 3.3 whorls measures: Length, 9.0 mm.; greater diameter, 6.6 mm.; lesser diameter, 5.3 mm.

Animals of this species were collected by Bartsch on Santa Cruz Mountain, near Senado, September 6, 1928. His description follows: Dorsal part deeply olivaceous with a pinkish area behind the tentacles. The whole dorsal surface is marked by fine white dots and by short streaks, most concentrated a little before and behind the tentacles. Sides dark olivaceous, marked by rather large white spots, which are composed of numerous fine dots. Sole of foot pale olivaceous. Tentacles with a pale orange wash.

**OPISTHOSIPHON (CUBITASIPHONA) SOSAL, new species**

## PLATE 16, FIGURE 6

Shell ovate-conic, white or pale yellow. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose. Postnuclear whorls inflated, strongly rounded, and marked by retractively slanting axial riblets which are distantly spaced and sublamellar on the early turns and which are rounded and rather closely approximated on the last whorl. Of these riblets, 31 occur on the first of the remaining turns and 162 are on the last. At irregular intervals these riblets are gathered into hollow cusps at the summit. Suture strongly constricted. Periphery decidedly inflated, strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs. Within the umbilicus and on its outer edge a series of slender spiral cords are present that render the riblets feebly scalloped at their junction. Aperture broadly oval; peristome double, the inner exerted and slightly reflected; the outer narrow on the outer and basal lip, expanded into a conspicuous auricle at the posterior angle, and broadly expanded on the inner lip, on the middle of which it shows a conspicuous fold. Posterior to this fold it is reflected partly over the umbilicus. The entire outer peristome is marked by numerous, concentric lamellae. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture directed backward into the suture.

The type, U.S.N.M. No. 535476, comes from Loma Caracuna, Finca Marchena, Siboney, Camagüey Province. It has 3.8 whorls remaining and measures: Length, 11.2 mm.; greater diameter, 8.3 mm.; lesser diameter, 6.3 mm.

**OPISTHOSIPHON (CUBITASIPHONA) LITORALE, new species**

## PLATE 16, FIGURE 7

Shell broadly ovate, pale brown with a peripheral chestnut-brown band. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, marked on the first of the remaining turns by very slender, distantly spaced axial riblets, which become finer and more closely approximated as the whorls increase in number. They are exceedingly fine on the last turn. At distant intervals these riblets are gathered into inconspicuous cusps at the summit. In the type 53 of the axial ribs are present on the first turn and 192 on the last. Suture strongly constricted. Periphery inflated, very strongly rounded. Base short, very broadly, openly umbilicated, marked by the continuation of the axial ribs and by a series of closely approximated, low, broad, rounded cords in the umbilicus and on the outer umbilical wall. Aperture broadly oval; peristome

double, the inner exerted and slightly reflected; the outer narrow on the outer and basal lip, expanded into a conspicuous auricle at the posterior angle and on the inner lip posterior to the middle, spreading out as a broad flap, which touches the preceding whorl on the parietal wall and which partly hides the umbilicus. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture behind the peristome directed into the suture.

The type, U.S.N.M. No. 535477, was collected by Doctors Palmer and Bernudez at Cayo Cruz, north of Camagüey, Camagüey Province. It has 3.5 whorls remaining and measures: Length, 9.2 mm.; greater diameter, 7.3 mm.; lesser diameter, 5.4 mm.

OPISTHOSIPHON (CUBITASIPHONA) BERRYI Clapp

Shell elongate-ovate, varying in ground color from flesh color to orange, pale brown and dark brown, usually with a broad subperipheral band which, however, may be wanting. The peristome is flesh colored or pale yellow; the interior varies in intensity of coloration with the exterior. Nuclear whorls 2, small, well rounded, microscopically granulose, with the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by almost vertical or slightly retractively slanting, very closely spaced axial riblets, which vary in strength in the different subspecies. On the early whorls these riblets are distantly spaced, but they become more closely approximated as the shell increases in size, and on the last whorl they are usually about as wide as, or almost as wide as, the spaces that separate them. Some of these riblets become expanded and fused at the summit to form slender cusps, which extend into the suture. These cusps vary considerably in strength in the different subspecies. Base inflated, strongly rounded. Umbilicus varying from almost closed by the reflected outer peristome to entirely open, depending upon the subspecies, marked by the continuation of the axial riblets and by spiral threads. The latter are confined to the umbilical region. Aperture broadly oval; peristome double, the inner moderately exerted and slightly reflected; the outer strongly expanded, always more so on the inner lip than on the outer, that of the inner lip notched either narrowly or broadly, the part posterior to the notch being reflected over the umbilicus. A conspicuous auricle is always present at the posterior angle of the aperture. The outer peristome shows concentric laminations. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture, directed backward into the suture.

This species is restricted to the Cubitas Mountain region of Camagüey Province, where it breaks up into a number of geographic races, which we shall designate as subspecies, and which the following key and descriptions will help in recognition:

KEY TO THE SUBSPECIES OF *OPISTHOSIPHON* (*CUBITASIPHONA*) *BERRYI*

Posterior half of inner lip of the outer peristome flaringly expanded to almost cover the umbilicus.....	<i>viguetaense</i>
Posterior half of inner lip of the outer peristome not flaringly expanded but strongly inbent to partly cover the umbilicus.	
Axial ribs moderately strong.....	<i>berryi</i>
Axial ribs very fine.....	<i>transitorium</i>

***OPISTHOSIPHON* (*CUBITASIPHONA*) *BERRYI VIGUETAENSE*, new subspecies**

## PLATE 17, FIGURE 8

This subspecies is easily differentiated from the others by its larger size and pale color. Bartsch collected a large series of specimens at La Vigueta, on the north side of the Cubitas Mountains, between Paso de la Guanaja and Los Paredones.

The type, U.S.N.M. No. 535478, has 41 axial ribs on the first of the remaining turns and 132 on the last; it has 4.1 whorls remaining and measures: Length, 14.3 mm.; greater diameter, 9.0 mm.; lesser diameter, 7.2 mm.

***OPISTHOSIPHON* (*CUBITASIPHONA*) *BERRYI BERRYI* Clapp**

## PLATE 17, FIGURES 9, 10

1919. *Opisthosiphon berryi* CLAPP, Nautilus, vol. 32, p. 86, pl. 7, fig. 14.  
 1920. *Opisthosiphon berryi* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67.  
 1920. *Opisthosiphon* (*Opisthosiphona*) *berryi semiapertus* (Torre and Henderson) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67.  
 1921. *Opisthosiphon* (*Opisthosiphona*) *berryi* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 248, pl. 38, figs. 1-4.  
 1921. *Opisthosiphon* (*Opisthosiphona*) *berryi semiapertum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, pp. 249-250, in part, pl. 38, figs. 5-8.

This subspecies has a wide distribution. It was described from collections made by Dr. S. S. Berry at Cairije, Cerro de Tuabaquey, at the eastern end of the Cubitas Mountains. Bartsch collected it at Los Corrales de Cangilones. It appears to range through the rock piles of the southeastern part of the Cubitas Mountain region, including the passes of Vereda de los Burros and de la Guanaja.

Study of a large amount of material now in our collection compels us to fuse *Opisthosiphon* (*Opisthosiphona*) *berryi semiapertum* with the typical subspecies.

In this race the posterior half of the inner lip of the outer peristome, while expanded, does not almost cover the umbilicus, but it is inbent to partly cover it. In this respect it differs from *O. (C.) berryi viguetaense*. *Opisthosiphon* (*Cubitasiphona*) *berryi transitorium* has the axial ribs much finer.

In the specimen figured, U.S.N.M. No. 355475, which is one of the original lot, the first whorl shows 70 axial riblets, while the last whorl

has 181. This specimen has a little over 3 whorls remaining and measures: Length, 11.7 mm.; greater diameter, 8.8 mm.; lesser diameter, 6.7 mm. Figure 9 of plate 17 is from a photograph of the type of *O. (O.) b. semiapertum* Torre and Henderson.

**OPISTHOSIPHON (CUBITASIPHONA) BERRYI TRANSITORIUM** Torre and Henderson

PLATE 17, FIGURE 6

1921. *Opisthosiphon (Opisthosiphona) paredonense transitorium* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 251, pl. 39, figs. 1, 2.

This subspecies was described from the south entrance of Paso de la Guanaja, Cubitas Mountains. Bartsch made an enormous collection of this race in various stations in this pass. It is easily differentiated from typical *O. (C.) berryi berryi* by its smaller size and by its much finer ribbing.

The type, U.S.N.M. No. 314947, has 76 axial ribs on the first of the remaining turns and 188 on the last. It has a little more than 3 whorls remaining and measures: Length, 11.3 mm.; greater diameter, 8.5 mm.; lesser diameter, 6.4 mm.

**OPISTHOSIPHON (CUBITASIPHONA) TERSUM** Torre and Henderson

PLATE 17, FIGURES 2, 4

1921. *Opisthosiphon (Opisthosiphona) bioscai tersum* TORRE and HENDERSON, Proc. U.S. Nat. Mus., vol. 59, p. 256.

Shell elongate-ovate, flesh colored with a yellowish tinge, marked by interrupted spiral bands of brown, which are almost continuous; the interior of the aperture flesh colored, rayed by the spiral bands; peristome white. Nuclear whorls 2, small, well rounded, microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear axial sculpture. Postnuclear whorls strongly rounded, marked by slender, retractively slanting axial riblets which are distantly spaced on the first of the remaining turns and which gradually become more closely approximated; on the last whorl they are separated by spaces a little narrower than the riblets. In the type 74 of these riblets occur upon the first turn, 112 upon the second, and 184 upon the last; they extend prominently up on the summit where, at more or less regular intervals, several of them become fused to form hollow cusps that crenulate the summit. These cusps are much more conspicuous on the last whorl than on the earlier turns. Suture moderately constricted. Periphery strongly rounded. Base moderately long, openly umbilicated, marked by the continuation of the axial riblets, and by slender spiral threads within the umbilicus, with a few obsolete ones immediately adjacent to it. These spiral threads cause the riblets to become only slightly expanded at their junction. Aperture broadly oval; peristome double, the outer

broadly expanded on the parietal wall, where it is reflected over and appressed to the preceding turn, and on the inner lip this outer peristome is reflected over the umbilicus, almost completely hiding it when viewed squarely; on the basal and outer lip it becomes narrower but it is again expanded into a broad auricle at the posterior angle, where it is rendered irregular by the siphon immediately behind it; inner peristome slightly exerted and slightly expanded. Operculum typically opisthosiphonid.

The type, U.S.N.M. No. 314953, was collected at La Providencia, El Cercado, Sierra de Cubitas, Camagüey Province. It has a little over 3 whorls and measures: Length, 11.0 mm.; greater diameter, 7.2 mm.; lesser diameter, 5.8 mm.

Bartsch also collected this species in Paso de Lesca and at Sitio Afuera, at the south end of Paso de la Escalera, Cubitas Mountains, Camagüey Province.

Figure 2 shows an extreme variant of the species with an enormously developed outer peristome of the inner lip. This is U.S.N.M. No. 355501 and it comes from Paso de los Paredones, and measures: Length, 10.5 mm.; greater diameter, 7.9 mm.; lesser diameter, 6.2 mm

OPISTHOSIPHON (CUBITASIPHONA) APERTUM Torre and Henderson

PLATE 17, FIGURE 1

1920. *Opisthosiphon (Opisthosiphona) apertus* (Toire and Henderson) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67, *nomen nudum*.

1921. *Opisthosiphon (Opisthosiphona) apertum* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 253, pl. 40, figs. 1, 3.

Shell ovate, thin, flesh colored, horn colored, pale orange, or pale brown, sometimes unicolor, but usually with a broad brown band at the periphery; peristome white; the interior of the aperture varying with the external color. Nuclear whorls 2, small, well rounded, microscopically granulose, with the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by very poorly developed, slightly retractively slanting axial riblets, which are more distantly spaced on the early turns than the later. In the type 42 of these riblets occur upon the first turn, 64 upon the second, 140 upon the third, and 160 upon the last whorl. Some of these riblets extend slightly above the rest at the summit and fuse to form very weak, almost obsolete cusps. Suture strongly constricted. Periphery well rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial riblets, and within the umbilicus by 10 spiral threads. Last whorl solute for almost half a turn. Aperture broadly oval; peristome double, the inner slightly exerted and moderately reflected; the outer, conspicuously expanded on the inner lip and very slightly so on the outer, forming a conspicuous auricle at the posterior angle of the

aperture. Operculum typically opisthosiphonid. Siphon at the posterior angle of the aperture directed backward into the suture.

The type, U.S.N.M. No. 314951, was collected by Torre and Henderson at Paso de Lesca, Sierra de Cubitas, Camagüey Province. It has a little over 3 whorls and measures: Length, 12.2 mm.; greater diameter, 8.7 mm.; lesser diameter, 6.4 mm.

*OPISTHOSIPHON (CUBITASIPHONA) DEVIATUM*, new species

PLATE 17, FIGURE 7

Shell elongate-ovate, orange-brown with a broad band of brown at the periphery; peristome yellowish white. Nuclear whorls decollated. Postnuclear whorls inflated, well rounded, marked by slightly retractively slanting axial riblets, which are a little more distantly spaced on the early turns than on the later; on the last whorl they are about as wide as the spaces that separate them. Of these riblets, 86 occur upon the first of the remaining turns, 146 upon the second, and 170 upon the last. Some of these riblets fuse at the summit to form minute white cusps. These riblets are of rather irregular development and spacing, and they are best shown on the last turn. Suture strongly constricted. Periphery inflated, well rounded. Base short, openly umbilicated, inflated, well rounded, marked by the continuation of the axial ribs, and within the umbilicus by 14 spiral threads. Last whorl solute for about one-fourth of a turn. Aperture broadly oval; peristome double, the inner moderately exerted; the outer only slightly expanded on the outer lip and but little more so on the inner, forming a conspicuous auricle at the posterior angle. Operculum? Siphon at the posterior angle directed into the suture.

The type, U.S.N.M. No. 355487, was collected by Torre at Cantera de Montejo, Arroyo Hondo, 3 leagues east of Camagüey. It has 3.5 whorls and measures: Length, 11.2 mm.; greater diameter, 8.2 mm.; lesser diameter, 6.4 mm.

*OPISTHOSIPHON (CUBITASIPHONA) PAREDONENSE* Torre and Henderson

Shell elongate-ovate, varying in color from flesh color through orange to pale or dark brown or even purplish brown, unicolor, or with a broad peripheral spiral zone of brown. Nuclear whorls 2, small, well rounded, microscopically granulose, showing the beginning of the postnuclear sculpture on the last portion of the last turn. Postnuclear whorls inflated, strongly rounded, marked by slightly retractively slanting axial riblets, which vary in strength and spacing in the different subspecies. Some of these riblets fuse at the summit to form cusps which are variable in strength but which are usually constant in the different subspecies. Suture strongly constricted. Base

inflated, strongly rounded, marked by the continuation of the axial ribs and by numerous spiral lirations on the umbilical wall. The last whorl is solute for a fraction of a turn and has a strong carina behind the posterior angle of the aperture, where the reflexed breathing siphon forms a conspicuous element. Aperture oval; peristome double, the inner peristome slightly exerted; the outer usually a little wider on the parietal wall and the inner lip than on the outer lip, forming a conspicuous auricle at the posterior angle, which is appressed to the breathing siphon. Operculum typically opisthosiphonid.

This species occupies the Cubitas Mountain range of Camagüey Province, where it breaks up into the two following subspecies:

KEY TO THE SUBSPECIES OF OPISTHOSIPHON (CUBITASIPHONA) PAREDONENSE

Whorls strongly inflated.....	<b>escalerense</b>
Whorls not strongly inflated.....	<b>paredonense</b>

OPISTHOSIPHON (CUBITASIPHONA) PAREDONENSE ESCALERENSE, new subspecies

PLATE 17, FIGURE 3

This race was collected by Bartsch in large numbers on Paso de la Escalera. It is larger than the typical race and has the whorls much more inflated and the axial ribs on the early turns much less numerous; it is only upon the last whorl that these ribs become decidedly concentrated.

The type, U.S.N.M. No. 535479, has 33 axial ribs on the first of the remaining turns and 175 are on the last. It has almost 4 whorls remaining and measures: Length, 12.5 mm.; greater diameter, 8.7 mm.; lesser diameter, 6.5 mm.

OPISTHOSIPHON (CUBITASIPHONA) PAREDONENSE PAREDONENSE Torre and Henderson

PLATE 17, FIGURE 5

1920. *Opisthosiphon (Opisthosiphona) paredonensis* (Torre and Henderson) HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67, *nomen nudum*.  
 1921. *Opisthosiphon (Opisthosiphona) paredonense paredonense* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, p. 251, pl. 38, figs. 9-11.

This race, which is remarkably abundant in the Paso de los Paredones, Cubitas Mountains, is distinguished from *O. (C.) p. escalerense* by its smaller size and by its much less inflated whorls, with the ribs more closely spaced on the second whorl. The cusps at the summit are also much more pronounced.

The type, U.S.N.M. No. 314946, has 62 axial ribs on the first of the remaining turns and 156 on the last; it has a little over 4 whorls remaining and measures: Length, 12.5 mm.; greater diameter, 8.4 mm.; lesser diameter, 6.3 mm.

## CYLINDROSIPHONA, new subgenus

Shell subcylindric, with sublamellar axial ribs, which are weakly nodulose. Intercostal spaces marked by fine axial hairlines. Spiral sculpture absent on spire, base, and umbilicus. Last whorl solute. Operculum typically opisthosiphonid. Siphon free, behind the peristome at the posterior angle of the aperture.

Type: *Opisthosiphon (Cylindrosiphona) bacillum*, new species.

## OPISTHOSIPHON (CYLINDROSIPHONA) BACILLUM, new species

Shell small, subcylindric, varying in color from white through straw color to brown, unicolor or banded; peristome faintly yellow. Nuclear whorls a little more than 2, inflated, strongly rounded, of almost uniform diameter, forming a truncated pupoid apex. Postnuclear whorls rather high between summit and suture, moderately rounded, and marked by strong lamellar axial ribs, which become expanded at the summit into rather prominent cusps. Slender, narrow, scalloped nodules are present on the ribs, which are usually best developed on the early turns. The intercostal spaces are marked by microscopic axial hairlines. Suture rather strongly constricted. Periphery well rounded. Base short, somewhat inflated, strongly rounded, and marked by the continuation of the axial ribs, which extend into the umbilicus; umbilicus free of spiral sculpture. Last whorl decidedly solute for about one-third of a turn. Aperture broadly oval; peristome double, the inner slightly exerted and reflected; the outer moderately expanded, a little narrower on the parietal wall than on the rest of the aperture, marked by slender, concentric laminae. Operculum typically opisthosiphonid. Siphon free at the posterior angle of the aperture.

The species ranges through parts of Camagüey and Oriente Provinces.

## KEY TO THE SUBSPECIES OF OPISTHOSIPHON (CYLINDROSIPHONA) BACILLUM

Axial ribs strongly scalloped.....	<b>garciai</b>
Axial ribs not strongly scalloped.....	<b>bacillum</b>

## OPISTHOSIPHON (CYLINDROSIPHONA) BACILLUM GARCIAI, new subspecies

## PLATE 19, FIGURE 5

This subspecies was collected by García Castaneda, near Holguín, Oriente Province. It differs from typical *O. (C.) bacillum bacillum* in having the sculpture much more pronounced, the nodulation much stronger, and the color paler. The type has 35 axial ribs on the first of the remaining turns and 48 on the last whorl.

The type, U.S.N.M. No. 535430, has 4.5 whorls remaining and measures: Length, 7.6 mm.; greater diameter, 3.3 mm.; lesser diameter, 2.8 mm.

## OPISTHOSIPHON (CYLINDROSIPHONA) BACILLUM BACILLUM, new subspecies

## PLATE 19, FIGURE 4

We have seen this race from El Cacaotal, Sierra de Najaza; Guai-canamar; Vereda del Telégrafo; 9 miles east of Cantera de Montejo; Finca de Riverón, Martí; Sierra de Sibanicú and El Zanjón, Sibanicú; all these localities in Camagüey Province. This subspecies differs from *O. (C.) bacillum garciai*, from Oriente Province in having the sculpture less strongly developed, the nodules of the ribs feebler, and the color bands more pronounced. The type has 29 axial ribs on the first of the remaining turns and 32 on the last whorl.

The type, U.S.N.M. No. 535423, comes from El Cacaotal. It has 4.0 whorls remaining and measures: Length, 7.8 mm.; greater diameter, 3.3 mm.; lesser diameter, 3.0 mm.

## DALLSIPHONA, new genus

The shells of this monotypic genus have a turbinate shape. They are openly, widely umbilicated, with the surface marked by numerous, fine, closely spaced axial ribs, which are not thickened or gathered into tufts at the summit. The spiral sculpture is confined to the umbilicus. The operculum is typically opisthosiphonid. The siphon is incomplete, i. e., it is connected with the edge of the peristome by a slit.

The genus is known only from the southeastern Cubitas Mountains. Type: *Dallsiphona dalli* (Torre and Henderson).

## DALLSIPHONA DALLI (Torre and Henderson)

## PLATE 19, FIGURE 6

1920. *Opisthosiphon dalli* TORRE and HENDERSON, A new *Opisthosiphon* from Cuba, privately printed, June 25.  
 1920. *Opisthosiphon (Opisthosiphona) dalli* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 68.  
 1921. *Opisthosiphon (Opisthosiphona) dalli* TORRE and HENDERSON, Proc. U. S. Nat. Mus., vol. 59, pp. 254-255, pl. 40, figs. 2, 8, 9.

Shell turbinate, ranging in color from ivory white or pale brown to pale orange; aperture ivory white. Nuclear whorls 2.7, forming a narrow tip, well rounded, smooth except the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls strongly inflated, very strongly rounded, marked by slender, closely spaced, retractively slanting axial threads, of which 102 occur upon the first of the remaining turns in the type, 192 upon the second, and 404 upon the last whorl. These threads are separated by mere impressed lines. Suture well constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, openly umbilicated, marked by the continuation of the axial riblets

and within the umbilicus by 13 very fine slender spiral threads. Aperture almost circular; peristome double, the outer broadly expanded on the inner lip, a little less expanded on the parietal wall, where it is adnate to the preceding turn, and least expanded on the outer lip, notched at the posterior angle to form the breathing siphon; inner peristome scarcely at all exerted but broadly reflected. Operculum paucispiral, opisthosiphonid.

The type, U.S.N.M. No. 314941, came from the mouth of Cueva del Circulo, near El Cercado, Sierra de Cubitas, Camagüey Province. It has 3.5 whorls remaining and measures: Length, 12.5 mm.; greater diameter, 11.5 mm.; lesser diameter, 8.8 mm.

The species ranges from the type locality slightly westward into the pass known as Vereda de los Burro.

#### XENOPOMOIDES, new genus

Shell elongate-conic; axial sculpture consisting of decidedly elevated spinose lamellar ribs, between which less elevated threads are present. Spiral sculpture merely indicated by the regular position of the spines or scallops on the spire and base. Aperture subcircular with double peristome, the outer broadly expanded, notched on the middle of the inner lip, with the part posterior to the notch reflected over and closing the umbilicus. Operculum opisthosiphonid, or like the young of *Xenopoma*. Breathing pore present at the posterior angle of the aperture, a little behind the peristome.

Type: *Xenopomoides delicatulum*, new species.

#### XENOPOMOIDES DELICATULUM, new species

#### PLATE 19, FIGURE 1

Shell elongate-conic, thin, milk white. Nuclear whorls 2, decidedly inflated, strongly rounded, microscopically granulose, forming a large mammillated apex, which projects over the preceding turn. Post-nuclear whorls strongly rounded, marked by axial ribs, which are of two series, one decidedly lamellar and distantly, not regularly spaced; the other series more numerous, between the lamellar ribs consisting of elements a little higher than threads, yet not quite lamellar. The elevated ribs are provided at regular intervals with scalloped, flattened, denticle-like projections, which are not hollow; of these, 5 occur between the summit and suture and 3 on the base between the edge of the closed umbilicus and the periphery. Suture strongly constricted. Base short, strongly rounded. Aperture subcircular; peristome double, the inner slightly exerted and slightly reflected; the outer very broadly expanded and notched on the edge of the inner lip, the portion posterior to the notch being reflected over the um-

bilicus, which it completely closes, and over the parietal wall. The outer peristome is marked by concentric lamellae. Operculum opisthosiphonid, that is, it bears numerous, closely spaced, decidedly elevated, retractively slanting lamellae, which do not quite cover the entire whorls but which leave the spaces free between adjacent whorls. The outer and inner edges of these riblets are fused into a slender lamella. The structure really more closely resembles early stages of *Xenopoma* than *Opisthosiphon*. There is a breathing puncture at the posterior angle of the aperture a little behind the peristome.

The type, U.S.N.M. No. 535537, was collected by Dr. Charles T. Ramsden at Florida Blanca, Oriente Province. It has 4.6 whorls remaining and measures: Length, 9.5 mm.; greater diameter, 5.6 mm.; lesser diameter, 4.3 mm.

#### Genus RHYTIDOTHYRA Henderson and Bartsch

1920. *Rhytidothyra* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 65.

Shell elongate-ovate, marked by axial ribs and by spiral threads. A breathing pore at the posterior angle of the aperture, a short distance within the peristome, communicates with a slender tube following the posterior angle of the aperture on the inside for three or more whorls, where it in turn communicates with a slender cleft in the wall of the hollow axis, through which breathing may take place through the narrow puncture at the decollated tip. The operculum consists of many strongly raised, retractively curved lamellar ribs, which extend completely across the turns. These lamellar ribs are high at their inner edge, from which they pass down in a gentle curve, rising again to their highest altitude at their outer border, where they become fused into a spiral lamella, which projects almost as far as the basal chondroid plate. The lateral margin of the operculum is strongly channeled.

Type: *Rhytidothyra bilabiata* (Orbigny).

#### RHYTIDOTHYRA BILABIATA (Orbigny)

Shell broadly conic, varying from comparatively large to moderately small; ranging in color from ashy gray to reddish or even through pale brown to rather bright red; never banded. The peristome varies from white to pale orange; the inside of the aperture has the same range of color variation. Nuclear whorls about 2, well rounded, smooth, forming a small apex, which appears slightly truncated. Postnuclear whorls strongly rounded, slightly shouldered at the summit, marked by retractively slanting, slightly wavy, sublamellar, closely spaced axial ribs, which are much more strongly developed and

broadly expanded at the summit. These riblets are more closely approximated at irregular intervals, which condition gives a somewhat varicial appearance to the shell. The spiral sculpture consists of spiral threads, which vary considerably in strength in the different races; in some races they are scarcely apparent, while in others they are quite conspicuous. The junctions of the axial riblets and spiral threads do not form conspicuous nodules, but the spiral threads render the axial riblets wavy. Suture strongly constricted. Periphery of the last whorl inflated, well rounded. Base short, inflated, well rounded, openly umbilicated, marked by the continuations of the axial riblets, which here become very much intensified, and which are almost broken up into squamae by the spiral sculpture. This condition is particularly pronounced immediately behind the aperture, where each lamella terminates in a series of scallops. This character is also a variable one, finding different expressions in the different races. The last whorl is disjunct for a varying distance, depending upon the subspecies. Aperture subcircular; peristome double, the outer moderately, broadly expanded, a little wider on the parietal wall and the inner lip than on the rest of the shell. In some of the races the parietal outer peristome is appressed to the preceding turns; in others it remains disjunct. Inner peristome stronger exerted and slightly reflected. A breathing pore opens on the inside of the parietal wall at some little distance behind the aperture, near the posterior angle of the aperture. This pore communicates with a tube, which is located in the posterior angle and which extends backward for more than 3 whorls. It then communicates by a slender cleft with the hollow axis, through which breathing is evidently effected when the operculum is closed. Operculum consists of many strongly raised, retractively curved lamellar ribs, which extend completely across the turns. These lamellar ribs are high at their inner edge, from which they pass down in a gentle curve, rising again to the highest altitude at their outer border, where they become fused into the spiral lamellae, which project almost as far as the basal chondroid plate at the edge of the operculum; the lateral margin of the operculum is strongly channeled.

This species is widely distributed through the Province of Pinar del Rio, occurring almost on every exposed lump of limestone from Guane eastward to Rangel and Rio Santa Cruz.

The peculiar development of the breathing apparatus defines a very distinct group, which we recognize as a single species. This species breaks up into a series of geographic races, upon which we shall bestow subspecific rank.

## KEY TO THE SUBSPECIES OF RHYTIDOTHYRA BILABIATA

Entire shell bright rose colored.....	<i>rosea</i>
Entire shell not bright rose colored.	
Early whorls only, bright rose colored.	
Later whorls with a rosy flush.....	<i>rosacea</i>
Later whorls without a rosy flush.	
Peristome white.....	<i>bilabiata</i>
Peristome buff.....	<i>aurantiaca</i>
Early whorls white.	
Shell small.....	<i>nana</i>
Shell not small.....	<i>straminea</i>

**RHYTIDOTHYRA BILABIATA ROSEA, new subspecies**

## PLATE 18, FIGURE 2

This subspecies ranges from La Mina westward to the Sierra de Ancon, where we have seen it from the Hoyo de Magdalena, in the Costanera de San Vicente, then southward through the south side of this range to the Sierra del Infierno.

It is characterized by a bright rose color. It also has the axial ribs less expanded at the edge and a little more distantly spaced than the other races, and the spiral sculpture is emphasized, the combination of the two forming a screenlike pattern.

The type, U.S.N.M. No. 535505, has 5.2 whorls remaining and measures: Length, 18.6 mm.; greater diameter, 12.2 mm.; lesser diameter, 9.3 mm.

**RHYTIDOTHYRA BILABIATA ROSACEA, new subspecies**

## PLATE 18, FIGURE 5

This subspecies centers about the region of Viñales. We have it from the Sierra de Viñales, the Chorrera, the mogotes from Laguna de Piedras, extending from the Mogote Puertecitas to Mogote de la Rinconada. We also refer here, with some doubt, specimens from Cayos de San Felipe.

In this subspecies we have rosy early whorls, and the rest of the turns are washed with pale rose color. The peristome is white.

The type, U.S.N.M. No. 355142, comes from the Puerta del Ancon. It has a little more than 4 whorls remaining and measures: Length, 18.2 mm.; greater diameter, 11.9 mm.; lesser diameter, 9.7 mm.

The animal of this subspecies was described by Bartsch, from specimens collected by him on the Chorrera, June 22, 1928, as follows: Body ash gray, with numerous fine, smoky flesh-colored dots. Tentacles bright orange, with pale red base. Foot short, deeply cleft in the median line, smoky gray. The locomotion of the two sides is alternate.

## RHYTIDOTHYRA BILABIATA BILABIATA (Orbigny)

## PLATE 18, FIGURE 6

1842. *Cyclostoma bilabiata* ORBIGNY, in Sagra's Histoire physique, politique et naturelle de l'île de Cuba, vol. 1, pp. 258-259, pl. 22, figs. 3-5, 8, 8'.
1849. *Cyclostoma salebrosum* MORELET, Testacea novissima insulae Cubana et Americae Centralis, p. 23.
1850. *Cyclostoma dorbignyanum* PETIT, Journ. Conchyl., vol. 1, p. 46.
1850. *Choanopoma? bilabiatum* GRAY, Nomenclature of molluscous animals and shells in the collection of the British Museum, p. 52.
1852. *Cistula? bilabiata* PFEIFFER, Monographia pneumonopomorum viventium, vol. 1, pp. 271-272, in part.
1856. *Ctenopoma bilabiatum* PFEIFFER, Malakozool. Blätter, vol. 3, p. 59.
1863. *Chondropoma bilabiatum* REEVE, Conchologia iconica, No. 7.
1890. *Ctenopoma bilabiatum* CROSSE, Journ. Conchyl., vol. 38, p. 276.
1920. *Rhytidothyra bilabiata* HENDERSON AND BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 65.

The typical subspecies was described from Pan de Guajaibón. It is known also from Hato Caimito, just west of Pan de Guajaibón, and from Sierra Chica, to the south. It has been found also at Cacarajícara, to the northeast of Guajaibón, and it extends southeast of Guajaibón to Rangel and the Rio Santa Cruz.

From a nomenclatorial standpoint this race has met with considerable difficulty, as is shown in our synonymy. It is distinguished by being rather large, in having the apex bright rose-colored, with the rest of the shell white. The last whorl is solute. The axial ribs are rather closely spaced and are rendered vertebrated by the spiral threads. On the early whorls the spiral sculpture is considerably more pronounced than on the last. In strength and disposition of the axial ribs this subspecies resembles *R. bilabiata aurantiaca*, from which it is readily distinguished by its white peristome.

The specimen described and figured, U.S.N.M. No. 355155, was collected at Sagua on the west side of Pan de Guajaibón. It has a little more than 4 whorls remaining and measures: Length, 14.9 mm.; greater diameter, 9.7 mm.; lesser diameter, 8.0 mm.

## RHYTIDOTHYRA BILABIATA AURANTIACA, new subspecies

## PLATE 18, FIGURE 4

This race has a rather extensive distribution. We have seen specimens from Sierra de Guane, Mendoza (Paso Real), Puerta de la Muralla, Sierra de los Acostas, El Francisco, Sierra de San Carlos or Luis Lazo, Sumidero, Isabel Maria, the mogotes east of Cabezas, and Pan de Azucar. It therefore appears to cover the entire western part of the Organos Mountains and the limestone blocks lying off that region.

The subspecies is characterized by having a bright rose-colored tip, with the rest of the shell faintly flushed with rose. The peristome and the interior of the aperture are buff.

The type, U.S.N.M. No. 355127, comes from Sierra de Guane. It has a little more than 4 whorls remaining and measures: Length, 17.0 mm.; greater diameter, 11.4 mm.; lesser diameter, 8.9 mm.

The animal of this subspecies was collected on the Sierra de los Acostas July 6, 1928, by Bartsch. He describes it as having the upper parts pale buff, marbled with small brownish streaks. The sides of the body are darker than the dorsum. Tentacles pale buff. Sole of the foot short, flesh colored with smoky suffusion, deeply, medially cleft, the motion being alternate on the two sides.

**RHYTIDOTHYRA BILABIATA NANA, new subspecies**

PLATE 18, FIGURE 1

This subspecies occupies the various limestone blocks surrounding Kilometer 14 between Pinar del Rio and Viñales. It is a small, completely white race; even the peristome is white. In the axial ribbing it resembles *R. bilabiata straminea*, from which the color will distinguish it. The spiral sculpture in *nana* is a little stronger, also.

The type, U.S.N.M. No. 355136, comes from the mogote on the north side of the road. It has a little more than 4 whorls remaining and measures: Length, 15.0 mm.; greater diameter, 9.2 mm.; lesser diameter, 7.5 mm.

**RHYTIDOTHYRA BILABIATA STRAMINEA, new subspecies**

PLATE 18, FIGURE 3

This subspecies ranges through the isolated blocks of limestone known as Hoyo del Guamá, Las Cuevitas, and Las Lagunitas. It is a medium-sized race, with the early whorls white and with the rest of the shell straw-colored. The axial ribs are sublamellar and expanded at the free margin. The spiral sculpture is comparatively reduced so that it is not as conspicuous as in the other races.

The type, U.S.N.M. No. 169927, comes from Hoyo del Guamá. It has 3.5 whorls remaining and measures: Length, 15.1 mm.; greater diameter, 10.2 mm.; lesser diameter, 8.2 mm.

**Genus XENOPOMA Crosse**

1890. *Xenopoma* CROSSE, Journ. Conchyl., vol. 38, p. 282.

Shell elongate-conic, with the last part of the last whorl detached and deflected considerably below the preceding turn. The sculpture consists of widely spaced axial ribs, which bear strong, hollow, cusplike tubercles at their intersections with the obsolete spiral cords. In addition to this, fine, wavy axial threads occur between the cusped

ribs. Peristome reflected, widely expanded, and somewhat fluted. Operculum marked by retractively curved ribs, which do not extend across the entire width of the whorls. The inner border of these ribs is fused to form a lamella, which is a little higher than the ribs. The outer border of the ribs become fused to form an enormously developed lamella in the last turn, which is reflected inward, domelike, over the operculum which it almost completely covers. This reflected lamella bears fine corrugations on its surface. The center of the operculum is decidedly concave.

Type: *Xenopoma hystrix* ([Wright] Pfeiffer).

KEY TO THE SPECIES OF XENOPOMA

- Spines small..... *humboldtianum*  
 Spines large.  
 Outer peristome broadly expanded on the parietal wall..... *aguayoi*  
 Outer peristome not broadly expanded on the parietal wall.  
 Umbilical wall with well developed spiral zones of spines... *hendersoni*  
 Umbilical wall without well developed spiral zones of spines.  
 Spines between summit and umbilicus, 4..... *hystrix*  
 Spines between summit and umbilicus, 9..... *spinossissimum*

XENOPOMA HUMBOLDTIANUM (Pfeiffer)

PLATE 19, FIGURE 8

1867. *Choanopoma humboldtianum* PFEIFFER, Malakozool. Blätter, vol. 14, pp. 150-151.  
 1898. *Choanopoma (Blaeospira) humboldtianum* KOBELT and MÖLLENDORFF, Nachr. Deutsch. Malak. Ges., vol. 30, p. 183.  
 1920. *Xenopoma humboldtiana* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 68.

Shell broadly clongate-conic, flesh colored. Nuclear whorls decolated in all our specimens. Postnuclear whorls inflated, strongly rounded, marked by slender, raised, spinulose axial lamellae, between which from 3 to 7 finer axial threads are present. Of the axial lamellae 20 are present in the specimen figured on the first of the remaining turns, 30 on the second, 44 on the third, and 42 on the fourth. These lamellae bear rather fine, low, hollow spines, of which 3 are present on the first and second, and 5 are upon the remaining turns between the summit and the suture. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, and marked by the continuation of the axial sculpture and by 4 slender denticles on each lamella, the fourth marking the outer boundary of the umbilical wall being the strongest, while within the umbilicus there are 11 spiral threads which, at their junction with the axial lamellae, form slender nodules. The last whorl is solute for a little more than half a turn. Aperture subcircular; peristome double, the inner slightly exserted; the outer broadly expanded on the outer and

basal lip, less so on the inner and parietal wall. Operculum paucispiral, with the nucleus almost subcentral, each whorl marked by raised calcareous lamellae as in young *Xenopoma*, but here the outer surface of the lamellae is not strongly developed and arched over as it is in the other *Xenopomas*.

There are 4 specimens before us, U.S.N.M. No. 493394, received from Dr. C. Ramsden, collected on Mogote de Santa Ana, Oriente Province. The one described and figured has a little over 4 whorls and measures: Length, 10.0 mm.; greater diameter, 7.2 mm.; lesser diameter, 5.2 mm.

*XENOPOMA AGUAYOI*, new species

PLATE 19, FIGURE 7

Shell very large, elongate-conic, pale yellow. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming a slender, rather elongated apex. The last portion of the last nuclear turn shows the beginning of the postnuclear sculpture. Postnuclear whorls strongly rounded, marked alternately by decidedly spinose axial lamellae and by finer axial threads between these, the latter varying in number from 4 to 10. The second and third turns have 19 of the strong lamellae, while 22 are present on the fourth, 23 on the fifth, 24 on the sixth, and 25 on the last postnuclear whorl. On the first turn the strong spiral sculpture is poorly differentiated. The spines on the lamellae form exceedingly large cusps, which are hollow. These cusps are not well differentiated on the first and second postnuclear turns; on the third, 2 strong cusps and indications of lesser ones are present; on the fifth there is a strong median cusp with 2 less strong anterior and one posterior to it; on the sixth whorl there is a strong median cusp with 2 posterior and anterior to it. These become intensified on the first whorl; on the last whorl there are 4 strong cusps and a slender, auriclelike element at the summit, and sometimes a more slender denticle between the one at the summit and the first strong cusp. Between the periphery and the umbilicus two more cusps are present. The umbilical wall also shows some indication of fine spines, although here they are almost obsolete. The last whorl is solute and deflected for about half a turn. Aperture subcircular; peristome double, the inner slightly exerted and reflected; the outer very broadly expanded and of almost the same width all around, marked by concentric laminae. Operculum typically xenopomid.

The type, U.S.N.M. No. 535541, was collected by Dr. Aguayo at Loma de la Cantera, Miranda, Oriente Province. It is a complete specimen having 9.6 whorls and measuring: Length, 18.2 mm.; greater diameter, 10.1 mm.; lesser diameter, 6.0 mm.

This species is easily distinguished from all the others by having the peristome broadly expanded on the parietal wall.

## XENOPOMA HENDERSONI, new species

## PLATE 19, FIGURE 3

Shell elongate-conic, flesh colored with a pinkish tinge, the tip and the peristome white. Nuclear whorls 2, forming a conspicuous mammillated apex, with the whorls inflated and microscopically granulose, and the last portion of the last turn showing the beginning of the post-nuclear sculpture. Postnuclear whorls strongly rounded, marked by strongly raised slender spinose axial lamellae, between which 4 to 8 finer axial threads are present. Of these lamellae, 24 occur on the first turn of the type, 22 on the second and third, 24 on the fourth, 26 on the fifth, and 32 on the last whorl. The lamellae on the first turn bear no spines, on the second there are 2, on the third and fourth 3, on the fifth 4, and on the sixth 6 between the summit and the suture. Suture strongly constricted. Periphery strongly rounded. Base well rounded, openly umbilicated, marked by the continuation of both the strong and the weak axial sculpture. The lamellae bear 3 slender spines. Within the umbilicus the wall is marked by the continuation of the axial threads and by much enfeebled lamellae. These are crossed by 9 spiral threads, which render their junctions with the axial lamellae minutely spinose. The last whorl is solute for a little more than half a turn. Aperture subcircular; peristome double, the inner slightly exerted; the outer broadly expanded on the outer and basal lip, less so on the inner and parietal, fluted and slightly digitated at the external margin. Operculum typically xenopomid.

The type, U.S.N.M. No. 493390, was collected by Mr. Henderson at Farallon de Nipe, Oriente Province. It has 8.2 whorls remaining and measures: Length, 14.0 mm.; greater diameter, 7.6 mm.; lesser diameter, 6.1 mm.

This species is easily distinguished from the other members by the presence of fine spines on the umbilical wall.

## XENOPOMA HYSTRIX ([Wright] Pfeiffer)

## PLATE 19, FIGURE 2

1861. *Cyclostoma pterostomum* [Gundlach] POEY, *Memorias sobre la historia natural de la isla de Cuba*, vol. 2, p. 405, *nomen nudum*.  
 1862. *Choanopoma hystrix* [Wright] PFEIFFER, *Malakozool. Blätter*, vol. 8, pp. 221-222.  
 1890. *Xenopoma hystrix* CROSSE, *Journ. Conchyl.*, vol. 38, pp. 283-284, pl. 5, fig. 2.  
 1920. *Xenopoma hystrix* HENDERSON and BARTSCH, *Proc. U. S. Nat. Mus.*, vol. 58, p. 68.

Shell very elongate-conic, flesh colored. Nuclear whorls a little more than 2, well rounded, microscopically granulose, forming a conspicuous mammillated apex with the last portion of the last turn

showing the beginning of the postnuclear sculpture. Postnuclear whorls strongly rounded, marked by axial lamellae, which bear hollow spines; between these axial lamellae are finer axial threads. On the first postnuclear whorl the axial sculpture consists of 40 slender riblets, while on the succeeding two turns 16 lamellae are present on each; on the fourth whorl there are 18, on the fifth 20, and on the last 24. Two spines are present on the spire of all the turns but the last. On the last an additional spine makes its appearance between the summit and the first strong spine. On the middle of the base there is another spine on the continuation of the lamellae. The last whorl is solute for about a whole turn, and broadly deflected. The inside of the umbilical wall is marked by fine axial threads, continuing the finer sculpture; the coarser lamellae are here much reduced. Aperture subcircular; peristome double, the inner slightly exerted; the outer broadly expanded, slightly digitate, and fluted on the outer lip. Operculum typically xenopomid.

U.S.N.M. No. 10990 contains 4 specimens from the type locality, Cayo del Rey, Oriente Province, collected by C. Wright. One of these is a perfect specimen, which we have described and figured. It has 8.2 whorls and measures: Length, 14.3 mm.; greater diameter, 5.8 mm.; lesser diameter, 5.2 mm.

This species differs from *X. hendersoni* and *X. spinosissimum* by having only three spines on the lamellae of the last whorl.

**XENOPOMA SPINOSISSIMUM, new species**

PLATE 19, FIGURE 9

Shell broadly elongate-conic, pinkish flesh colored with the peristome white. Nuclear whorls 2, forming a conspicuous apex, the inflated microscopically granulose whorls of which form a decidedly mammillated apex. The last portion of the last nuclear turn shows the beginning of the postnuclear sculpture. Postnuclear whorls strongly rounded, marked by slender, raised, spinose axial lamellae, between which 6, 8, or even more slender axial threads are present. On the first whorl there are 34 slender axial riblets, on the second 26, on the third 20, on the fourth 22, on the fifth 24, and on the sixth 26. These lamellae bear two spines on the first, second, and third turns; on the fourth there are 4, on the fifth 5, and on the last 7 between the summit and the suture. These spines are very long, slender, and hollow. Suture strongly constricted. Base short, strongly rounded, marked on the ribs by 2 strong spines and a third that is less strong. Within the umbilicus there are 5 slender spiral threads. There is little differentiation within the umbilicus between the strong lamellae and the finer sculpture. The last whorl is solute and deflected for a little more than half a turn. Aperture subcircular; peristome double,

broadly expanded, the inner slightly exerted; the outer slightly fluted on the outer edge. Operculum typically xenopomid.

The type, U.S.N.M. No. 493388, was collected by Mr. Henderson at Farallon de Canapú, Cayo del Rey, Oriente Province. It has 7.5 whorls remaining and measures: Length, 11.5 mm.; greater diameter, 6.3 mm.; lesser diameter, 5.5 mm.

This species is readily distinguished from *X. hystrix* by its large number of spiral threads and by its larger number of spines, and from *X. hendersoni* by lacking the fine spines on the umbilical wall.

#### Genus PARACHONDRIA Dall

1905. *Parachondria* DALL, Proc. Malac. Soc. London, vol. 6, p. 209.

Shell ranging in shape from elongate-ovate to elongate-conic, marked by axial ribs only, or by axial ribs and spiral threads, which are confined to the umbilicus, or by axial and spiral threads on spire and base, or slender axial lamellae and subobsolete spiral threads, which give to the axial sculpture an articulate appearance. No breathing device is present. The operculum has the inner portion of its turns covered by a calcareous deposit, which consists of numerous low, retractively curved, fused riblets, which are not fused into a raised lamella at their outer edge, nor does the calcareous deposit extend to the edge of the chondroid basal plate. There is thus left a narrow channel, in the bottom of which the chondroid plate may be seen at the outer edge of each whorl.

Type: *Parachondria fascia* Wood.

The genus is represented by the subgenera *Parachondria* and *Parachondrops*. In the Cuban species the *Parachondria* characters of the operculum are very poorly developed; they are not nearly as strong as those in the Jamaican species.

#### KEY TO THE CUBAN SUBGENERA OF PARACHONDRIA

Axial and spiral sculpture strong..... **Parachondria**  
 Axial and spiral sculpture not strong.  
 Axial ribs narrow, rendered articulate by the spiral sculpture..... **Parachondrops**

#### Subgenus PARACHONDRIA Dall

1905. *Parachondria* DALL, Proc. Malac. Soc. London, vol. 6, p. 209.

Shell elongate-conic, marked by strong axial and spiral threads on spire and base. Operculum typical parachondroid.

Type: *Parachondria (Parachondria) fascia* (Wood).

#### KEY TO THE SPECIES OF THE SUBGENUS PARACHONDRIA

Last whorl adnate..... **texta**  
 Last whorl solute..... **abnata**

## PARACHONDRIA (PARACHONDRIA) TEXTA ((Gundlach) Pfeiffer)

Shell large, elongate-conic, pale horn-color with very faint interrupted spiral bands of brown. The dots or spots composing these bands are arranged in both axial and spiral series. Nuclear whorls almost 2, inflated, well rounded, microscopically granulose. Post-nuclear whorls well rounded, marked by slender, well-rounded axial ribs, which are strongly elevated and gathered into tufts at the summit. In addition to the axial sculpture the whorls are marked by slender, spiral threads, which render the axial ribs nodulose, the nodules being oval with their long axis coinciding with the axial sculpture. Suture moderately well constricted. Periphery well rounded. Base moderately long, narrowly, openly umbilicated, marked by the continuation of the axial riblets and by spiral threads between the periphery and the outer angle of the umbilicus. These threads render the axial riblets nodulose, and they are a little stronger than those on the spire. The outside of the umbilical wall is also marked by slender spiral threads. The last whorl may be slightly solute or the outer peristome may be adnate to the preceding turn. Aperture broadly oval; peristome double, the outer broadly flaringly expanded; the inner slightly expanded and appressed to the outer. Operculum paucispiral with a chondroid basal plate with a heavy calcareous deposit, which forms radiatingly curved, low ridges that do not quite reach to the periphery of the turns. This operculum stands midway between typical *Chondropoma* and *Parachondria*. The species is known only from Oriente Province. We recognize the following subspecies:

## KEY TO THE SUBSPECIES OF PARACHONDRIA (PARACHONDRIA) TEXTA

Shell pale and inconspicuously spotted.....	<b>texta</b>
Shell not pale and rather conspicuously spotted.	
Axial ribs of uniform strength.....	<b>portillensis</b>
Axial ribs not of uniform strength.....	<b>booneae</b>

## PARACHONDRIA (PARACHONDRIA) TEXTA TEXTA ((Gundlach) Pfeiffer)

## PLATE 20, FIGURE 7

1858. *Cyclostoma textum* (Gundlach) PFEIFFER, Malakozool. Blätter, vol. 5, p. 192.  
 1861. *Chondropoma textum* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.  
 1920. *Chondropoma* (*Chondropomorus*) *textum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 61.

This typical subspecies was collected by Gundlach at El Morro, at the entrance to the port of Santiago, Oriente. It is larger than the other races, paler, with the brown spots almost obsolete, but their indication shows that here, also, they are in axial and spiral series. They are rather distantly spaced. The axial riblets are quite slender, and

their spacing is a little more approximated than that of the spiral threads, which are of about equal strength.

Gundlach says that he found specimens of this race on trees close to the ground and among sprouts and that the animal is pale brown with an olivaceous tint. The tentacles are white at their base and tip and they are ochraceous-orange in the middle.

A cotype, U.S.N.M. No. 493347, has 4.5 whorls remaining and measures: Length, 17.3 mm.; greater diameter, 8.7 mm.; lesser diameter, 7.0 mm.

**PARACHONDRIA (PARACHONDRIA) TEXTA PORTILLENIS, new subspecies**

PLATE 20, FIGURE 9

This race, which Bartsch collected at Puerto del Portillo, east of Ensenada de Mora, is dark, like *P. (P.) texta booneae*, but the brown markings are a little less pronounced, and the whorls are much more inflated and gibbose and average considerably larger.

The type, U.S.N.M. No. 391398, has 5.0 whorls remaining and measures: Length, 16.5 mm.; greater diameter, 8.7 mm.; lesser diameter, 7.4 mm.

**PARACHONDRIA (PARACHONDRIA) TEXTA BOONEAE (Welch)**

PLATE 20, FIGURE 8

1934. *Chondropoma (Chondropomorus) textum booneae* WELCH, Nautilus, vol. 47, pp. 107-108, pl. 11, fig. 4.

This race, which was collected by Pilsbry in a ravine east of La Vigia, Ensenada de Mora, is smaller than the typical race and is much darker in color. The interrupted spiral bands are almost continuous, and the axial arrangement, while still indicated, is less pronounced.

The type, U.S.N.M. No. 535329, has 4.5 whorls remaining and measures: Length, 15.0 mm.; greater diameter, 7.8 mm.; lesser diameter, 6.5 mm.

**PARACHONDRIA (PARACHONDRIA) ABNATA ([Gundlach] Pfeiffer)**

PLATE 20, FIGURE 6

1858. *Cyclostoma abnatum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 5<sup>r</sup> p. 191.

1861. *Chondropoma abnatum* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.

1920. *Chondropoma (Chondropomorus) abnatum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 61.

Shell elongate-conic, flesh colored, with interrupted pale brown spiral bands. The dots composing these bands are arranged in both axial and spiral series. Nuclear whorls almost 2, forming a very blunt, inflated apex, all but the last portion microscopically granulose, the

last part showing the beginning of fine axial threads. Postnuclear whorls inflated, strongly rounded, marked by retractively slanting, slender, sublamellar axial riblets, which are of irregular strength and spacing. These riblets are gathered together into tufts at the summit. The spaces separating these riblets vary from as wide as the riblets to four times their width. In addition to the axial riblets, the whorls are marked by spiral threads, which, while slender, are nevertheless rather strongly elevated. These spiral threads render the axial riblets conspicuously tuberculated. The spaces enclosed between the axial riblets and the spiral threads are more or less square or rectangular pits, depending upon the approximations of the riblets. Suture very strongly constricted. Periphery of the last whorl strongly rounded. Base short, inflated, narrowly, openly umbilicated, strongly rounded, marked by the continuations of the axial riblets and by spiral threads, which are a little stronger than those on the spire. These threads also render the axial riblets conspicuously nodulose. There are 5 of the spiral threads on the base between the periphery and the edge of the umbilicus. On the inner umbilical wall 5 additional threads are present; these decrease in size from without, inward. The last whorl is solute for about one-twentieth of a turn. Aperture large, oval; peristome double, the outer decidedly expanded and reflected, slightly channeled at the anterior angle, and somewhat auriculate at the posterior angle, of almost equal width around the outer lip, slightly broader at the junction of the basal and inner lip; on the parietal wall the peristome is of about half the width of that of the outer lip and is separated from the preceding turn by a gap as wide as or wider than the width of the peristome; inner peristome moderately elevated, slightly expanded and reflected. Operculum paucispiral, with the nucleus halfway between subcentral and marginal; the outside covered with a fine granular deposit and the curved parachondroid ridges.

Gundlach cites Aguadores, near Santiago, as the type locality, where he collected it "among rubbish and below rocks." He speaks of the animal as follows: "Animal pale, brownish white with a rose colored tinge. The antennae of the same color but the thickened apex and the snout pale brownish. The head is marked with dark spots. In other examples the color is soiled white, while the head has a Turk blue sheen. The tentacles are also of this color, but the apex and the snout are brownish; the head is spotted with small dots." We have also seen specimens from Ciudadmar (El Morro), and Siboney.

The specimen described and figured, U.S.N.M. No. 104497, is probably from the type locality. It has 3.5 whorls remaining and measures: Length, 10.6 mm.; greater diameter, 5.6 mm.; lesser diameter, 4.5 mm.

## Subgenus PARACHONDROPS Henderson and Bartsch

1920. *Parachondrops* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, pp. 66-67.

Shell elongate-conic. Nuclear whorls about 2, the first smooth, except for microscopic granules; the second also very strongly rounded and marked by fine, hairlike, retractively curved axial riblets, which are relatively more closely spaced than the axial ribs on the post-nuclear whorls. We have here an acceleration of the postnuclear sculpture extending over half of the nuclear turns. The axial sculpture of the postnuclear whorls consists of slender sublamellar riblets, which are rendered wavy or articulate by the ill-defined spiral sculpture. Operculum typically parachondroid.

Type: *Parachondria (Parachondrops) campbelli* (C. B. Adams).

## KEY TO THE SPECIES OF THE SUBGENUS PARACHONDROPS

Decollated shell more than 13 mm. long.

Outer peristome narrow, of the same width all around..... *wrighti*

Outer peristome not narrow or of the same width all around.

Sculpture strong.

Whorls inflated, rotund..... *erecta*

Whorls not inflated, well rounded..... *lurida*

Sculpture feeble..... *abtiana*

Decollated shell not more than 11 mm. long.

Last whorl decidedly solute..... *daudinoti*

Last whorl adnate or almost so.

Basal spiral threads rather strong..... *chordata*

Basal spiral threads obsolete..... *nigricula*

## PARACHONDRIA (PARACHONDROPS) WRIGHTI (Pfeiffer)

## PLATE 20, FIGURE 5

1862. *Tudora wrighti* PFEIFFER, Malakozool. Blätter, vol. 9, p. 4, pl. 1, figs. 4, 5.

Shell elongate-conic, thin, semitranslucent. Nuclear whorls decollated. Postnuclear whorls only moderately rounded, marked by low, retractively curved, slightly wavy axial riblets, which become almost obsolete on the last turn. Some of these riblets become expanded and form hollow tufts at the summit. The spiral sculpture is just sufficiently indicated to render the axial riblets articulate, but scarcely noticeable on the last whorl. Suture moderately constricted. Periphery inflated, strongly rounded. Base rather short, inflated, strongly rounded, openly umbilicated, and marked by the feeble continuation of the axial ribs and, near the umbilicus, by a few weak spiral threads. Aperture oval; peristome double, the outer very slightly expanded, slightly auriculate at the posterior angle, very narrow, scarcely projecting beyond the inner, which is also reflected on the outer lip and only a little so on the

columellar and parietal wall. There is a slight space between the outer peristome and the preceding turn.

The specimen described and figured, U.S.N.M. No. 367773, was collected by Wright at Hermitaño, between Demajagua and Guantánamo. It has 4.0 whorls remaining and measures: Length, 14.8 mm.; greater diameter, 7.2 mm.; lesser diameter, 6.2 mm. The thin shell and the obsolete sculpture will easily distinguish this species from all the other *Parachondrops*.

**PARACHONDRIA (PARACHONDROPS) ERECTA** ([Gundlach] Pfeiffer)

Shell elongate-conic, varying in color from flesh color to pale wax yellow. The peristome may be white or yellowish. In addition to this the shell is marked by interrupted spiral bands of brown, which vary from strong to merely indicated. Nuclear whorls 1.5, forming a blunt apex, the first half white, well rounded, smooth, except for microscopic granules. The next turn is inflated, strongly rounded, and marked by fine, hairlike, retractively slanting axial riblets, which are about half as wide as the spaces that separate them and are much closer spaced than the axial riblets of the postnuclear turns. Post-nuclear whorls well rounded, marked by slender axial riblets, which vary considerably in strength, spacing, and regularity in the various subspecies. Some of these riblets are expanded at the summit, or several of them may be fused at the summit to form large, hollow cusps. The spiral threads are even more slender than the axial riblets which are rendered slightly wavy, that is, articulate, by the spiral threads. Suture well constricted. Periphery well rounded. Base moderately long, well rounded, with a moderately wide-open umbilicus, marked by the same type of sculpture as that characterizing the spire. Within the umbilicus the spiral sculpture becomes much intensified, forming rather strong cords, while the axial riblets become somewhat reduced. The last whorl is nearly always very slightly solute behind the aperture. Aperture broadly ovate; peristome double, the outer moderately expanded, somewhat auriculate at the posterior angle, and a little wider on the columellar margin than on the outer lip. The peristome may touch the preceding whorl or it may leave a slight curve between it and the preceding turn. The outer peristome is marked by feeble lines of growth; the inner peristome is slightly expanded and almost appressed to the outer. Operculum thin, corneous, paucispiral, with excentric nucleus and a heavy deposit of calcareous material, which is more or less arranged in concentric ridges, feebly indicating the parachondroid sculpture.

The species is restricted to Oriente Province and breaks up into a series of races, four of which we recognize here as distinct subspecies. The following key will help to differentiate these:

## KEY TO THE SUBSPECIES OF PARACHONDRIA (PARACHONDROPS) ERECTA

Spiral sculpture on last whorl strong.

Interrupted color bands strong.

Axial riblets closely spaced..... mayensis

Axial riblets distantly spaced..... ramonensis

Interrupted color bands feeble..... erecta

Spiral sculpture on last whorl feeble..... turquinensis

## PARACHONDRIA (PARACHONDROPS) ERECTA MAYENSIS, new subspecies

## PLATE 20, FIGURE 1

This race, which was collected by Dr. Ramsden at Isabelita plantation, La Maya, Oriente, has the axial riblets almost as closely approximated as those in typical *P. (P.) erecta erecta*, but they are a little less elevated. It agrees with *P. (P.) erecta ramonensis* in having the strong interrupted spiral bands of brown. The peristome is separated from the preceding turn at the parietal wall.

The type, U.S.N.M. No. 367778, has 4.2 whorls remaining, and measures: Length, 14.0 mm.; greater diameter, 7.2 mm.; lesser diameter, 6.1 mm.

## PARACHONDRIA (PARACHONDROPS) ERECTA RAMONENSIS, new subspecies

## PLATE 20, FIGURE 4

This subspecies was collected by Gundlach at El Ramon, east of Santiago. It differs from the typical race in being smaller, in having the whorls a little more rounded, and in having the axial ribs more distantly spaced and more irregular in development; that is, heavy and fine riblets are present. The tufts at the summit are also heavier and are less inclined to consist of fused riblets. The interrupted spiral bands of brown are quite strong, and the peristome at the parietal wall touches the preceding turn.

The type, U.S.N.M. No. 367780, has 4.2 whorls remaining and measures: Length, 13.7 mm.; greater diameter, 7.0 mm.; lesser diameter, 6.3 mm.

## PARACHONDRIA (PARACHONDROPS) ERECTA ERECTA ([Gundlach] Pfeiffer)

## PLATE 20, FIGURE 2

1858. *Cyclostoma erectum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 5, p. 189.

1865. *Chondropoma erectum* PFEIFFER, Monographia pneumonopomorum viventium, vol. 3, p. 156.

1920. *Chondropoma (Chondropomorus) erectum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 61.

The typical subspecies comes from the region of Santiago. It is larger than the others and it has the spiral sculpture on the last whorl

strongly developed, the axial ribs slender and sublamellar, and the brown spiral bands merely indicated.

The specimen figured, U.S.N.M. No. 367779, which was collected by Gundlach at El Morro de Santiago, has 4.8 whorls remaining and measures: Length, 16.0 mm.; greater diameter, 8.2 mm.; lesser diameter, 7.0 mm.

PARACHONDRIA (PARACHONDROPS) ERECTA TURQUINENSIS, new subspecies

PLATE 20, FIGURE 3

This race was collected by Jeanneret on Pico Turquino. It differs from the other races in having the axial riblets much less strongly elevated and less strongly developed and much more closely approximated, with the spiral sculpture much enfeebled, almost obsolete on the last turn. The whorls are also a little more inflated and very conspicuously denticulated at the summit. The interrupted spiral color bands are moderately strong. The last whorl is slightly solute.

The type, U.S.N.M. No. 367781, has 5.1 whorls remaining and measures: Length, 13.8 mm.; greater diameter, 7.1 mm.; lesser diameter, 6.0 mm.

PARACHONDRIA (PARACHONDROPS) LURIDA ([Gundlach] Pfeiffer)

PLATE 21, FIGURE 13

1858. *Cyclostoma lurida* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 2, pp. 4, 12, *nomen nudum*.  
 1858. *Cyclostoma luridum* [Gundlach] PFEIFFER, Malakazool. Blätter, vol. 5, pp. 45-46.  
 1865. *Tudora lurida* PFEIFFER, Monographia pneumonopomorum viventium, Suppl. 2, p. 137.  
 1920. *Parachondria (Parachondrops) lurida* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67.

Shell elongate-conic, pale yellow, the interior pale yellow, the peristome flesh colored. Nuclear whorls decollated in all our material. Postnuclear whorls moderately well rounded, narrowly shouldered at the summit, marked by feeble, slightly retractively slanting axial riblets, which become expanded to form hollow tufts at the summit. These tufts are not all of the same size and are rather irregularly developed. In the specimen described and figured, 80 axial riblets occur upon the first of the remaining turns, 100 upon the second, 110 upon the third, and 104 upon the last. The spiral sculpture consists of slender, low, rounded threads, of which 6 occur upon the first and second turns, 8 upon the third and fourth, and 9 upon the last, between the summit and the suture. The junctions of the axial riblets and the spiral threads form slender, elongated nodules, which have their long axis parallel with the axial sculpture, while the spaces enclosed between them are more or less rectangular, shallow areas. Suture strongly

constricted. Periphery strongly rounded. Base moderately long, strongly rounded, narrowly umbilicated, marked by the continuation of the axial ribs and by 8 spiral threads of about the same strength as those on the spire, while within the umbilicus 5 additional spiral threads are present. Last whorl solute for about one-fourth of a turn, and slightly deflected. Aperture broadly oval; peristome double, the outer expanded into a conspicuous auricle at the posterior angle, narrow on the outer lip, and wider on the inner and basal lip, and again narrow on the parietal wall; the inner moderately exerted and rather broadly expanded. Operculum paucispiral with the nucleus halfway between submarginal and subcentral; the turns are marked on the outside by numerous, retractively slanting lamellae, which extend over about three-fifths of the whorls, fusing on the inner surface; the outer two-fifths of the turns are without reinforcement.

The specimen described and figured, U.S.N.M. No. 355391, comes from the type locality, Guisa, southeast of Bayamo, Oriente Province. It was part of the Redfield collection and it was probably received from Poey or Gundlach. It has a little over 4 whorls remaining and measures: Length, 15.5 mm.; greater diameter, 7.8 mm.; lesser diameter, 6.5 mm.

PARACHONDRIA (PARACHONDROPS) ABTIANA (Pfeiffer)

PLATE 21, FIGURE 11

1862. *Tudora abtiana* PFEIFFER, Malakozool. Blätter, vol. 9, p. 4.

Shell elongate-conic, pale wax yellow with interrupted spiral bands of brown. Nuclear whorls decollated in all our specimens. Postnuclear whorls well rounded and marked by slender, slightly elevated, rather closely spaced axial riblets, which are gathered into hollow tufts at more or less regular intervals at the summit. The spiral sculpture consists of feeble threads, just strong enough to render the axial riblets wavy or articulate. Suture well constricted. Periphery somewhat inflated, well rounded. Base short, well rounded, marked by the continuation of the axial ribs and by spiral threads that are obsolete, except within the umbilicus and the anterior two-thirds of the base, where they become more intensified. The last whorl is solute for about one-fifth of a turn. Aperture oval; peristome double, the outer slightly auriculate at the posterior angle, rather heavy and expanded, very slightly wider on the columellar margin than on the inner lip; the inner slightly exerted, reflected, and appressed to the outer. Operculum paucispiral, with a heavy deposit of calcareous material, which is arranged in retractively curved folds suggesting a development midway between *Chondropoma* and *Parachondria*.

The specimen figured, U.S.N.M. No. 11055, is one of 3 collected by Wright at Saltadero, Guantánamo. It has 4.2 whorls remaining and

measures: Length, 15.4 mm.; greater diameter, 7.6 mm.; lesser diameter, 6.5 mm.

The species is easily distinguished from *P. (P.) erecta* and *P. (P.) lurida* by its much less strongly developed sculpture.

PARACHONDRIA (PARACHONDROPS) DAUDINOTI ([Gundlach] Pfeiffer)

PLATE 21, FIGURE 9

1860. *Cyclostoma daudinoti* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 6, pp. 69-70.

1865. *Choanopoma daudinoti* PFEIFFER, Monographia pneumonopomorum viventium, Suppl. 2, p. 105.

Shell small, elongate-conic, dark horn colored. Nuclear whorls decollated in all our specimens. Postnuclear whorls somewhat inflated, well rounded, marked by narrow, sublamellar axial ribs, of which some are stronger than others, with 2 or even more finer riblets between the strong ones. Some of these riblets become expanded at the summit to form denticles, a few of which are rather heavy and hollow. The spiral sculpture consists of mere indications of threads, which, however, render the ribs of the early whorls slightly scalloped and sinuous, that is, articulate. On the last whorl the spiral sculpture is obsolete. Periphery of the last whorl strongly rounded. Here, too, the axial riblets are a little more closely approximated than on the early whorls. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, well rounded, moderately broadly, openly unbilicated, marked by the continuations of the axial riblets and by 2 faint spiral threads outside of the umbilical margin and by 3 strong spiral threads within the umbilicus, which here render the axial riblets scalloped. Last whorl solute for about one-fifth of a turn. Aperture very broadly oval, almost subcircular; peristome double, the outer flaringly expanded all around except on the parietal wall, where it is quite narrow, marked by a series of concentric lamellae; the inner slightly exerted and slightly expanded. Operculum typically parachondroid, i. e. upon the chondroid base there is a strong development of retractively curved axial riblets, which are fused on the inside, and which become diminished as they approach the periphery, vanishing before reaching the outer extremity. This is the only Cuban species we know in which the operculum agrees with the Jamaican species in the strong development of the opercular characters.

The specimen figured, U.S.N.M. No. 355387, comes from Monte Toro, Guantánamo. It has 5.1 whorls remaining and measures: Length, 8.9 mm.; greater diameter, 4.3 mm.; lesser diameter, 3.4 mm.

Gundlach says of the animal: "On rocks. Animal whitish, neck a little brownish, white about the eyes. Blackish dots on the head form a longitudinal line on each side which passes through the base of

its antennae. Tentacles brownish at the apex. A dark longitudinal streak is present between the neck and foot. Some individuals are a little more rusty in color."

**PARACHONDRIA (PARACHONDROPS) CHORDATA** ([Gundlach] Pfeiffer)

Shell elongate-conic, pale brown, marked by interrupted spiral bands of brown. Aperture flesh colored within, showing the spiral bands inside. The nuclear whorls are strongly rounded; the beginning of the nuclear turns are smooth; the rest of the first turn is marked by wavy, raised spiral cords, while the last turn is marked by distantly spaced, scalariform axial riblets. Postnuclear whorls strongly rounded, marked by closely spaced, sublamellar axial riblets, which become expanded at the summit, or several of them fuse to form toothlike elements. The spiral sculpture consists of about 5 low, rounded, broad cords which render the axial riblets scalloped. Suture strongly constricted. Base moderately long, well rounded, narrowly umbilicated, marked by 4 spiral cords. Another one is apparent within the umbilicus. Aperture broadly oval; peristome double, the outer broadly expanded, appressed to the preceding turn with the parietal portion; the inner peristome slightly projecting, moderately expanded, and reflected. Operculum thin, corneous, paucispiral, with the nucleus halfway between subcentral and marginal; the outside covered with a rather thick calcareous deposit, which bears the usual retractively curved parachondroid ridges, which are not strongly developed at this point.

This species ranges through a large part of Oriente Province and breaks up into a number of subspecies, which the following key will help to differentiate:

**KEY TO THE SUBSPECIES OF PARACHONDRIA (PARACHONDROPS) CHORDATA**

- Both peristomes broadly, flaringly expanded.  
 Shell large, more than 10 mm. long----- **tanamensis**  
 Shell small, less than 8 mm. long----- **baracoensis**  
 Both peristomes not broadly, flaringly expanded.  
 Sculpture strong.  
 Axial riblets very closely spaced----- **mayariensis**  
 Axial riblets less closely spaced.  
 Spiral cords of base very strong----- **songoensis**  
 Spiral cords of base not very strong----- **guantanamensis**  
 Sculpture feeble----- **chordata**

**PARACHONDRIA (PARACHONDROPS) CHORDATA TANAMENSIS, new subspecies**

**PLATE 21, FIGURE 3**

In this race, which comes from El Coco, south of Sagua de Tánamo, Oriente, both peristomes are broadly expanded. In this character it

resembles *P. (P.) chordata baracoensis*, from which it is easily distinguished by its much larger size.

The type, U.S.N.M. No. 367788, was collected by Arango. It has 4.2 whorls remaining and measures: Length, 11.0 mm.; greater diameter, 5.9 mm.; lesser diameter, 5.2 mm.

PARACHONDRIA (PARACHONDROPS) CHORDATA BARACOENSIS, new subspecies

PLATE 21, FIGURE 10

In this race, which comes from Silla de Bacz, west of Baracoa, both peristomes are flaringly expanded, as in *P. (P.) chordata tanamensis*, but the shell of *baracoensis* is smaller.

The type, U.S.N.M. No. 535334, has 4.5 whorls remaining and measures: Length, 7.8 mm.; greater diameter, 4.2 mm.; lesser diameter, 3.3 mm.

PARACHONDRIA (PARACHONDROPS) CHORDATA MAYARIENSIS, new subspecies

PLATE 21, FIGURE 8

This race was collected by Jeanneret at Picote, and by John B. Henderson at Piedra Gorda, Mayari, Oriente Province. It belongs to the group which has the inner peristome narrowly expanded, with strong axial and spiral sculpture, and with the axial riblets very closely spaced, in which character it differs from *P. (P.) chordata songoensis* and *P. (P.) chordata guantanamensis*.

The type, U.S.N.M. No. 367789, has 4.3 whorls remaining and measures: Length, 9.0 mm.; greater diameter, 4.8 mm.; lesser diameter, 3.8 mm.

PARACHONDRIA (PARACHONDROPS) CHORDATA SONGOENSIS, new subspecies

PLATE 21, FIGURE 2

This race was collected by Dr. Ramsden at Reuter, Alto Songo, Oriente. It, also, belongs to the group in which the inner peristome is only slightly expanded. It is most nearly related to *P. (P.) chordata guantanamensis*; both of these subspecies have the axial riblets distantly spaced, but in *songoensis* the spiral cords of the base are very strong, which character differentiates it from *guantanamensis*.

The type, U.S.N.M. No. 367767, has 4.8 whorls remaining and measures: Length, 9.6 mm.; greater diameter, 6.0 mm.; lesser diameter, 3.7 mm.

PARACHONDRIA (PARACHONDROPS) CHORDATA GUANTANAMENSIS, new subspecies

PLATE 21, FIGURE 12

This race comes from the Yateras region, Guantánamo. It belongs to the group that does not have both peristomes flaringly expanded,

the inner being only slightly expanded. It is most nearly related to *P. (P.) chordata songoensis*, with which it shares the rather distant spacing of the axial riblets, but from which it is differentiated by its much weaker basal spiral cords

The type, U.S.N.M. No. 493357, a complete specimen, has 7.5 whorls and measures: Length, 12.6 mm.; greater diameter, 5.4 mm.; lesser diameter, 4.8 mm.

PARACHONDRIA (PARACHONDROPS) CHORDATA CHORDATA ([Gundlach] Pfeiffer)

PLATE 21, FIGURE 1

1858. *Cyclostoma chordatum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 5, p. 189.

1861. *Adamsiella chordatum* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 353 (27).

1920. *Chondropoma (Chondropomorus) chordatum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 61.

The typical race comes from Enramadas, in the region of Santiago, Oriente. It also belongs to the group that has the inner peristome only slightly expanded and reflected. It differs from all the other members of that group in having both the axial and spiral sculpture quite feebly expressed.

The specimen figured, U.S.N.M. No. 493354, a cotype received from Gundlach, has 4.5 whorls remaining, and measures: Length, 10.1 mm.; greater diameter, 5.4 mm.; lesser diameter, 4.3 mm.

PARACHONDRIA (PARACHONDROPS) NIGRICULA (Gundlach)

PLATE 21, FIGURE 7

1860. *Cyclostoma nigriculum (Ctenopoma)* GUNDLACH, Malakozool. Blätter, vol. 7, p. 28.

1861. *Ctenopoma nigriculum* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.

1920. *Parachondria (Parachondrops) nigricula* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67.

Shell elongate-conic, pale yellow, with the inner peristome white. Nuclear whorls decollated in all our specimens. Postnuclear whorls slightly inflated, well rounded, marked with retractively slanting, slender axial ribs, of which 40 occur upon the first of the remaining turns, 72 upon the second, 90 upon the third, 126 upon the fourth, and 144 upon the last. These ribs are not all of the same strength, but a series of taller ones alternate with more slender elements, the taller ones forming expanded tubercles at the summit, which here give to these groups a somewhat tufted appearance. The spiral sculpture consists of obsolete cords, which render the riblets slightly wavy. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, narrowly, openly umbilicated, marked by the continuation of the axial ribs and by a strong spiral

cord marking the termination of the umbilicus. Aperture subcircular; peristome double, the outer expanded a little less on the parietal wall than on the rest, marked by a series of concentric lamellae; the inner slightly exerted and reflected. Operculum paucispiral, with the nucleus halfway between subcentral and submarginal; the whorls are marked by feeble, retractively curved, slender lamellae, which do not quite extend to the outer edge of the chondroid plate.

The specimen described and figured, U.S.N.M. No. 57136, is one of 5 collected by Arango on El Yunque. It has a little over 5 whorls and measures: Length, 9.8 mm.; greater diameter, 4.9 mm.; lesser diameter, 3.8 mm.

Additional series of specimens before us come from Baracoa, El Yunque, and Mata east of Baracoa.

In this species the males are much smaller than the females. Gundlach says of this species: "On stones and trees at Baracoa, Yunque and Mata. Animal brownish with dark dots which become confluent into spots on the snout, the head and part of the neck. Eye ring rose red-white. Tentacles bright coral red with gray apex. The space between neck and foot is dark gray."

#### Subfamily ADAMSIELLINAE Henderson and Bartsch

1920. Adamsiellinae HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 70.

Shell ranging in form from ovate-conic to elongate-conic, marked by axial and spiral sculpture of equal strength, this sculpture giving the surface a granulose appearance, or marked by axial ribs which are stronger than the spiral threads, the latter giving the ribs an articulate appearance. In two groups the ribs are gathered into tufts at the summit. No special breathing device has been observed in any of the species. The operculum consists of a chondroid basal plate composed of several whorls, in which the upturned outer edge of the preceding whorl is strengthened and built into a strongly elevated lamella by the inner edge of the succeeding turn. There is no ribbing or buttressing to this lamella.

*Type genus.*—*Adamsiella* Pfeiffer.

#### Genus ADAMSIELLA Pfeiffer

1851. *Adamsiella* PFEIFFER, Zeitschr. Malac., vol. 8, p. 155.

#### CUBADAMSIELLA, new subgenus

Shell ranging in shape from ovate to elongate-conic. Nuclear whorls smooth, except for microscopic granulations; the last portion of the last whorl usually showing the feeble beginning of the post-nuclear axial ribs. The postnuclear axial sculpture consists of slender sublamellar axial riblets. The spiral sculpture varies from obsolete threads to nothing; when present it renders the axial ribs articulate.

The last whorl is usually solute. The peristome is double, the outer expanded but not thickened. Operculum typically adamsiellid with fine hairlike extensions on the outside of the chondroid basal plate radiating from the raised lamella anteriorly.

Type: *Adamsiella (Cubadamsiella) gratiosa*, new species.

The sublammellar axial ribs and thin outer peristome readily distinguish this subgenus from the Jamaican *Adamsiellops*.

Typical *Adamsiella* is not found in Cuba. So far we have found only the present subgenus in the island.

KEY TO THE SPECIES OF THE SUBGENUS CUBADAMSIELLA

Shell elongate-ovate.....	<i>gratiosa</i>
Shell elongate-conic.	
Axial ribs scalloped.....	<i>leoni</i>
Axial ribs not scalloped.....	<i>procax</i>

ADAMSIELLA (CUBADAMSIELLA) GRATIOSA, new species

PLATE 21, FIGURE 4

Shell elongate-ovate, varying in color from wax yellow to pale orange. Nuclear whorls a little more than 1.5, well rounded, and marked by microscopic granules. Postnuclear whorls inflated, strongly rounded, marked by very slender, rather distantly spaced, sublammellar axial riblets. The broad intercostal spaces and the sides of the ribs are marked in addition by exceedingly fine, microscopic, wavy incremental lines. There are about 40 of these riblets on the first whorl and about 55 on the last. The spiral sculpture is absent on the spire. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, strongly rounded, openly umbilicated, and marked at the umbilical edge by a feebly developed spiral thread. There are also some faint indications of another thread a little farther within. The last whorl may be solute or adnate to the preceding turn. The outside of the parietal wall is marked with the continuation of the axial ribs. Aperture very broadly oval, almost circular; peristome double, the outer thin, expanded, a little narrower on the parietal wall, slightly auriculate at the posterior angle; the inner slightly exerted and slightly reflected. Operculum with an almost central nucleus and a strongly elevated lamella rising from the inner edge of the turns, which is slightly outcurved at the free edge. The spaces between the lamellae are marked by fine granules. In some of these specimens there is a slight indication of distantly spaced, slender, recurved threads between the lamellae.

The type, U.S.N.M. No. 535339, was collected by Bartsch at Guajabana, Santa Clara Province, on the western end of the hill north of the railroad track. It has 6.4 whorls and measures: Length, 7.0 mm.; greater diameter, 3.9 mm.; lesser diameter, 3.4 mm.

We found this species rather widely distributed in Santa Clara Province. We have seen specimens from the northeast slope of La Puntilla; from the lomas de Ramón Martínez, between Remedios and Zulueta; from Charco Majá, north slope of Loma Platero a little east of Yagüey; Vereda del Resbalillo Cambao, near Remedios; and Guajabos.

ADAMSIELLA (CUBADAMSIELLA) LEONI, new species

PLATE 21, FIGURE 5

Shell small, thin, elongate-conic, of wax yellow ground color with interrupted spiral bands of brown, which are arranged in both axial and spiral series. These color bands are shown within the aperture. Nuclear whorls 2, forming a rather large, somewhat mammillated blunt apex, with the whorls inflated, strongly rounded, and microscopically granulose. Postnuclear whorls slightly shouldered, strongly rounded, and marked by strong, distantly spaced, lamellar axial ribs, which are separated by finer axial threads. These vary in number from 3 to 6. The heavy axial ribs extend prominently to the summit and here develop into toothlike elements. The spiral sculpture consists of ill-defined threads, which render the axial ribs vertebrated and the larger of the axial ribs scalloped at their free margin. Suture strongly constricted. Periphery strongly rounded. Base short, strongly rounded, very openly umbilicated, and marked by the continuation of the axial ribs and by feeble spiral threads. The last whorl is solute for about one-half of a turn, with the outside of the parietal wall marked by the continuations of the axial ribs, but with no indication of spiral sculpture. Aperture circular; peristome double, the outer thin, narrowly expanded and a little narrower on the parietal wall than on the rest. The inner decidedly exerted and slightly reflected at its free edge. Operculum thin, corneous, with almost central nucleus. The whorls are provided with a strong, decidedly elevated lamella at their inner edge, which is bent slightly outward at the free margin. There are fine calcareous granules in the spaces between the lamellae.

The type, U.S.N.M. No. 535337, which was collected by Hermano Leon at Cabezadas del Caracusey, Sierra de Gavilanes, Santa Clara Province, has 5.2 whorls remaining and measures: Length, 7.1 mm.; greater diameter, 4.0 mm.; lesser diameter, 3.3 mm.

A larger specimen has 5.3 whorls remaining and measures: Length, 9.0 mm.; greater diameter, 4.5 mm.; lesser diameter, 3.5 mm. This specimen, and the one from which the nucleus and operculum were described, are listed as U.S.N.M. No. 535338.

## ADAMSIELLA (CUBADAMSIELLA) PROCAX (Poey)

## PLATE 21, FIGURE 6

1851. *Cyclostoma procax* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 1, pp. 104, 106, pl. 7, figs. 12-14.

1854. *Cistula? procax* PFEIFFER, Malakozool. Blätter, vol. 1, p. 95.

Shell small, elongate-conic, of wax yellow ground color with interrupted spiral bands of brown, which are arranged in both axial and spiral series. Nuclear whorls almost 2, forming a somewhat mammillated blunt apex, with the whorls inflated, strongly rounded, and microscopically granulose. Postnuclear whorls very inflated and strongly rounded, the first one marked by about 60 threadlike, retractively curved axial riblets. These riblets become decidedly diminished on the next whorl, which has only about 40. From this point they increase in number on each turn to the last whorl, which shows more than 60. Beginning with the second whorl and continuing through the last turn, the riblets become sublamellar, and are rendered sinuous and slightly vertebrated by the poorly developed spiral threads, which are almost obsolete. These riblets extend prominently to the summit, but they scarcely show indications of becoming enlarged at the summit. Suture very strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, very openly umbilicated, marked by the continuations of the axial riblets and by a faint suggestion of spiral threads. The axial riblets extend into the open umbilicus, but here there is no indication of spiral sculpture. The last whorl is solute for about one-fourth of a turn. Aperture very broadly oval, almost circular, not evenly curved, the outer lip being much more strongly arched than the inner; peristome double, the outer thin, narrow, flaringly expanded and slightly auriculate at the posterior angle, a little wider on the outer lip than on the parietal wall; the inner peristome is slightly exerted and reflected, very distinct from the outer, the inner peristome showing the external color bands. Operculum thin, corneous, with subcentral nucleus and with a thin lamella rising on the inner edge of the turns, which is slightly outward bent. The rest of the operculum is covered by fine granules.

The specimen figured, one of nine, U.S.N.M. No. 535336, has 9.2 whorls and measures: Length, 9.8 mm.; greater diameter, 4.3 mm.; lesser diameter, 3.2 mm.

This species, for which Poey did not cite a locality, was lost for some time. It has recently been rediscovered by Hermano León at Lomas de Buenos Aires, between Cienfuegos and Trinidad.

## Subfamily ANNULARIINAE Henderson and Bartsch

1920. Annularinae HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 71.

Shell ranging in form from depressed-helicoid to elongate-conic. The axial sculpture may be almost obsolete or it may consist of strong ribs or many slender lamellae, which may or may not be gathered into tufts at the summit. The spiral sculpture may be absent, confined to the umbilicus, or cover spire and base. In strength the spiral sculpture varies from fine threads to strong cords. Breathing devices are present in some groups and absent in others. They range from a mere notch or slit puncture to a pore with external siphon. The operculum may be flat or convex on the outside, provided with a calcified lamella, which rises from the inner edge of the whorls. This lamella may be vertically placed upon the basal plate or it may be obliquely situated or reflected to parallel the basal plate. It may be almost smooth or ribbed.

*Type genus*.—*Annularia* Schumacher.

## KEY TO THE GENERA OF THE SUBFAMILY ANNULARIINAE

- Outer edge of the opercular lamella touching that of the succeeding whorl, thus forming a continuous surface.
- Nuclear whorls thimble-pitted.
- Nuclear whorls with axial ribs and spiral threads..... **Limadorex**
- Nuclear whorls without axial ribs or spiral threads..... **Limadora**
- Nuclear whorls not thimble-pitted.
- Nuclear whorls microscopically granulose..... **Tudora**
- Outer edge of the opercular lamella not touching that of the succeeding whorl, thus not forming a continuous surface..... **Annularia**

**LIMADOREX, new genus**

Small tudorids having the nuclear whorls thimble-pitted and in addition provided with axial riblets and spiral threads, which characters at once distinguish it from *Limadora*. The postnuclear whorls are marked by sublamellar, wavy axial ribs. Peristome double. Breathing puncture present.

Type: *Limadorex limonensis*, new species.

**LIMADOREX LIMONENSIS, new species**

## PLATE 22, FIGURES 6, 7

Shell rather large, elongate-conic, pale yellow. Nuclear whorls 2, strongly rounded, with the first whorl showing indications of retractively slanting axial ribs and with the entire surface thimble-pitted. Postnuclear whorls inflated, strongly rounded, marked by slightly retractively slanting axial riblets, of which 102 occur on the first of the remaining turns, 138 on the second, and 158 on the last. These riblets are not quite so wide as the spaces that separate them, and they are expanded at the summit and at the periphery into more or less auricular elements, which are usually fused. The spiral sculpture con-

sists of feeble indications of threads, which render the axial riblets wavy. Of these, 7 appear to be present on all the whorls. Suture strongly constricted. Periphery strongly rounded. Base marked by the continuation of the axial ribs and by 7 spiral threads, which render the riblets slightly scalloped. Aperture almost circular; peristome double, the outer broadly expanded, deeply notched on the middle of the inner lip and reflected posterior to this, and appressed to the base, completely covering the umbilicated area; the outer peristome is marked by slender concentric lamellae; inner peristome slightly exserted. Operculum typically tudorid.

The type, U.S.N.M. No. 356392, was collected on El Toro, Sierra de Limones, Pinar del Rio, by Henderson and Bartsch in 1916. It has almost 4 whorls and measures: Length, 7.6 mm.; greater diameter, 4.5 mm; lesser diameter, 3.5 mm.

The peculiar thimble-pitting of the nuclear whorls will distinguish this species from all the other western Cuban annularids. It is distinguished from *Limadora* proper by the possession of a breathing pore and a double peristome.

#### LIMADORA, new genus

Annularids in which the nuclear whorls are pitted and rough like a rasp, characters which distinguish this group from all the other members of the family, for in the rest the nuclear whorls are either smooth or only microscopically granulose. The operculum is typically tudorid, i. e., the whorls are provided with a lamella which rises from the inner edge of the turns, and which is reflected outward to parallel the basal chondroid plate, and which extends to the outer edge of the whorls, thus forming a continuous surface without a channel between the turns, in which the chondroid basal plate is visible. The lamella is marked by retractively curved threads. Peristome simple. Breathing pore absent.

Type: *Limadora tollini* (Ramsden).

#### KEY TO THE SPECIES OF LIMADORA

Shell of trochid outline.....	tollini
Shell not of trochid outline.	
Shell elongate-ovate or elongate-conic.	
Umbilicus narrowly perforate.....	garciana
Umbilicus imperforate.....	scabrata

#### LIMADORA TOLLINI (Ramsden)

#### PLATE 22, FIGURES 1, 4

1915. *Rhytidopoma tollini* RAMSDEN, *Nautilus*, vol. 28, pp. 135-136, pl. 6, fig. 5.  
 1920. *Ramsdenia tolleni* HENDERSON and BARTSCH, *Proc. U. S. Nat. Mus.*, vol. 58, p. 79.

Shell of trochid outline, flesh colored with a yellowish tinge. Nuclear whorls almost 2, strongly rounded, rough like a coarse rasp.

Postnuclear whorls very strongly inflated and strongly rounded, the first marked by fairly regularly distantly spaced axial riblets, which are slightly wavy, the rest by lamellose axial riblets, which are rendered scalloped at regular intervals. Of these scallops, 4 occur between the summit and the periphery of the whorls. Suture very strongly constricted. Periphery inflated, strongly rounded. Base very broadly, openly umbilicated, marked by the continuation of the axial ribs and three series of scallops. The outer edge of the umbilicus is limited by a strong spiral cord, and the umbilical wall has 8 low spiral threads, which also render the axial ribs slightly scalloped. The last whorl is solute for about one-fifth of a turn. Aperture subcircular; peristome simple. Operculum tudorid.

The specimen described and figured, U.S.N.M. No. 493473, a topotype, was collected by Oscar Tollin 15 miles south of Media Luna, on the road to Pilón, Oriente Province. It has 5.1 whorls and measures: Length, 7.0 mm.; greater diameter, 6.2 mm.; lesser diameter, 5.3 mm.

LIMADORA GARCIANA (Aguayo)

Shell varying from elongate-conic to elongate-ovate, flesh colored, with a yellowish tinge. Nuclear whorls 2, well rounded, rough, with a surface resembling that of a coarse rasp. Postnuclear whorls somewhat inflated, well rounded, marked by rather strong, hollow, retractively slanting, sublamellose axial riblets, which project at the summit as slender auricles. The spiral sculpture consists of obsolete threads, which render the axial riblets scalloped. Suture strongly constricted. Periphery well rounded. Base well rounded, very narrowly, openly umbilicated, marked by the continuation of the axial riblets and by spiral cords, the latter a little stronger than those on the spire; the junction of the spiral cords with the axial ribs render the latter strongly scalloped. Last whorl solute for almost half a turn, which gives a free view of the umbilical wall, which is marked by the continuation of the axial riblets and by spiral threads, the latter forming narrow scallops at their junction with the axial riblets. Aperture very broadly oval; peristome double, the inner projecting scarcely above the outer; the outer only slightly expanded. Operculum typically tudorid.

This species is found in the region of Santa Lucia, Oriente Province. We are recognizing two subspecies, which the following key and descriptions will help to differentiate:

KEY TO THE SUBSPECIES OF LIMADORA GARCIANA

Spiral cords on spire 4.....	<i>sillaensis</i>
Spiral cords on spire 5.....	<i>garciana</i>

## LIMADORA GARCIANA SILLAENSIS, new subspecies

## PLATE 22, FIGURE 2

The type of this subspecies was collected by Mr. Henderson at La Silla, Santa Lucia, Oriente Province. It is distinguished from *L. garciana garciana* in having the whorls higher, in being much more elongate, in having the last whorl more solute, and in having one spiral cord less on the whorls than in the typical race.

The type, U.S.N.M. No. 356385, has 4.4 whorls remaining and measures: Length, 11.0 m.; greater diameter, 5.6 m.; lesser diameter, 5.2 mm.

## LIMADORA GARCIANA GARCIANA (Aguayo)

## PLATE 22, FIGURE 5

1932. *Ramsdenia garciana* AGUAYO, Occ. Pap. Boston Soc. Nat. Hist., vol. 8, p. 32, pl. 3, fig. C.

This subspecies comes from Sao Arriba, some 4 miles northeast of Holguín, Oriente Province. It differs from *L. garciana sillaensis* in having the whorls less high. *L. garciana garciana* therefore has a chubbier general appearance than *sillaensis*, and it has one more spiral thread on the turns.

The specimen described and figured, U.S.N.M. No. 493513, is a topotype having 3.6 whorls remaining and measures: Length, 9.7 mm.; greater diameter, 6.0 mm.; lesser diameter, 5.4 mm.

## LIMADORA SCABRATA, new species

## PLATE 22, FIGURE 3

Shell elongate-conic, flesh colored, with a yellowish tinge, and marked by two interrupted spiral bands of brown; the spots composing these are rather broad and large. There is an additional spiral band of the same color and practically the same size on the base. Nuclear whorls almost 2, well rounded, roughened like a file. Postnuclear whorls marked by retractively curved, sublamellar axial riblets, which are hollow near the summit, where they become expanded into cusps. There is also a tendency toward hollowness in three additional scallops on the whorls between the summit and the suture. The spaces separating the axial riblets are about twice as wide as the riblets. Suture very strongly constricted. Periphery well rounded, marked by a scallop on the ribs. Base rather short, well rounded, and marked by the continuation of the axial ribs, which bear two additional scallops; these scallops are stronger than those on the spire. The base is very narrowly umbilicated, but the umbilicus is not perforated. On the parietal wall, inconspicuous spiral threads are indicated. The last whorl is solute for about one-tenth of a turn. Aperture broadly oval; peristome simple. Operculum typically tudorid. In imma-

ture specimens the umbilicus is broadly open and the umbilical wall is marked by 4 spiral cords, which are strongly scalloped at their junction with the axial ribs.

The type, U.S.N.M. No. 493416, was collected by Dr. Victor Rodríguez at Finca Santa Maria (de Riveron), Martí, Loma de Sibanicú, Camagüey Province. It has 4.2 whorls remaining and measures: Length, 10.5 mm.; greater diameter, 5.7 mm.; lesser diameter, 4.8 mm.

#### Genus TUDORA Gray

1850. *Tudora* GRAY, Nomenclature of molluscous animals and shells in the collection of the British Museum, pt. 1, Cyclophoridae, p.48.

Shell ranging from helicoid to elongate-conic in form, marked by axial ribs only, or with axial ribs and spiral sculpture. The latter may be confined to the umbilicus or it may be present on spire and base. The axial sculpture varies from strong to almost obsolete, or it may consist of slender, sublamellar riblets. The spiral sculpture is equally variable as to strength in the different species. Breathing devices may be present or absent in this genus. The operculum has a basal chondroid plate composed of a number of whorls, the inner edge of which develops a strong calcified lamella, which is reflected outward until it parallels the basal chondroid plate, to which it is connected by calcareous bars. The lamella extends to the outer edge of the whorls of the operculum and thus forms a continuous surface on the outside. The lamella is usually marked by fine, retractively slanting striations or riblets.

Type: *Cyclostoma megacheilos* Potiez and Michaud.

#### KEY TO THE CUBAN SUBGENERA OF THE GENUS TUDORA

Breathing device present.

Shell with breathing siphon..... **Eutudorops**

Shell with breathing puncture..... **Eutudorex**

Breathing device absent.

Early postnuclear whorls solute..... **Ramsdenia**

Early postnuclear whorls not solute.

Shell of helicoid shape..... **Gundlachtudora**

Shell not of helicoid shape.

Peristome simple..... **Wrightudora**

Peristome double.

Axial ribs vertebrated..... **Aguayotudora**

Axial ribs not vertebrated..... **Tudorina**

#### Subgenus EUTUDOROPS Henderson and Bartsch

1920. *Eutudorops* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, pp. 78-79.

The first half nuclear whorl is microscopically granulose; the rest of the nuclear turns are marked by distantly spaced axial ribs. Shell ranging from ovate-conic to elongate-conic, the axial sculpture of the

postnuclear whorls consisting of slender, sublamellar riblets, which are rendered wavy by the low rounded spiral cords. There is a breathing pore, which is provided with a siphon externally on the parietal wall near the posterior angle of the aperture a little within the edge of the peristome. Operculum typically tudorid.

Type: *Tudora* (*Eutudorops*) *torquata* ([Gutierrez] Poey).

TUDORA (EUTUDOROPS) TORQUATA ([Gutierrez] Poey)

PLATE 22, FIGURES 8, 9

1858. *Cyclostoma torquata* [Gutierrez] POEY, *Memorias sobre la historia natural de la isla de Cuba*, vol. 2, p. 34, pl. 4, fig. 2.  
 1858. *Ctenopoma torquata* PFEIFFER, *Monographia pneumonopomorum viventium*, Suppl. 1, p. 105.  
 1920. *Eutudora* (*Eutudorops*) *torquata* HENDERSON and BARTSCH, *Proc. U. S. Nat. Mus.*, vol. 58, p. 79.

Shell moderately large, elongate-conic, flesh colored or pale yellow. Nuclear whorls 2, the first smooth, the second showing the ingression of the axial ribs, which here become quite strongly developed. Postnuclear whorls inflated, strongly rounded, marked by retractively slanting axial riblets, which vary much in strength in different individuals, and which usually develop into rather conspicuous auricles at the summit and into strong scallops at the periphery; where these two elements meet the ribs frequently become fused. The spiral sculpture also varies much in strength, ranging from obsolete to strong, rounded cords. The number of spiral threads between summit and suture may vary from 4 to 8; these spiral threads render the riblets wavy or faintly scalloped. Suture strongly constricted. Periphery well rounded. Base moderately long, well rounded, marked by the continuation of the axial riblets and by spiral threads, which also vary in number and strength. The reflected outer peristome of the inner lip usually completely covers the narrow umbilicus, or there may be a narrow chink left uncovered. Aperture subcircular; peristome double, the inner slightly exerted; the outer narrowly expanded on the outer and basal lip and broadly expanded on the inner lip and parietal wall, to cover the umbilicus. There is a breathing pore at the posterior angle, which continues on the outside as a heavily wrinkled, curved siphon. Operculum typical of *Tudora*.

The specimen figured, U.S.N.M. No. 493418, a cotype, was received by Dr. de la Torre from Gutierrez, who received it from El Lechuzo, which is now called Rodas. This is about 10 miles north of the Bay of Cienfuegos. It has 3.5 whorls remaining and measures: Length, 10.7 mm.; greater diameter, 6.0 mm.; lesser diameter, 5.5 mm.

We have also figured a specimen, U.S.N.M. No. 493419, from San Isidro north of Cienfuegos, in order to show the tremendous variation in size and sculpture through which the species ranges.

This species is known only from Santa Clara Province. It is tremendously variable throughout its range as far as size and sculpture are concerned. There appears to be no constancy in the variation that would show a relationship to the zoogeographic areas occupied. We are therefore refraining from attempting to split it up into subspecies. While the extreme variations in a single locality are much greater than are frequently represented in zoogeographic races of a species, here fixation apparently has failed to become effective.

Forty lots before us range from the type locality south to Soledad to Guayos eastward to San Isidro and Loma El Capiro, and Loma de Bonachea to Loma de Santa Fe. On the north coast, following the range of mountains from the west eastward we have seen it from Corralillo, Santa Teodosia, Pilar, Ramona, Lutgardita, Zambumbia, Flor de Cuba, Finca Delicia, Capitolio, Jumaguas, Arboleda, Loma de la Viruela, Finca el Miradero, Finca Oriente, Finca Santa Clara, El Purio, Mogote de la Sierra, El Guajén, El Rincón, Loma Sola, El Hacha, Loma Murciélagos, El Palenque, La Puntilla, Charco Maja, Mogote de Ramon Martinez, Central San Agustín, Mogote Buena Vista, Cayo Conuco, Cerro de Guajabana, Sierra de Meneses opposite Juncalito, east of Yaguajay, and Sierra de Jatibonica at Los Broqueles.

Bartsch collected living specimens of this species at Central San Agustín on Mogote de Ramon Martinez, August 6, 1928. He described it as flesh colored with a slight grayish area between the tentacles, showing a pinkish tinge. The upper portion of the side of the body ashy, the tentacles varying from flesh colored to pale yellow. Sole of the foot medially cleft, flesh colored. The animal suspends itself by a mucous thread when it is at rest.

#### EUTUDOREX, new subgenus

Small tudorids of ovate or elongate-ovate outline, with lamellar or sublamellar, wavy axial ribs. The spiral sculpture on the spire may be obsolete or consist of strong cords. The umbilicus may be open or closed. Aperture almost circular; peristome double. The outer peristome may be notched on the inner lip or it may be entire. Operculum typically tudorid. A breathing pore is present on the parietal wall near the posterior angle, a little within the edge of the peristome.

The members of the subgenus are confined to Pinar del Rio Province.  
Type: *Tudora (Eutudorex) rotundata* (Poey).

#### KEY TO THE SPECIES OF THE SUBGENUS EUTUDOREX

Outer peristome of inner lip notched and reflected over the umbilicus.

Spiral cords of spire very strong, broad, and closely spaced..... **welchi**  
Spiral cords of spire not very strong, or broad, or closely spaced.

Spiral cords of spire weak or obsolete.

Axial ribs uniform..... **rotundata**

Axial ribs not uniform.

Axial ribs consisting of alternating strong and lesser series.....

*undosa*

Spiral cords of spire not weak or obsolete.

Spiral cords absent.....

*pulverulenta*

Outer peristome of inner lip not notched or reflected over the umbilicus.

Outer peristome decidedly expanded.....

*rocai*

Outer peristome moderately expanded.

Axial ribs uniform.....

*complanata*

Axial ribs not uniform.

Axial ribs consisting of alternating series of strong and lesser series.....

*troscheli*

**TUDORA (EUTUDOREX) WELCHI, new species**

PLATE 23, FIGURE 6

Shell rather large, elongate-conic, flesh colored with a brownish flush. Nuclear whorls decollated in all our specimens. Postnuclear whorls well rounded, slightly shouldered at the summit, marked by closely crowded, vertebrated axial ribs, of which 221 are present on the last turn. The axial ribs are separated by mere lines; at intervals, however, there is a little wider space, which evidently marks a resting period. The spiral sculpture consists of low, broad, rounded cords separated by narrow, impressed lines, which render the axial riblets slightly nodulose. Of these cords, 7 are present between the summit and the periphery. Suture strongly constricted. Periphery well rounded. Base moderately long, well rounded, marked by the continuation of the axial ribs and by 5 spiral cords, which are a little stronger than those on the spire and render the axial riblets nodulose. This type of sculpture extends into the umbilicus, which, however, is covered by the reflected outer peristome of the inner lip. Aperture broadly oval; peristome double, the inner slightly exerted; the outer narrowly expanded on the outer and basal lip, broadly expanded on the inner lip, on the middle of which it is notched, the portion posterior to the notch being reflected to cover the umbilicus. On the parietal wall the outer peristome is broadly expanded and adnate to the preceding turn, forming a slight hood at the posterior angle. Operculum typically tudorid.

The type, U.S.N.M. No. 493420, was collected by Dr. d'Alté A. Welch at Sierra de Paso Real de Guane. It has 3.6 whorls and measures: Length, 11.4 mm.; greater diameter, 5.9 mm.; lesser diameter, 5.0 mm.

## TUDORA (EUTUDOREX) ROTUNDATA (Poey)

## PLATE 23, FIGURE 2

1851. *Cyclostoma rotundatum* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 1, pp. 419-420, in part, pl. 34, figs. 19-21.  
 1856. *Ctenopoma rotundatum* PFEIFFER, Malakozool. Blätter, vol. 3, pp. 60, 126.  
 1920. *Tudora (Tudorops) rotundata* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 77.

Shell small, yellow. Nuclear whorls decollated in all our specimens. Postnuclear whorls decidedly inflated, strongly rounded, marked by almost vertical axial riblets, of which 68 occur on the first, 108 on the second, and 150 on the last; these riblets are expanded into strong auricles at the summit; they are likewise expanded at the periphery, where these two elements meet and usually fuse. The spiral sculpture consists of feeble indications of threads, of which 5 are present on the first turn, 6 on the second, and 7 on the last between summit and suture. These spiral threads render the axial riblets somewhat wavy and slightly scalloped. Suture strongly constricted. Periphery inflated, well rounded. Base rather long, well rounded, marked by the continuation of the axial riblets and by 7 spiral threads, which grow progressively stronger from the periphery toward the umbilicus, the last two about the umbilicus forming strong scallops at their junction with the axial ribs. Aperture circular; peristome double, the outer very broadly expanded, deeply notched on the middle of the inner lip, posterior to which it is reflected over the preceding turn, completely covering the umbilicus; the outer peristome is marked by slender, concentric lamellae; the inner peristome is slightly exerted. Operculum typically tudorid.

Gundlach states of this species (Malakozool. Blätter, vol. 3, p. 126, 1856): "It was gathered at the entrance of Santa Cruz de los Pinos under stones and decaying leaves. The animal is pale straw yellow with the tip of the feelers somewhat thickened and brownish. The upper part of the neck with an ochraceous suffusion, the sides darker."

The specimen described and figured, U.S.N.M. No. 11042, is one of 7 collected by C. Wright at Loma de Rangel, Pinar del Rio. It has 3.2 whorls and measures: Length, 6.3 mm.; greater diameter, 4.5 mm.; lesser diameter, 3.4 mm.

## TUDORA (EUTUDOREX) UNDOSA ([Gundlach] Pfeiffer)

Shell small, varying in shape from elongate-ovate to elongate-conic, flesh colored with a yellowish tinge. Nuclear whorls about 2, strongly rounded, microscopically granulose, forming a slender apex. Postnuclear whorls decidedly inflated, strongly rounded, and marked by slightly retractively slanting axial ribs, which are not all of the same strength, larger sublamellar elements being separated by a number of less strongly developed and less elevated ribs. At the

summit these ribs form slight auricles which touch the preceding whorl where occasionally several of them become fused. They also become expanded near the bottom on the early turns and thus form a more or less interlocking element at the suture. The spiral sculpture consists of feeble threads, which render the axial riblets wavy or vertebrated. Suture very strongly constricted. Periphery well rounded. Base marked like the spire, but with the spiral cords more pronounced. Aperture broadly ovate; peristome double, the inner slightly exerted; the outer broadly expanded, widest on the inner lip, notched in the middle and reflected posterior to the notch over the umbilicus, which it completely covers. It is also marked by slender, concentric laminae. Operculum typically tudorid. There is a breathing puncture on the parietal wall near the posterior angle of the aperture.

This species ranges from Lagunillas de Consolación east to the Sierra de Güira, San Diego de los Baños.

We are recognizing three subspecies, which the accompanying key and descriptions will help to differentiate:

KEY TO THE SUBSPECIES OF *TUDORA* (*EUTUDOREX*) *UNDOSA*

Spiral sculpture obsolete on last whorl.....	<i>laureani</i>
Spiral sculpture not obsolete on last whorl.	
Shell large, length more than 9 mm.....	<i>barroi</i>
Shell small, length less than 6 mm.....	<i>undosa</i>

*TUDORA* (*EUTUDOREX*) *UNDOSA LAUREANI*, new subspecies

PLATE 23, FIGURE 8

This race was collected by Laureano Pequeño at Mogote El Arabó, La Ceja near Lagunillas de Consolación, San Juan y Martínez. It differs from the other large member, *T. (E.) undosa barroi*, in having the spiral sculpture of the last whorl obsolete, and in being smaller and less elongate-conic. Here likewise the axial ribs are much more frequently gathered into tufts at the summit.

The type, U.S.N.M. No. 493422, a complete specimen, has 6.2 whorls and measures: Length, 9.1 mm.; greater diameter, 5.3 mm.; lesser diameter, 4.4 mm.

*TUDORA* (*EUTUDOREX*) *UNDOSA BARROI*, new subspecies

PLATE 23, FIGURE 7

This subspecies comes from the mogote lying about Kilometer 14 on the road between Pinar del Rio and Viñales. It is larger than any of the other races, and it is easily differentiated from *T. (E.) undosa laureani* by its more elongate form and strong spiral sculpture on the last whorl.

The type, U.S.N.M. No. 356468, a decollated specimen having 3.3 whorls, measures: Length, 9.4 mm.; greater diameter, 5.4 mm.; lesser diameter, 5.0 mm.

## TUDORA (EUTUDOREX) UNDOSA UNDOSA ([Gundlach] Pfeiffer)

## PLATE 23, FIGURE 4

1863. *Ctenopoma undosum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 10, pp. 193-194.  
 1867. *Cyclostoma undosum* ARANGO, Repert fisico natural Isla de Cubana, p. 76.  
 1920. *Tudora (Tudorops) undosa* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 77.

The typical subspecies occupies the Sierra de Güira and is much smaller than the other two.

A cotype, U.S.N.M. No. 356388, received from Gundlach, has 3.1 whorls remaining and measures: Length, 5.0 mm.; greater diameter, 4.0 mm.; lesser diameter, 3.1 mm. Its last whorl has 208 axial riblets

## TUDORA (EUTUDOREX) PULVERULENTA ([Wright] Pfeiffer)

## PLATE 23, FIGURE 5

1864. *Ctenopoma pulverulentum* [Wright] PFEIFFER, Malakozool. Blätter, vol. 11 pp. 103-104.  
 1867. *Cyclostoma pulverulentum* ARANGO, Repert fisico natural Isla de Cubana, p. 76.  
 1920. *Tudora (Tudorops) pulverulenta* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 77.

Shell elongate-conic, slender, pale yellow with the peristome and interior of the aperture a little paler. Nuclear whorls decollated. Postnuclear whorls inflated, strongly rounded, marked by slightly retractively slanting axial riblets, of which 82 occur on the first whorl, 116 on the second, 142 on the third, and 178 on the last. These riblets develop into strong auricles at the summit, particularly so on the last turn, and these auricles are frequently fused in groups into denticles. The spiral sculpture is scarcely indicated; but the slight waviness of the ribs suggests this sculpture. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs and by 6 spiral threads about the umbilicus. These spiral threads cover the umbilical half of the base and they are strongest near the umbilicus, where they render the axial riblets feebly scalloped. Aperture very broadly oval, almost circular; peristome double, the outer expanded, somewhat wavy and reflected over the umbilicus; the inner fusing with the outer, and indicated only at the posterior angle. Operculum typically tudorid.

The specimen described and figured, U.S.N.M. No. 356394, is a topotype received from Dr. de la Torre, collected by C. Wright at Isabel Maria, Pinar del Rio. It has a little over 4 whorls and measures: Length, 6.8 mm.; greater diameter, 3.6 mm.; lesser diameter, 2.7 mm. The species seems restricted to that locality.

## TUDORA (EUTUDOREX) ROCAI, new species

## PLATE 23, FIGURE 3

Shell elongate-ovate, moderately large, flesh colored, with a yellowish tinge. Nuclear whorls decollated. Postnuclear whorls inflated, strongly rounded, marked by slender, retractively curved, wavy axial riblets, of which 137 are present on the last turn in the type. These riblets are developed into auricles at the summit, and they also tend to form projections at the periphery. On the early whorls these two elements interlock. These riblets are about half as wide as the spaces that separate them. The spiral sculpture is indicated by the waviness of the axial ribs. Suture very strongly constricted. Periphery inflated, strongly rounded. Base short, openly umbilicated, strongly rounded, marked by the continuation of the axial ribs, which here likewise are wavy and at the edge of the umbilicus it is marked by a spiral series of strong scallops, which grow consecutively weaker from the outer toward the inside. Two of these strong series of scallops are present at the edge of the umbilicus and four are apparent on the anterior half of the umbilical wall. Aperture almost circular; peristome double, the inner slightly exerted and slightly reflected; the outer broadly expanded, decidedly so on the inner lip, and marked by concentric laminae. On the parietal wall the outer peristome is adnate to the preceding turn. Operculum typically tudorid. A breathing pore is present on the parietal wall near the posterior angle, slightly within the edge of the peristome.

The type, U.S.N.M. No. 493424, was collected by Father Roca at Sitio de la Sierra, north side of the Sierra de San Andrés. It has 3.2 whorls remaining and measures: Length, 6.3 mm.; greater diameter, 4.0 mm.; lesser diameter, 3.7 mm.

This species is easily differentiated from other *Eutudorex* in that it lacks the notch on the outer peristome of the inner lip, and in that it has the peristome of the inner lip decidedly expanded.

## TUDORA (EUTUDOREX) COMPLANATA, new species

## PLATE 23, FIGURE 1

Shell small, ovate, flesh colored, with a yellowish tinge. Nuclear whorls decollated. Postnuclear whorls very strongly inflated, strongly rounded, marked by vertical, wavy axial riblets, which are a little narrower than the spaces that separate them. Of these 178 are present on the last whorl. These riblets become slightly expanded at the summit, also on the early whorls at the periphery, where these two elements interlock. The intercostal spaces are bridged by slender, threadlike spiral elements which are much finer than the axial ribs. Suture profoundly constricted. Periphery inflated, strongly rounded. Base short, strongly rounded, openly umbilicated, marked by the con-

tinuation of the axial riblets and by spiral threads equaling those of the spire. The edge of the umbilicus is marked by a strong spiral cord, while the umbilical wall itself is free of spiral sculpture. Aperture almost circular; peristome double, the inner slightly exerted; the outer evenly, moderately broadly expanded and marked by concentric laminae and adnate to the preceding turn at the parietal wall. There is a breathing pore on the parietal wall near the posterior angle of the aperture slightly within the peristome. Operculum typically tudorid.

The type, U.S.N.M. No. 493425, comes from El Palmarito; that is the north side of El Queque, near Viñales, Pinar del Rio Province. It has almost 3 whorls remaining and measures: Length, 4.5 mm.; greater diameter, 3.0 mm.; lesser diameter, 2.5. mm.

This species can be readily differentiated from *T. (E.) troscheli* by having the axial ribs of uniform strength instead of a double series.

**TUDORA (EUTUDOREX) TROSCHELI (Pfeiffer)**

Shell small, thin, semitranslucent, pale straw yellow. Nuclear whorls 1.5, forming a blunt apex, well rounded, microscopically granulose, with the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls inflated, well rounded, marked by retractively slanting axial riblets, which are not all of the same strength, but several slightly weaker ones are separated by a little stronger element. These riblets, particularly the stronger ones, become slightly expanded into small auricles at the summit. The spiral sculpture consists of very slender threads, which cross the intercostal spaces but not the ribs. These threads differ in strength and spacing in the different subspecies. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, openly umbilicated, marked by the continuation of the axial ribs, which here become much intensified, the stronger elements becoming decidedly lamellose; the fine spiral sculpture described for the spire is also present on the base; in addition to that, two considerably stronger spiral threads mark the outer limit of the umbilicus. The umbilical wall is marked by the continuation of the axial riblets. Aperture almost circular; peristome double, the inner slightly exerted; the outer rather broadly expanded and slightly reflected, marked by concentric laminae adnate to the preceding turn on the parietal wall. Operculum typically tudorid.

This species is confined to Pinar del Rio Province, where it appears to range from Pan de Azucar through Cayos de San Felipe and Viñales to the mogotes south of the Sierra de San Andrés.

We are recognizing four subspecies, which the following key and descriptions will help to differentiate:

## KEY TO THE SUBSPECIES OF TUDORA (EUTUDOREX) TROSCHELI

Axial and spiral sculpture feeble.....	<i>troscheli</i>
Axial and spiral sculpture not feeble.	
Axial ribs strongly scalloped.....	<i>azucarensis</i>
Axial ribs not strongly scalloped.	
Spiral threads of intercostal spaces strongly developed...	<i>antoniensis</i>
Spiral threads of intercostal spaces poorly developed...	<i>palmaritensis</i>

## TUDORA (EUTUDOREX) TROSCHELI TROSCHELI (Pfeiffer)

## PLATE 24, FIGURE 3

1864. *Choanopoma troscheli* PFEIFFER, Malakozool. Blätter, vol. 11, p. 103.  
 1867. *Cyclostoma troscheli* ARANGO, Repert fisico natural Isla de Cubana, p. 76.  
 1920. *Tudora (Tudorops) troscheli* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 77.

The typical subspecies appears to be confined to Cayos de San Felipe, Pinar del Rio Province. It is differentiated from the others by its larger size and by its feeble axial and spiral sculpture.

A cotype, U.S.N.M. No. 356396, has 4 whorls remaining and measures: Length, 6.3 mm.; greater diameter, 4.2 mm.; lesser diameter, 3.1 mm.

## TUDORA (EUTUDOREX) TROSCHELI AZUCARENSIS, new subspecies

## PLATE 24, FIGURE 4

This race comes from Pan de Azucar, Pinar del Rio Province. It is a very small race, with the axial ribs very strongly scalloped. In size it resembles *T. (E.) troscheli palmaritensis*, from which, however, it is easily distinguished by its strong sculpture.

The type, U.S.N.M. No. 493427, has 3 whorls remaining and measures: Length, 4.5 mm.; greater diameter, 2.7 mm.; lesser diameter, 2.4 mm.

## TUDORA (EUTUDOREX) TROSCHELI ANTONIENSIS, new subspecies

## PLATE 24, FIGURE 1

This subspecies comes from Hoyo Largo de San Antonio, one of the mogotes off the south side of the Sierra de San Andrés, Pinar del Rio Province. The spiral threads of the intercostal spaces are very strongly developed, in which respect it differs from *T. (E.) troscheli palmaritensis*, from which it is also distinguished by its much larger size.

The type, U.S.N.M. No. 493429, has 3.1 whorls remaining and measures: Length, 5.0 mm.; greater diameter, 3.5 mm.; lesser diameter, 3.0 mm.

## TUDORA (EUTUDOREX) TROSCHELI PALMARITENSIS, new subspecies

## PLATE 24, FIGURE 2

This race comes from El Palmarito, that is, the north side of El Queque near Viñales. It is small, like *T. (E.) troscheli azucarensis*, from which it is readily distinguished by its much weaker sculpture and scarcely indicated scallops.

The type, U.S.N.M. No. 493431, has 3 whorls remaining and measures: Length, 4.6 mm.; greater diameter, 3.4 mm.; lesser diameter, 3.0 mm.

## Subgenus RAMSDENIA Preston

1913. *Ramsdenia* PRESTON, Proc. Malac. Soc. London, vol. 10, p. 323.

Shell small, elongate-conic. Nuclear whorls forming a subglobular apex followed by one or more turns, which are decidedly solutely coiled, resembling a corkscrew, after which the normal coiling is resumed. Most of the shells gathered are decollated at the termination of the solute portion. The whorls are marked by slender, sublamellar, wavy axial riblets, which are usually auriculated at the summit. Scallops may also be present at intervals on the ribs of the spire and the periphery may have strong scallops, which may interdigitate with those at the summit of the whorls. Fine spiral lirations may or may not be present on the spire. The base also may or may not have spiral cords. The umbilicus, however, is always provided with spiral cords. The last whorl is solute. The axis of the shell is hollow. Peristome double, the outer with a channel at the posterior angle, which forms an auricle. Operculum rather large, capping the aperture. Chondroid plate decidedly concave, that is, its outer margin inward bent. Calcareous lamella broadly expanded and curved to form one continuous sheet of rounded whorls, which are marked by retractively curved, slender threads.

Type: *Tudora (Ramsdenia) nobilitata mirifica* (Preston).

## KEY TO THE SPECIES OF THE SUBGENUS RAMSDENIA

Fine spiral sculpture present.....	<b>nobilitata</b>
Fine spiral sculpture absent.	
Axial ribs coarse and decidedly lamellose.....	<b>bufo</b>
Axial ribs not coarse or decidedly lamellose.	
Axial ribs sublamellose.	
Periphery with a dark chestnut band.....	<b>notata</b>
Periphery without a dark chestnut band.....	<b>natensoni</b>
Axial ribs obsolete.....	<b>perspectiva</b>

## TUDORA (RAMSDENIA) NOBILITATA ([Gundlach] Poey)

Shell small, elongate-conic, milk white. Nuclear whorls 2, forming a subglobular apex, well rounded, microscopically granulose, with the

last portion of the last whorl showing the beginning of the postnuclear sculpture. The first two postnuclear whorls are very solutely coiled, the first one being marked by distantly spaced, wavy axial riblets; the rest, which are inflated and strongly rounded, are marked by sinuous, almost vertical axial ribs, which on the last whorl are a little narrower than the spaces that separate them. Some of the axial riblets are expanded into hollow auricles at the summit. The intercostal spaces are marked by numerous, somewhat irregularly spaced, fine spiral lirations, which vary much in strength in the different subspecies. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, narrowly, openly umbilicated, marked by the continuation of the wavy axial riblets. Last whorl solute for a fraction of a turn. The umbilical wall is marked by the continuation of the axial riblets and by spiral threads, which vary in strength and number in the different races; the junctions of the axial ribs and spiral cords form nodules or scallops. Aperture circular; peristome double, the inner slightly exerted above the outer; the outer very narrowly expanded. Operculum typically ramsdenid.

This species comes from Oriente Province, where it breaks up into the following subspecies:

KEY TO THE SUBSPECIES OF TUDORA (RAMSDENIA) NOBILITATA

Spiral lirations on spire conspicuous.

Spiral cords on the umbilical wall few and strong..... nobilitata

Spiral cords on the umbilical wall many and weak..... mirandensis

Spiral lirations on spire inconspicuous

Spiral cords on the umbilical wall strong..... mirifica

Spiral cords on the umbilical wall not strong.

Shell small and slender..... yaterasensis

Shell large and stout..... mayariensis

TUDORA (RAMSDENIA) NOBILITATA NOBILITATA ([Gundlach] Poey)

PLATE 24, FIGURES 5, 8

1858. *Cyclostoma nobilitatum* [Gundlach] POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 2, p. 87.

1862. *Ctenopoma nobilitatum* PFEIFFER, Malakozool. Blätter, vol. 9, p. 3.

1920. *Ramsdenia nobilitatum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus. vol. 58, p. 79.

The typical subspecies was collected by Gundlach at Enramadas (San Luis), north of Santiago, Oriente Province.

It is a small race in which the spiral lirations are conspicuous and the auricles at the summit interlock with denticles projecting downward from the periphery. The specimen, U.S.N.M. No. 355666, which has served for our description and figure, is a paratype collected by Gundlach at the type locality. It has 3 whorls remaining, which

bear 67 axial ribs on the first, 94 on the second, and 103 on the third. In addition to these ribs, the base has three weak spiral cords, and the umbilical wall bears 7 strong cords on its anterior two-thirds; these cords render the axial riblets decidedly scalloped. The specimen figured measures: Length, 5.5 mm.; greater diameter, 3.2 mm.; lesser diameter, 3.0 mm.

TUDORA (RAMSDENIA) NOBILITATA MIRANDENSIS, new subspecies

PLATE 24, FIGURE 7

This subspecies was collected by Dr. Pilsbry at Tibisi near Miranda, Oriente Province.

This race agrees with *T. (R.) nobilitata nobilitata* in the strength of its spiral lirations of the spire, but it is easily distinguished from *nobilitata* by its larger size and much more numerous and finer spiral cords on the umbilical wall.

The type, U.S.N.M. No. 535667, has 3.8 whorls remaining and measures: Length, 10.0 mm.; greater diameter, 3.9 mm.; lesser diameter, 3.7 mm. The first of these whorls has 54 axial riblets, the second 82, the third 102, and the last eight-tenths of a whorl has 94 axial riblets. The base is marked by four feeble spiral threads, and the umbilical wall has 14.

TUDORA (RAMSDENIA) NOBILITATA MIRIFICA (Preston)

PLATE 24, FIGURES 6, 9

1913. *Choanopoma (Ramsdenia) mirifica* PRESTON, Proc. Malac. Soc. London, vol. 10, p. 323, figured.

1920. *Ramsdenia mirifica* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 79.

This subspecies was collected by Dr. Ramsden at Bayate near Concepcioncita, northwest of Guantánamo, Oriente Province. It belongs to the group in which the spiral lirations are inconspicuous, and the spiral cords on the umbilical wall are few and strong.

The specimen described and figured, a cotype, U.S.N.M. No. 356482, has 3 whorls remaining, of which the first has 86 riblets, the second 97, and the last 114. The axial riblets terminate in conspicuous auricles at the summit and interlock with denticles at the periphery of the preceding turn. The base has mere indications of spiral threads, while the umbilical wall shows 6 strong cords. The specimen figured measures: Length, 5.9 mm.; greater diameter, 3.5 mm.; lesser diameter, 3.0 mm.

**TUDORA (RAMSDENIA) NOBILITATA YATERASENSIS, new subspecies**

## PLATE 25, FIGURE 4

This race comes from the Yateras region, northeast of Guantánamo, Oriente Province. It is a small slender race, in which the spiral lirations are inconspicuous and the spiral cords on the umbilical wall are weak.

The type, U.S.N.M. No. 356484, has 3.2 whorls remaining, of which the first bears 90 axial riblets, while the last has 124. The base shows only the merest indications of spiral threads, and the umbilical wall is marked by 8 very feeble cords, which render the axial riblets weakly nodulose. The type measures: Length, 5.9 mm.; greater diameter, 3.2 mm.; lesser diameter, 2.8 mm.

**TUDORA (RAMSDENIA) NOBILITATA MAYARIENSIS, new subspecies**

## PLATE 25, FIGURE 3

This is the largest of all the races. The type, U.S.N.M. No. 535669, was collected by Wright at Piloto Arriba, Mayarí, Oriente Province. It has 3.2 whorls remaining, of which the first bears 102 riblets, the second 121, and the third, which is a little more than two-tenths of a turn, bears 123. The spiral sculpture on the base is too feeble to be definitely described, and the umbilicus bears 7 weak cords. The type measures: Length, 6.7 mm.; greater diameter, 5.0 mm.; lesser diameter, 4.2 mm. The large size and stout shape will easily differentiate this from the other subspecies.

**TUDORA (RAMSDENIA) BUFO (Pfeiffer)**

## PLATE 25, FIGURE 2

1864. *Ctenopoma? bufo* PFEIFFER, Malakozool. Blätter, vol. 11, p. 104.

1865. *Ctenopoma bufo* PFEIFFER, Monographia pneumonopomorum viventium, Suppl. 2, pp. 113-114.

1867. *Cyclostoma bufo* ARANGO, Repert fisico natural Isla de Cubana, p. 74.

1920. *Ramsdenia bufo* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 79.

Shell elongate-conic, pale yellow. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly rounded, marked by lamellar, slightly retractively slanting, hollow axial riblets, of which 62 occur on the first, 76 on the second, and 88 on the last of the remaining turns. These riblets are developed into strong auricles at the summit. The spiral sculpture consists of broad, low, rounded threads, which render the axial riblets conspicuously scalloped at their junctions. Five of these threads occur on the first of the remaining turns, and 6 are on the last. Suture strongly constricted. Periphery well rounded. Base short, well rounded, narrowly, openly umbilicated, marked by the

continuation of the axial riblets and by 4 broad spiral threads, which render the axial riblets conspicuously scalloped at their junction. The umbilical wall is marked by the feeble continuation of the axial riblets and by 12 spiral threads; here, also, the combination of the two forms feeble scallops. Last whorl solute for one-tenth of a turn. Aperture subcircular; peristome double, the inner moderately exerted; the outer moderately, broadly expanded, a little wider on the inner lip and the parietal wall than on the outer and basal lip, marked by concentric lamina. Operculum typically ramsdenid.

U.S.N.M. No. 356490 contains 2 specimens from the type locality, Malaño Cave, Oriente Province, one of which we have figured. It has a little over 3 whorls and measures: Length, 6.8 mm.; greater diameter, 4.1 mm.; lesser diameter, 3.6 mm. The other specimen has a little over 3 whorls and measures: Length, 6.9 mm.; greater diameter, 4.5 mm.; lesser diameter, 3.8 mm. In one of these specimens the first postnuclear whorl is slightly solute, showing the typical solute characteristic of *Ramsdenia*.

The exceedingly strong, hollow lamellose ribs will distinguish this species from all other *Ramsdenias*.

**TUDORA (RAMSDENIA) NOTATA, new species**

PLATE 25, FIGURES 5, 8

Shell elongate-conic, flesh colored, with a conspicuous spiral band of brown a little posterior to the middle of the base. Nuclear whorls 2, forming a subglobular apex, well rounded, microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. The first two postnuclear whorls are very strongly solute, corkscrew-shaped, the first one marked by distantly spaced, lamellar axial riblets; the rest of the postnuclear whorls inflated, strongly rounded, marked by sinuous, rather closely spaced, sublamellar axial riblets, of which 84 occur on the first of the remaining turns, 126 on the second, and 142 on the last. Some of these riblets are expanded into hollow auricles at the summit. The spaces between the axial riblets are not marked by incised spiral lines, but are granular. Suture strongly constricted. Periphery inflated, well rounded. Base short, well rounded, marked by the continuation of the sinuous axial riblets and by 2 spiral threads, one of which is on the middle and the other marks the junction of the umbilical wall with the base. The spiral cords render the axial riblets conspicuously scalloped. The umbilical wall is marked by the continuation of the feeble axial riblets and by 3 spiral threads; the junction of these with the axial riblets renders them feebly scalloped. Last whorl solute for one-third of a turn. Aperture subcircular; peristome double, the inner moderately exerted; the outer

broadly, flaringly expanded, more so on the outer lip than on the inner, reflected into a sinus at the posterior angle, and marked by concentric laminae. Operculum typically ramsdenid.

The type, U.S.N.M. No. 356488, was collected by Mr. Henderson at Camayén, Santa Lucía, Oriente Province. It has a little over 3 whorls and measures: Length, 6.2 mm.; greater diameter, 4.3 mm.; lesser diameter, 3.3 mm.

**TUDORA (RAMSDENIA) NATENSONI, new species**

Shell small, elongate-conic, thin, semitranslucent, flesh colored, with the scallops white. Nuclear whorls 2, strongly rounded, forming a globular apex. The first 1.5 turns of the postnuclear whorls are solute; the rest of the postnuclear whorls are somewhat inflated, well rounded, and marked by sublamellar axial riblets, which appear more or less in series, that is, several stronger riblets will be succeeded by several weaker ones, giving the shell a somewhat scalariform aspect. These axial riblets are conspicuously expanded into auricles at the summit. There are also several rows of scallops on the axial riblets of the spire, which are arranged in spiral series. These scallops may be hollow. The peripheral series not infrequently interlocks with those at the summit of the succeeding whorls. Suture strongly constricted. Periphery rendered slightly angulated by the scallops referred to. Base well rounded, marked by three rows of scallops. The last whorl is solute for a fraction of a turn; it is openly umbilicated and marked by the continuation of the axial ribs and spiral cords. Aperture circular; peristome double, the inner slightly exerted; the outer rather broadly expanded all around and conspicuously scalloped at the edge, forming a conspicuous auricle at the posterior angle, which is channeled and backward reflected, marked by a series of concentric lamellae. Operculum typically ramsdenid.

This species comes from the north coast of Oriente Province.

KEY TO THE SUBSPECIES OF *TUDORA (RAMSDENIA) NATENSONI*

Shell slender.....	<i>natensoni</i>
Shell stout.....	<i>canetensis</i>

***TUDORA (RAMSDENIA) NATENSONI NATENSONI, new subspecies***

PLATE 25, FIGURE 9

Natenson collected the typical subspecies at Finca El Retiro (de Silva), and San Alejo, Boca de Taco, Nibujón, west of Baracoa, Oriente Province. It differs from *T. (R.) natensoni canetensis* in being much more slender, and in having the axial ribs much more scalariform.

The type, U.S.N.M. No. 535670, comes from Finca El Retiro. It has 4.3 whorls remaining and measures: Length, 8.3 mm.; greater

diameter, 5.0 mm.; lesser diameter, 4.0 mm. There are 53 riblets present on the first whorl, 67 on the second, 77 on the third, 120 on the fourth, and 69 on the last three-tenths of a whorl.

**TUDORA (RAMSDENIA) NATENSONI CANETENSIS, new subspecies**

PLATE 25, FIGURE 7

Natenson collected this race at Cañete, west of Taco, west of Baracoa, Oriente Province.

It differs from the typical race in being much larger, stouter, and in having the axial ribs not as conspicuously scalariform. The type, U.S.N.M. No. 535673, has 4.2 whorls remaining and measures: Length, 8.9 mm.; greater diameter, 5.0 mm.; lesser diameter, 4.3 mm. It has 44 riblets on the first whorl, 76 on the second, 128 on the third, and 129 on the last and the fraction remaining.

**TUDORA (RAMSDENIA) PERSPECTIVA ([Gundlach] Pfeiffer)**

PLATE 25, FIGURES 1, 6

1859. *Cyclostoma perspectivum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 6, p. 72.  
 1865. *Ctenopoma perspectivum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 2, pp. 116-117.  
 1915. *Rhytidopoma perspectivum* PILSBRY, Nautilus, vol. 28, p. 136.  
 1920. *Ramsdenia perspectivum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 79.

Shell elongate-conic, pale horn colored. Nuclear whorls 2, forming a subglobular apex, the whorls of which are well rounded and microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. The first two post-nuclear turns are solute, very openly and broadly coiled, and marked by rather distantly spaced, retractively slanting, axial riblets; the later turns are strongly rounded and marked by slightly retractively curved, axial riblets which are very poorly developed and tend to become obsolete on the last whorl. The stronger of these riblets are developed into conspicuous auricles at the summit. In the specimen described and figured, 108 of these ribs are present on the next to the last whorl and 136 on the last. Suture strongly constricted. Periphery well rounded. There is an indication of a feeble spiral thread immediately below the periphery and two additional strong spiral cords on the base render the axial riblets strongly scalloped at their junction. The umbilicus is broadly open, and the umbilical wall is marked by the feeble continuation of the axial riblets and 3 obsolete spiral threads, which also render the axial riblets scalloped. Last whorl solute for about one-half a turn. Aperture subcircular; peristome double, the outer strongly fimbriated, the strongest fim-

briation marking the posterior angle, a little broader on the outer lip than on the rest; inner peristome slightly exerted. Operculum typically ramsdenid.

The specimen described and figured is a cotype, U.S.N.M. No. 356491, collected by Gundlach at Monte Toro, Guantánamo, Oriente Province, and presented to the U. S. National Museum by Dr. de la Torre. It has 3 whorls and measures: Length, 7.4 mm.; greater diameter, 4.9 mm.; lesser diameter, 3.9 mm.

Of the animal Gundlach says (Malakozool. Blätter, vol. 6, p. 72, 1859): "On stones. Animal whitish with white dots which become fused into spots on the foot. Head and middle of antennae ochre colored. Tip of antennae blackish."

#### GUNDLACHTUDORA, new subgenus

Helicoid tudorids having the spiral sculpture stronger than the axial. Peristome decidedly thickened and transversely fluted. Operculum with the calcareous lamella reflected to touch that of the succeeding whorl; lamella marked with oblique threads.

Type: *Tudora* (*Gundlachtudora*) *decolorata* ([Gundlach] Pfeiffer).

#### TUDORA (GUNDLACHTUDORA) DECOLORATA ([Gundlach] Pfeiffer)

#### PLATE 28, FIGURE 3

1859. *Cyclostoma decoloratum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 6, p. 70.  
 1863. *Cyclostoma decoloratum* REEVE, Conchologia iconica, no. 150.  
 1865. *Choanopoma decolorata* PFEIFFER, Monographia pneumonopomorum viventium, Suppl. 2, p. 107.  
 1920. *Tudora* (*Tudorellata*) *decolorata* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 76.

Shell subglobular, yellowish white. Nuclear whorls 2, forming an almost mucronate apex, well rounded, microscopically granulate, except for the last portion of the last whorl, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by slightly retractively slanting, wavy axial riblets, and by spiral threads which are a little stronger than the axial riblets. Of these, 5 occur on the first, 7 on the second, and 10 on the last between the summit and suture. The spiral threads render the axial riblets strongly wavy. Suture strongly constricted. Periphery inflated, well rounded. Base short, openly umbilicated, strongly rounded, marked by the continuation of the axial riblets and by 8 spiral threads, which are as strong as those on the spire. The axial riblets extend into the umbilicus, where they become closely crowded. On the umbilical wall there are 9 spiral threads, which are stronger than those on the base. Last whorl solute for a fourth of a turn. Aperture broadly oval; peristome double, the inner slightly exerted and slightly

reflected, almost fusing with the outer; the outer very much thickened, broadly expanded and decidedly fluted all around. Operculum with subcentral depressed nucleus and a broad calcareous lamella, which is reflected to parallel the chondroid plate on the last turn, and which forms a continuous surface on the outside.

This species was described from Monte Toro, Guantánamo, Oriente Province.

The specimen described and figured is one of two, U.S.N.M. No. 356345, received from Poey. It has a little over 4 whorls and measures: Length, 9.7 mm.; greater diameter, 9.8 mm.; lesser diameter, 7.5 mm. The other specimen has a little over 4 whorls and measures: Length, 8.1 mm.; greater diameter, 8.7 mm.; lesser diameter, 6.6 mm.

Gundlach states of this species (Malakozool. Blätter, vol. 6, p. 70, 1859): "Animal whitish with white dots above which become fused into spots. Head with olive colored suffusion and dark dots, reddish within. Feelers cinnabar red with thickened brownish apex. The first turn of the animal appears greenish through the substance of the shell."

#### AGUAYOTUDORA, new subgenus

Shell varying from elongate-ovate to elongate-conic. Nuclear whorls microscopically granulose. Postnuclear whorls marked by axial ribs and by spiral threads, both of which elements vary materially in strength in the different species. The axial ribs may or may not be gathered into tufts or they may or may not form cusps at the summit. There is no siphon or breathing pore. Peristome simple. Operculum typically tudorid.

Type: *Tudora (Aguayotudora) aguayoi*, new species.

#### KEY TO THE SPECIES OF THE SUBGENUS AGUAYOTUDORA

Axial ribs exceedingly fine.....	<b>suavis</b>
Axial ribs not exceedingly fine.	
Axial ribs gathered into broad tufts.....	<b>cristata</b>
Axial ribs not gathered into broad tufts.	
Axial ribs obsolete on last whorl.....	<b>crassiuscula</b>
Axial ribs not obsolete on last whorl.	
Axial ribs expanding into hollow cusps at the summit.	
Shell elongate-conic.....	<b>bermudezi</b>
Shell ovate.....	<b>recta</b>
Axial ribs not expanding into hollow cusps at the summit.	
Axial ribs decidedly scalloped.....	<b>asperata</b>
Axial ribs not decidedly scalloped.	
Axial ribs tuberculate.....	<b>tuberculata</b>
Axial ribs not tuberculate.	
Axial ribs very regular.....	<b>aguayoi</b>
Axial ribs irregular.	
Umbilicus broad.....	<b>varicosa</b>
Umbilicus narrow.....	<b>obesa</b>

## TUDORA (AGUAYOTUDORA) SUAVIS, new species

## PLATE 26, FIGURE 5

Shell elongate-ovate, varying from pale yellow to pale brown, sometimes with a brown band at the suture. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose. Postnuclear whorls inflated, strongly rounded, marked by very closely spaced, low, rounded axial riblets, which are separated by spaces about as wide as the riblets. There are 431 of these on the last whorl. The riblets do not form cusps at the summit. The spiral sculpture is absent on the spire. Suture strongly constricted. Periphery of the last whorl well rounded. Base short, well rounded, marked by the continuation of the axial ribs and by 5 almost obsolete spiral cords, which grow successively a little stronger from the periphery toward the umbilicus. The umbilicus is broad and open and its wall bears 8 spiral cords, which grow successively stronger from within toward the outside. The axial riblets cross these spiral cords and their interspaces. Last whorl solute for about one-fifth of a turn. Aperture broadly oval; peristome simple, slightly auriculated at the posterior angle. Operculum typically tudorid.

The type, U.S.N.M. No. 493432, comes from Guaicanamar, Camagüey Province. It has 6.5 whorls and measures: Length, 12.1 mm.; greater diameter, 7.0 mm.; lesser diameter, 5.8 mm.

This species is easily distinguished from all the other *Aguayotudoras* by its fine ribbing.

## TUDORA (AGUAYOTUDORA) CRISTATA, new species

Shell thin, elongate-ovate, pale brown, with interrupted spiral bands of chestnut brown. Nuclear whorls 2, inflated, well rounded, microscopically granulose, forming a rather small apex. Postnuclear whorls inflated, rather high between summit and suture, marked by retractorily curved axial ribs, which form conspicuous scallops at the summit, where frequently several of them are fused together to form a tuft. On the early turns the axial riblets become expanded also into scallops at the periphery where they interlock with those at the summit of the succeeding turns. The spiral sculpture is obsolete or very poorly developed. Suture strongly constricted. Periphery of the last whorl well rounded. Here the scallops mentioned for the early turns are absent. Base short, well rounded, with a mere umbilical chink, but without apparent perforation, marked by spiral cords, which are low and broad anteriorly, and which become stronger toward the umbilicus, where they render the axial ribs weakly scalloped. The exposed portion of the umbilical wall shows slender spiral threads, which also form minute scallops at their junction with the

axial ribs. Aperture broadly oval; peristome simple, auriculated at the posterior angle. Operculum typically tudorid.

This species is confined to Camagüey Province. We are recognizing two subspecies, which the following key and descriptions will help to differentiate:

KEY TO THE SUBSPECIES OF *TUDORA* (AGUAYOTUDORA) *CRISTATA*

Spiral sculpture of last whorl obsolete..... *cristata*  
 Spiral sculpture of last whorl consisting of low rounded threads... *chorrillensis*

*TUDORA* (AGUAYOTUDORA) *CRISTATA CRISTATA*, new subspecies

PLATE 26, FIGURE 4

This subspecies comes from San Martín de Biaya, 15 miles south of Martí, Camagüey Province. It is easily distinguished from *T. (A.) cristata chorrillensis* in lacking the spiral threads on the last whorl.

The type, U.S.N.M. No. 493434, has 6.5 whorls and measures: Length, 12.8 mm.; greater diameter, 6.2 mm.; lesser diameter, 5.7 mm.

There is considerable variation in size of individuals of this subspecies. The smallest specimen has 6.2 whorls and measures: Length, 9.6 mm.; greater diameter, 5.7 mm.; lesser diameter, 4.9 mm.

*TUDORA* (AGUAYOTUDORA) *CRISTATA CHORRILENSIS*, new subspecies

PLATE 26, FIGURE 6

This subspecies comes from the Vereda del Telégrafo, Sierra del Chorrillo, south-southeast of Camagüey, Camagüey Province. It is readily distinguished from *T. (A.) cristata cristata* by the fact that the whorls have low rounded spiral threads, which render the axial ribs slightly sinuous. The spiral sculpture on the base is also much more pronounced.

The type, U.S.N.M. No. 493436, has lost the nuclear turns, the 5 postnuclear whorls measuring: Length, 13.3 mm.; greater diameter, 7.4 mm.; lesser diameter, 6.3 mm.

*TUDORA* (AGUAYOTUDORA) *CRASSIUSCULA*, new species

PLATE 26, FIGURE 7

Shell ovate, horn yellow, with interrupted spiral bands of brown. The elements composing these bands are rather distantly spaced and are arranged also in axial series. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose. Postnuclear whorls very inflated, strongly rounded, marked by retractively slanting axial ribs which are best developed on the early whorls and which become decidedly enfeebled, in fact almost obsolete, on the last turn. These riblets are distantly spaced on the early turns, but they become more

closely approximated on the later whorls, where they develop into strong cusps at the summit, which are very variable in strength. At the periphery on the early turns they also become strengthened into elongate, scalloplike elements. The spiral sculpture is indicated by a few threads on the first turn, but disappears on the succeeding turns. Suture well constricted. Periphery of the last whorl strongly inflated and rounded. Base short, openly umbilicated, inflated, strongly rounded, and marked by the continuation of the axial ribs and by a spiral cord at the outer edge of the umbilicus. There is the merest indication of a second cord a little posterior to this. The exposed portion of the umbilical wall is marked by 10 equally strong and equally spaced spiral cords, of which only the outer one is a little heavier than the rest. Aperture subcircular; peristome simple. Operculum typically tudorid.

The type, U.S.N.M. No. 493438, comes from Palomar de San José, Sierra de Guaicanamar, Camagüey Province. It has 6.2 whorls and measures: Length, 13.0 mm.; greater diameter, 7.8 mm.; lesser diameter, 6.3 mm.

We also have specimens from La Caridad de Guerrero, Sierra de Guaicanamar.

**TUDORA (AGUAYOTUDORA) BERMUDEZI, new species**

Shell elongate-ovate, thin, pale horn colored, with interrupted spiral bands of brown. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose. Postnuclear whorls high between the summit and suture, rather strongly inflated, marked by retractively curved, rather distantly spaced axial ribs, which are expanded into scallops at the summit and on the early turns, slightly thickened at the periphery, where they form weak interlocking elements with the scallops at the summit of the succeeding turn. Spiral sculpture absent on the spire. Suture constricted. Periphery well rounded. Base moderately long, narrowly, openly umbilicated, marked by the continuation of the axial ribs and on the umbilical wall by spiral threads, which become a little stronger toward the edge of the umbilicus than within. Last whorl solute. Aperture broadly oval; peristome simple. Operculum typically tudorid.

The species appears limited to Camagüey Province.

We are recognizing two subspecies, which the following key and descriptions will help to differentiate:

**KEY TO THE SUBSPECIES OF TUDORA (AGUAYOTUDORA) BERMUDEZI**

Shell stout.....	<b>bermudezi</b>
Shell slender.....	<b>sibanicuensis</b>

## TUDORA (AGUAYOTUDORA) BERMUDEZI BERMUDEZI, new subspecies

## PLATE 26, FIGURE 8

This subspecies comes from La Caridad, on the road southeast of Camagüey, Camagüey Province. It differs from *T. (A.) bermudezi sibanicuensis* in being much larger and stouter.

The type, U.S.N.M. No. 493441, has 5.3 whorls remaining and measures: Length, 14.0 mm.; greater diameter, 7.3 mm.; lesser diameter, 6.1 mm.

## TUDORA (AGUAYOTUDORA) BERMUDEZI SIBANICUENSIS, new subspecies

## PLATE 26, FIGURE 9

This subspecies was collected by Bermudez at Finca San Pablo near Sibanicú, Camagüey Province. It differs from *T. (A.) bermudezi bermudezi* in being much smaller and much more slender.

The type, U.S.N.M. No. 493442, has 4.5 whorls remaining and measures: Length, 10.7 mm.; greater diameter, 6.0 mm.; lesser diameter, 5.0 mm.

## TUDORA (AGUAYOTUDORA) RECTA ([Gundlach] Pfeiffer)

Shell ovate, varying in color from flesh colored to pale brown, marked with interrupted spiral bands of brown. Nuclear whorls 2, inflated, well rounded, microscopically granulose. Postnuclear whorls inflated, strongly rounded, marked by axial ribs, which vary materially in strength in the different races, not infrequently with a finer thread between the stronger ribs. The summits of the stronger axial ribs are expanded into hollow auricles and in the early whorls the axial ribs are also expanded at the periphery, forming an interlocking element in the suture with the auricles at the summit. In some of the races the axial ribs are somewhat sinuous and slightly nodulose. Suture well constricted. Periphery inflated, well rounded. Base moderately, broadly, openly umbilicated, marked by the continuation of the axial ribs. The umbilical wall bears spiral threads, which render the axial ribs nodulose, particularly so near the outer limit of the umbilicus. The last whorl is solute for a varying distance. Aperture broadly oval, with more or less of a carina at the posterior angle; peristome simple. Operculum typically tudorid.

The species is restricted to Camagüey Province. We are recognizing three subspecies, which the following key and descriptions will help to differentiate:

## KEY TO THE SUBSPECIES OF TUDORA (AGUAYOTUDORA) RECTA

Auricles at the summit closely spaced.

Axial ribs closely spaced..... **martiensis**

Axial ribs distantly spaced..... **barreti**

Auricles at the summit not closely spaced..... **recta**

## TUDORA (AGUAYOTUDORA) RECTA MARTIENSIS, new subspecies

## PLATE 26, FIGURE 1

This subspecies was collected by Dr. Rodriguez at Finca San Carlos, near the town of Marti, Camagüey Province. It resembles the typical race, but differs markedly from this by its much more uniform development of ribs and much greater number of auricles at the summit of the whorls. The nodulation of the axial ribs here is also much more pronounced.

The type, U.S.N.M. No. 493446, has 5.5 whorls and measures: Length, 10.2 mm.; greater diameter, 5.7 mm.; lesser diameter, 5.0 mm.

## TUDORA (AGUAYOTUDORA) RECTA BARRETI, new subspecies

## PLATE 26, FIGURE 2

This subspecies comes from Maraguán, Rio Hondo, about 13 miles southeast of Camagüey, Camagüey Province. It differs from the other two races in being much larger, with the axial ribs much more distantly spaced, and with the auricles at the summit strongly developed, in which respect it resembles *T. (A.) recta martiensis*.

The type, U.S.N.M. No. 493444, has lost the early whorls. The 4.2 turns remaining measure: Length, 12.7 mm.; greater diameter, 7.5 mm.; lesser diameter, 6.2 mm.

## TUDORA (AGUAYOTUDORA) RECTA RECTA ([Gundlach] Pfeiffer)

## PLATE 26, FIGURE 3

1863. *Cyclostomus rectus* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 10, p. 194.

1890. *Colobostylus rectus* CROSSE, Journ. Conchyl., vol. 38, p. 303.

1920. *Tudora (Tudorisca) recta* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 76.

The typical subspecies was collected by Gundlach between Las Tunas and Puerto Principe, Camagüey Province. It resembles most nearly *T. (A.) recta martiensis*, from which it is easily distinguished, however, by the fact that the differentiation into the stronger and weaker elements of the axial ribs is much more pronounced; the axial ribs therefore are much more irregular; also the auricles at the summit are much less frequently developed than in *T. (A.) recta martiensis*.

The specimen described and figured, U.S.N.M. No. 356367, a cotype, has 6 whorls and measures: Length, 10.2 mm.; greater diameter, 6.0 mm.; lesser diameter, 4.8 mm.

**TUDORA (AGUAYOTUDORA) ASPERATA, new species**

## PLATE 27, FIGURE 5

Shell elongate-ovate, white. Nuclear whorls 2, inflated, strongly rounded, forming a small mammillated apex. Postnuclear whorls inflated, strongly rounded, and marked by lamellar axial ribs, between which 1 or 2 finer axial ribs may be present. The lamellar ribs are decidedly scalloped, having the appearance of being rendered so by the spiral cords, which are not present in the intercostal spaces. Five of these scallops are present between summit and the periphery. The scallops at the periphery and the expanded riblets at the summit of the succeeding turns interlock on the early turns. Suture strongly constricted. Periphery well rounded. Base short, narrowly, openly umbilicated, marked by the continuation of the axial ribs, which bear 3 scallops. The umbilical wall also bears the continuation of the axial ribs and 4 feeble threads on the exposed portion. Last whorl slightly solute. Aperture very broadly oval, almost circular, peristome simple. Operculum typically tudorid.

The type, U.S.N.M. No. 493448, comes from El Cacaotal in the Sierra de Najaza. It has 6.2 whorls and measures: Length, 12.8 mm.; greater diameter, 6.9 mm.; lesser diameter, 5.3 mm.

The strong scallops on the ribs differentiate this at a glance from all the other *Aguayotudoras*.

**TUDORA (AGUAYOTUDORA) TUBERCULATA, new species**

## PLATE 27, FIGURE 2

Shell elongate-ovate, varying in color from flesh colored to chestnut-brown. The paler forms show conspicuous, interrupted spiral bands of brown. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly inflated, marked by retractively curved axial riblets, which are not all of the same strength; heavier ones are interspersed with 1 or 2 finer elements. The axial ribs are tuberculated, but no spiral threads appear to be present in the intercostal spaces. The tubercles are best developed on the early whorls, 6 being present between summit and suture on the second, and 7 on the third. On the last whorl they become enfeebled. Suture strongly constricted. Periphery inflated, well rounded. Base short, inflated, strongly rounded, broadly, openly umbilicated, marked by the continuation of the axial ribs and by 3 rows of tubercles, which here almost constitute spiral threads. The umbilical wall has 10 spiral threads, which render the axial ribs nodulose. The last whorl is solute for a tenth of a turn. Aperture broadly oval; peristome simple. Operculum typically tudorid.

The type, U.S.N.M. No. 493474, comes from the Vereda del Telégrafo, Sierra del Chorrillo. It has 4.4 whorls remaining and measures: Length, 11.0 mm.; greater diameter, 7.0 mm.; lesser diameter, 5.6 mm.

This species is easily distinguished from all the other *Aguayotodoras* by its granulose sculpture.

**TUDORA (AGUAYOTUDORA) AGUAYOI, new species**

Shell varying in shape from elongate-ovate to broadly ovate and in color from horn yellow to pale chestnut-brown, unicolor, or interruptedly spirally banded. Nuclear whorls 2, strongly rounded, microscopically granulose. Postnuclear whorls decidedly inflated, strongly rounded, marked by axial ribs which vary materially in strength; some are lamellar, while between them 1 or 2 finer threads may be present. The axial ribs are expanded into auricles at the summit and are thickened at the periphery, where in the early whorl they form interlocking elements. The axial ribs may or may not be nodulose, depending upon the race in question. Suture strongly constricted. Periphery inflated, well rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs, and by an indication of 1 or 2 feeble spiral threads adjacent to the open umbilicus. The umbilical wall is marked by the continuation of the axial ribs and by spiral threads, which render the ribs nodulose. Last whorl adnate or slightly solute. Aperture very broadly oval, with a decided auricle at the posterior angle; peristome simple. A shelf, which almost suggests a double peristome, limits the peristome at the posterior angle.

This species appears to be restricted to Camagüey Province.

We are recognizing 3 subspecies, which the following key and descriptions will help to differentiate:

**KEY TO THE SUBSPECIES OF TUDORA (AGUAYOTUDORA) AGUAYOI**

Shell broadly ovate.....	<i>aguayoi</i>
Shell elongate-ovate.....	
Axial ribs distantly spaced.....	<i>guaicanamarensis</i>
Axial ribs closely spaced.....	<i>najazaensis</i>

**TUDORA (AGUAYOTUDORA) AGUAYOI AGUAYOI, new subspecies**

**PLATE 27, FIGURE 7**

This subspecies comes from Guaicanamar. We have seen it also from Palomar de San José, Guaicanamar, Camagüey Province. It is easily distinguished from the other two by its broadly ovate form and its slightly more open umbilicus.

The type, U.S.N.M. No. 493476, comes from the Sierra de Guaicanamar. It has 6.6 whorls remaining and measures: Length, 13.7 mm.; greater diameter, 8.2 mm.; lesser diameter, 6.8 mm.

**TUDORA (AGUAYOTUDORA) AGUAYOI GUAICANAMARENSIS, new subspecies**

## PLATE 27, FIGURE 1

This subspecies comes from La Caridad de Guerrero, Sierra de Guaicanamar, Camagüey Province. We have seen it also from La Sierrita, Sierra de Guaicanamar, Camagüey Province. Its slender form easily distinguishes it from the typical race and the much more distantly spaced ribs distinguish it from *T. (A.) aguayoi najazaensis*.

The type, U.S.N.M. No. 493478, has 7 whorls and measures: Length, 13.2 mm.; greater diameter, 7.0 mm.; lesser diameter, 5.9 mm.

**TUDORA (AGUAYOTUDORA) AGUAYOI NAJAZAENSIS, new subspecies**

## PLATE 27, FIGURE 3

This subspecies comes from El Cacacaotal, Sierra de Najaza, Camagüey Province. This race resembles *T. (A.) aguayoi guaicanamarensis*, but differs from it in having the last whorl solute and the axial ribs more numerous and more closely spaced and rather conspicuously nodulose on the early turns.

The type, U.S.N.M. No. 493480, has 7.1 whorls and measures: Length, 12.7 mm.; greater diameter, 6.5 mm.; lesser diameter, 5.6 mm.

**TUDORA (AGUAYOTUDORA) VARICOSA, new species**

## PLATE 27, FIGURE 8

Shell broadly oval, thin, pale yellow, with very broad, interrupted spiral bands of brown, and with a broad chestnut-colored band at the summit. Nuclear whorls decollated in all our specimens. Post-nuclear whorls very strongly inflated, rounded, and marked by axial ribs, which vary from sublamellar to one or more slender elements between them. These ribs are expanded at the summit and not at all expanded at the periphery in the early turns. The spiral sculpture is absent on the spire. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs. The wall of the broadly open umbilicus, in addition to the continuation of the ribs, is marked by 8 spiral threads, which render the stronger axial ribs nodulose. Last whorl solute for about one-tenth of a turn. Aperture almost circular; peristome simple. Operculum typically tudorid.

The type, U.S.N.M. No. 493482, comes from the Sierra del Cachimbo, east of the Sierra de Najaza, Camagüey Province. It has 4.2 whorls remaining and measures: Length, 9.7 mm.; greater diameter, 7.5 mm.; lesser diameter, 6.0 mm.

## TUDORA (AGUAYOTUDORA) OBESA, new species

## PLATE 27, FIGURE 9

Shell elongate-ovate, rather stout, ranging in color from flesh color to pale chestnut-brown, with or without interrupted spiral bands of brown. Nuclear whorls 2, well rounded, microscopically granulose, forming a small apex. Postnuclear whorls marked by retractively curved axial riblets, which are rather irregular in strength and slightly so in spacing. They are about as wide as the spaces that separate them, and those of the early whorls are somewhat wavy or slightly nodulose. On the later turns this character is lost. The axial riblets become slightly exerted at the summit, particularly so on the early turns, where they also become somewhat thickened at the periphery. On the last whorl, however, these characters are lost. Suture strongly constricted. Periphery inflated, well rounded. Base moderately long, well rounded, marked by the continuation of the axial ribs. Umbilicus narrow, open, bearing 9 slender spiral threads, which render the axial ribs nodulose. Last whorl solute for about one-tenth of a turn. Aperture oval, rendered crested by a carina at the posterior angle; peristome simple. Operculum typically tudorid.

The type, U.S.N.M. No. 493484, comes from the Sierra del Ca-chimbo, that is, between the Sierra de Chorrillo and the Sierra Najaza, Camagüey Province. It has lost the nuclear turns. The 4.2 whorls remaining measure: Length, 13.6 mm.; greater diameter, 8.2 mm.; lesser diameter, 6.7 mm.

## WRIGHTUDORA, new subgenus

Shell small, elongate-ovate. Nuclear whorls inflated, well rounded, microscopically granulose. Postnuclear whorls with lamellar or sub-lamellar vertebrated axial ribs, which may or may not be gathered into tufts at the summit. Umbilicus open. Aperture subcircular; peristome double. Operculum typically tudorid. No breathing device is present.

Type: *Tudora* (*Wrightudora*) *enode* ([Gundlach] Pfeiffer).

## KEY TO THE SPECIES OF THE SUBGENUS WRIGHTUDORA

- |   |                      |
|---|----------------------|
| Axial ribs gathered into tufts at the summit..... | <i>enode</i>         |
| Axial ribs not gathered into tufts at the summit. |                      |
| Whorls strongly angulated in the middle.....      | <i>arcticoronata</i> |
| Whorls not strongly angulated in the middle.      |                      |
| Axial ribs uniform in strength and spacing.....   | <i>gundlachi</i>     |
| Axial ribs not uniform in strength and spacing.   |                      |
| Axial ribs scalloped.....                         | <i>semicoronata</i>  |
| Axial ribs not scalloped.....                     | <i>garridoiana</i>   |

## TUDORA (WRIGHTUDORA) ENODE ([Gundlach] Pfeiffer)

## PLATE 27, FIGURE 6

1860. *Ctenopoma enode* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 7, pp. 27-28.
1867. *Cyclostoma enode* ARANGO, Repert físico natural Isla de Cubana, p. 75.
1920. *Tudora (Tudorops) enode* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 77.

Shell elongate-conic, pale straw yellow. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly rounded, marked by slightly retractively slanting axial riblets, which are produced at the summit, where 2 to 4 become fused to form a hollow denticle, particularly on the last whorl. On the earlier whorls this fusing is less strongly marked. Of the axial riblets 68 occur on the first of the remaining whorls, 144 on the second, and 154 on the last. The spiral sculpture consists of slender threads, which render the axial riblets wavy but scarcely nodulose. Of these spiral threads, 5 occur on the first, 6 on the second, and 8 on the last whorl, between summit and suture. Suture strongly constricted. Periphery well rounded. Base short, somewhat inflated, well rounded, marked by 3 spiral cords. The narrow open umbilicus and the somewhat descending and solute last whorl show the presence of 5 spiral threads on the umbilical wall. Aperture almost circular; peristome double, the inner moderately exerted and slightly reflected; the outer narrowly expanded, somewhat auriculated at the posterior angle, and marked by slender concentric laminae. Operculum typically tudorid.

The specimen described and figured, U.S.N.M. No. 356395, is a cotype collected by Gundlach and presented by Dr. de la Torre. It comes from Gibara, Oriente Province. It has 3.5 whorls and measures: Length, 7.7 mm.; greater diameter, 4.6 mm.; lesser diameter, 3.9 mm.

## TUDORA (WRIGHTUDORA) ARCTICORONATA, new species

## PLATE 27, FIGURE 4

Shell elongate-turreted, pale yellow. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming a somewhat mammillated apex. Postnuclear whorls with an angulation on the middle of the turn marked by rather strong, lamellar axial ribs, between which finer axial riblets occur. The strong axial ribs are scalloped at intervals, and when these scallops are broken they reveal that they are hollow. The strong axial ribs are decidedly auriculated at the summit but they do not fuse to form cusps. Of the scallops 4 are present between the summit and the periphery, and the cusps at the summit indicate a fifth. Suture constricted, bridged by the cusps at the summit and by the scallops at the periphery. Base short, well

rounded, narrowly, openly umbilicated, marked by the continuation of the axial ribs, which here bear 3 scallops, the last being more acute and marking the outer limit of the umbilicus. The umbilical wall is also marked by the slender continuation of the axial riblets and by five slender spiral threads. The last whorl is solute for about one-tenth of a turn. Aperture subcircular; peristome double, the inner slightly exerted; the outer broadly expanded on the outer and basal lip, less so on the inner and parietal wall, very strongly fluted, the flutings forming denticulation on the inner lip. In addition to this the outer peristome is marked by slender, concentric laminae. Operculum typically tudorid.

The type, U.S.N.M. No. 493485, comes from Silla de Baez, west of Baracoa, Oriente Province. It has 5.1 whorls remaining and measures: Length, 8.6 mm.; greater diameter, 5.0 mm.; lesser diameter, 4.3 mm.

The elongate-turreted form, the strong angulations on the middle of the turns, and the strong differentiation of the axial riblets, which gives it a somewhat scalariform aspect, differentiate this from all the other Wrightudoras.

*TUDORA (WRIGHTUDORA) GUNDLACHI*, new species

PLATE 28, FIGURE 1

Shell small, elongate-conic, flesh colored, with a brownish flush. Nuclear whorls 2, inflated, well rounded, microscopically granulose, forming a small, almost mucronate, apex, the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls inflated, well rounded, marked by slender axial riblets, of which 62 occur on the first, 82 on the second, 144 on the third, and 172 on the last. These riblets are expanded into auricles at the summit and at the periphery, and where these two elements meet they sometimes fuse. The spiral sculpture consists of mere indications of threads too feebly expressed to be counted. Suture strongly constricted. Periphery weakly angulated. Base short, well rounded, marked by the continuation of the axial riblets and by a single spiral thread, which is a little nearer the umbilicus than the periphery. A strong spiral thread marks the junction of the base and the periphery, and its junction with the axial riblets renders these strongly scalloped. The umbilical wall is marked by the feeble continuation of the axial riblets and by 8 rather strong spiral threads. Last whorl solute for one-fifth of a turn. Aperture very broadly oval, almost subcircular; peristome double, the inner moderately, strongly exerted but not reflected; the outer narrowly expanded, strongly scalloped on the inner and basal lip, and marked by a series of concentric lamellae. Operculum typically tudorid.

The type, U.S.N.M. No. 493487, was collected by Gundlach at Mata, Oriente Province. It has 6.4 whorls remaining and measures: Length, 9.8 mm.; greater diameter, 5.2 mm.; lesser diameter, 4.5 mm.

This species most nearly resembles *Tudora* (*Wrightudora*) *garridoiana*, from which it can be readily distinguished by not having the axial riblets arranged in alternate series of strong and feeble assemblages.

TUDORA (WRIGHTUDORA) SEMICORONATA ([Gundlach] Pfeiffer)

PLATE 28, FIGURE 4

1861. *Cyclostoma semicoronatum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 7, pp. 28-29.  
 1865. *Ctenopoma semicoronatum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 2, p. 117.  
 1920. *Ramsdenia semicoronata* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 79.

Shell small, thin, elongate-conic, straw colored. Nuclear whorls 2, inflated, well rounded, microscopically granulose, forming a rather elevated tip. Postnuclear whorls inflated, strongly rounded, almost angulated in the middle, marked by retractively slanting, lamellar axial riblets, which are expanded into rather strong auricles at the summit and at the periphery; in adjacent whorls these two elements occasionally fuse. The axial riblets are hollow, and series of 2 to 4 strong riblets are separated by series of a similar number of weaker threads; of these riblets, 68 occur on the first, 112 on the second, and 118 on the last whorl. The spiral sculpture consists of moderately strong threads, which render the riblets wavy and scalloped at their junctions. Of these riblets, 4 occur on the first and 5 on the remaining turns between summit and suture. Suture strongly constricted. Base short, well rounded, openly moderately broadly umbilicated, marked by the continuation of the axial ribs and 3 spiral cords, of which the one marking the angle of the umbilicus is stronger than the rest. The umbilical wall is marked by the continuation of the axial riblets and by 6 slender spiral threads. Last whorl solute for about one-fifth of a turn. Aperture subcircular; peristome double, the outer broadly expanded, strongly scalloped at the edge, narrower on the parietal wall, produced into a moderately strong auricle at the posterior angle; inner peristome slightly exerted. Operculum as described for the species.

This species comes from Mata, Oriente Province. Gundlach says of it (Malakozool. Blätter, vol. 7, p. 29, 1861): "Animal brownish white. Dark dots form small spots and patches upon the snout and head. The region about the eye is rosy white; the interior of the head and antennae rose colored or rather bright coral red with fainter grayish apex. A dark coloration is present between the neck and foot."

The specimen described and figured, U.S.N.M. No. 356383, is one of two collected by Gundlach. It has 3.8 whorls and measures; Length, 7.3 mm.; greater diameter, 4.5 mm.; lesser diameter, 3.5 mm.

This race is most nearly related to typical *Tudora* (*Wrightudora*) *garridoiana garridoiana*, from which it differs by having the axial riblets much stronger and fewer in number.

**TUDORA (WRIGHTUDORA) GARRIDOIANA** ((Gundlach) Pfeiffer)

Shell elongate-conic, pale straw colored. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, marked by slightly retractively slanting, sublamellar, hollow riblets. These riblets are gathered into groups, several stronger lamellae being replaced by a number of weaker axial threads. These lamellae are developed into auricles at the summit and at the periphery. On adjacent whorls they frequently meet. The spiral sculpture consists of poorly developed threads, which are frequently merely indicated. Suture strongly constricted. Periphery well rounded. Base moderately long, well rounded, marked by the continuation of the axial sculpture and by indications of obsolete spiral threads. A strong spiral cord marks the junction of the base with the umbilical wall. The umbilical wall is marked by the feeble continuation of the axial riblets and spiral threads. Last whorl solute for a fraction of a turn. Aperture subcircular; peristome double, the inner moderately exerted and slightly reflected; the outer moderately broadly expanded, somewhat wavy, developed into an almost clawlike element at the posterior angle, and marked by a series of slender concentric lamellae. Operculum typically tudorid.

This species comes from the region of Baracoa, Oriente Province, where it breaks up into two races as follows:

**KEY TO THE SUBSPECIES OF TUDORA (WRIGHTUDORA) GARRIDOIANA**

Inner lip of outer peristome rather wide.....	<b>baracoensis</b>
Inner lip of outer peristome not wide.....	<b>garridoiana</b>

**TUDORA (WRIGHTUDORA) GARRIDOIANA BARACOENSIS, new subspecies**

PLATE 28, FIGURE 5

This race comes from Baracoa. It can be distinguished from *T. (W.) garridoiana garridoiana* in being a little more slender and in having the outer peristome of the inner lip much more expanded and more strongly fluted.

The type, U.S.N.M. No. 356382, has 4.2 whorls remaining and measures: Length, 8.3 mm.; greater diameter, 5.2 mm.; lesser diameter, 3.8 mm.

## TUDORA (WRIGHTUDORA) GARRIDOIANA GARRIDOIANA ([Gundlach] Pfeiffer)

## PLATE 28, FIGURE 2

1860. *Cyclostoma garridoianum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 7, pp. 26-27.

The typical members of this subspecies come from El Yunque de Baracoa. It is distinguished from *T. (W.) garridoiana baracoensis* in having the outer peristome of the inner lip much less strongly expanded and less strongly fluted.

The specimen described and figured, U.S.N.M. No. 356381, has 4.5 whorls and measures: Length, 8.9 mm.; greater diameter, 5.4 mm.; lesser diameter, 4.3 mm.

## TUDORINA, new subgenus

Shell very large, elongate-ovate, marked by both axial ribs and spiral threads on spire and base. Some of the axial ribs are gathered into tufts at the summit. Outer peristome narrowly expanded. Operculum typical of *Tudora*.

Type: *Tudora (Tudorina) rangelina* (Poey).

## TUDORA (TUDORINA) RANGELINA (Poey)

## PLATE 28, FIGURE 6

1851. *Cyclostoma rangelinum* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 1, p. 98, pl. 8, figs. 13-19.

1890. *Colobostylus rangelinus* CROSSE, Journ. Conchyl., vol. 38, p. 303.

1920. *Tudora (Tudora) rangelina* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 77.

Shell rather large, broadly elongate-conic, varying from unicolor straw color to brownish, banded with spiral bands, or with interrupted spiral bands of brown of varying width and spacing; the interior of the aperture varies with the exterior; the peristome is soiled white, marked with brown, or unicolor. Nuclear whorls 2, well rounded, microscopically granulose, the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls well rounded, marked by retractively slanting axial riblets and by spiral threads, the combination of the two forming a more or less fenestrated pattern. Both the axial riblets and the spiral threads become more numerous and more closely approximated on the last whorl than they are on the early turns; 2 to 6 or even more of these riblets become fused at the summit to form low whitish denticles, which are appressed to the preceding turn. Suture well constricted. Periphery well rounded. Base moderately long, well rounded, marked by axial riblets and by spiral threads like those on the spire. The base is openly, moderately broadly umbilicated, the umbilical wall being marked by the continuation of the axial riblets and by

spiral threads, which are a little broader and stronger than those on the rest of the base. Aperture broadly oval; peristome double, the inner but slightly exerted and appressed to the outer, but distinct all around; the outer narrowly expanded and slightly reflected, forming a conspicuous auricle at the posterior angle, which is adnate to the preceding turn. Operculum with the nucleus halfway between subcentral and submarginal, bearing a strong calcareous lamella, which is reflected to parallel the chondroid plate; the various turns of the calcareous lamella touch each other so as to form a continuous plate; the calcareous lamellae are marked by strong, retractively curved threads.

The specimen described and figured, U.S.N.M. No. 356362, is one of 5 topotypes from the Poey collection. It has 4.5 whorls remaining and measures: Length, 23.9 mm.; greater diameter, 15.8 mm.; lesser diameter, 12.7 mm.

This species is confined to the region of the Taco Taco River and Rangel, Pinar del Rio Province.

#### Genus ANNULARIA Schumacher

1817. *Annularia* SCHUMACHER, Essai d'un nouveau systeme des habitations des vers testaces, pp. 60, 196.

Shell ranging in form from depressed-helicoid to turbinate to elongate-conic. The sculpture may be almost obsolete or it may consist of axial riblets only, or of axial riblets and spiral threads; the latter may be confined to the umbilicus, or it may be present on the entire shell. There is a great range of variation in the strength of these sculptural features in different species. Breathing devices may be present or absent. The operculum consists of a chondroid plate, composed of a number of whorls, which bear a calcified spiral lamella on their inner edge; the lamella is obliquely deflected outward. The lamella on the succeeding turns does not fuse with that of its predecessor; there is always a space separating it from its neighbor. This lamella is always finely, obliquely striated, the striations varying considerably in strength in different species.

Type: *Turbo vincina* Linnaeus.

Typical *Annularia* has not been found in Cuba.

#### KEY TO THE CUBAN SUBGENERA OF THE GENUS ANNULARIA

Breathing siphon present.

Umbilicus open..... **Annularodes**

Umbilicus closed..... **Annularodisca**

Breathing siphon absent.

Breathing pore present.

Axial ribs articulated..... **Annularops**

Axial ribs not articulated.

Axial sculpture predominant..... **Annularodella**

Spiral sculpture predominant..... **Eutudora**

Breathing pore absent.

Breathing device reduced to a notch.

Axial sculpture predominant..... **Fossularia**

Spiral sculpture predominant..... **Eutudorisca**

Breathing device absent.

Lamella of operculum reenforced with strong, retractive-ly slanting riblets..... **Diplopoma**

Lamella of operculum not reenforced with strong, retractive-ly slanting riblets.

Shell ranging from elongate-conic to elongate-ovate.

Spiral sculpture on spire present.

Axial sculpture articulated..... **Juannularia**

Axial sculpture not articulated.

Shell very large..... **Annularita**

Shell not large..... **Troschelvindex**

Spiral sculpture on spire absent.

Postnuclear whorls solute..... **Blaesospira**

Postnuclear whorls not solute.

Postnuclear whorls spinose..... **Guajaibona**

Postnuclear whorls not spinose. **Subannularia**

Shell not ranging from elongate-conic to elongate-ovate.

Shell depressed-helicoid..... **Annularisca**

Shell not depressed-helicoid.

Shell of turbinid shape.

Axial and spiral sculpture present on spire..... **Annularex**

Peristome simple..... **Bermudezia**

Peristome double..... **Lugarenia**

Axial and spiral sculpture not present on spire.

Axial and spiral sculpture obsolete..... **Annularosa**

Axial and spiral sculpture not obsolete.

Operculum with strong lamella..... **Annularella**

Operculum with obsolete lamella..... **Chondropomatus**

#### Subgenus ANNULARODES Henderson and Bartsch

1920. *Annularodes* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 74.

Shell elongate-ovate, openly umbilicated, marked by regular, nonarticulate axial ribs and fine spiral threads on umbilical wall and adjacent base; breathing pore provided with an external siphon, which is directed backward, and which opens into the suture. Operculum typically annularid.

Type: *Annularia (Annularodes) uncinata* (Arango).

## KEY TO THE SPECIES OF THE SUBGENUS ANNULARODES

- Last whorl decidedly solute.  
 Outer peristome of inner lip broad..... *uncinata*  
 Outer peristome of inner lip not broad..... *canaoensis*
- Last whorl not decidedly solute.  
 Last whorl free from the preceding turn, immediately behind  
 the peristome.  
 Outer lip of outer peristome moderately broad..... *terneroensis*  
 Outer lip of outer peristome narrow.  
 Axial ribs closely spaced..... *cantarillensis*  
 Axial ribs not closely spaced..... *indivisa*
- Last whorl not free from the preceding turn, immediately be-  
 hind the peristome.  
 Sculpture fine and feeble..... *obsoleta*  
 Sculpture not fine or feeble..... *perezi*

## ANNULARIA (ANNULARODES) UNCINATA (Arango)

## PLATE 28, FIGURE 7

1884. *Choanopoma uncinatum* ARANGO, Proc. Acad. Nat. Sci. Philadelphia, p. 211.  
 1920. *Annularia (Annularodes) uncinata* HENDERSON and BARTSCH, Proc. U. S.  
 Nat. Mus., vol. 58, p. 74.

Shell elongate-ovate, of straw-colored ground color, marked by rather large, interrupted, spiral bands of brown, which consist of rather large spots that are arranged in both axial and spiral series. Nuclear whorls decollated. Postnuclear whorls strongly rounded, marked by retractively curved axial riblets, of which 60 are present on the first and 112 are on the last whorl. These riblets become expanded at the summit into hollow tufts, or several of them may become fused to form such a tuft. Occasionally there is an indication of a slight nodule below the expanded summit. Suture strongly constricted. Periphery inflated, strongly rounded. Base moderately long, well rounded, marked by the continuation of the axial ribs, which extend prominently into the umbilicus, and on the anterior portion of the umbilical wall by 12 spiral cords, which render the axial riblets nodulose. The last whorl is decidedly solute and deflected for about three-tenths of a turn. Aperture almost circular; peristome double, the inner moderately exerted and slightly reflected; the outer rather broadly expanded on the inner lip, a little less so on the parietal wall, and narrow on the outer and basal lip, forming a very conspicuous auricle, which embraces the reflected siphon. The outer peristome is marked by a series of concentric lamellae, which are particularly conspicuous at the auricle. Operculum typically annularid. The siphon is reflected backward and opens freely.

The specimen described and figured, U.S.N.M. No. 535616, a cotype, is from San Juan de los Yeras, Santa Clara Province. It was received from Arango by Dr. de la Torre. It has 4.0 whorls remaining and

measures: Length, 14.3 mm.; greater diameter, 7.4 mm.; lesser diameter, 6.8 mm.

This species agrees in the soluteness and deflection of its last whorl with *A. (A.) canoaensis*, from which it is easily distinguished by the broad inner lip of the outer peristome.

ANNULARIA (ANNULARODES) CANOAENSIS, new species

PLATE 28, FIGURE 8

Shell elongate-ovate, varying in color from straw color to pale brown, marked by rather pale, interrupted spiral bands of brown. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, well rounded, marked by slightly retractively curved axial ribs, of which 45 occur on the first and 110 on the last whorl. These riblets become expanded into feeble denticles at the summit or 2, 3, or 4 may become united to form a low hollow white cusp. Suture well constricted. Periphery of the last whorl well rounded. Base moderately long, well rounded, marked by the continuation of the axial ribs, which extend into the umbilicus, and on the umbilical wall by 13 feeble spiral threads, which render their junctions with the axial ribs feebly nodulose. The last whorl is solute for about one-sixth of a turn, decidedly deflected. Aperture subcircular; peristome double, the inner moderately exerted and slightly reflected; the outer rather narrow all around, forming a conspicuous auricle at the posterior angle, where it is reflected over and adjoins the siphon. The outer peristome is marked by concentric lamellae. Operculum typically annularid. The siphon is short, backward directed, and free.

The type, U.S.N.M. No. 535617, was collected by Dr. de la Torre at Casimbas de la Sierra de Canoa, Santa Clara Province. It has 4.4 whorls remaining and measures: Length, 14.0 mm.; greater diameter, 7.5 mm.; lesser diameter, 6.5 mm.

We have seen specimens also from Vereda del Alunado, Sierra de Jatibonico, which is nearby.

This species, like *A. (A.) uncinata*, has the last whorl solute and deflected, but is at once differentiated from that by its much narrower outer peristome of the inner lip.

ANNULARIA (ANNULARODES) TERNEROENSIS, new species

Shell elongate-conic, flesh colored, with broad interrupted spiral bands of brown, of which 4 occur between summit and suture and 4 are present on the base; the spiral bands show plainly in the interior of the aperture. Nuclear whorls 2, smooth, well rounded. Postnuclear whorls slightly inflated, well rounded, marked by rather distantly spaced, well-developed, retractively slanting axial riblets, which either singly or by the junction of two adjacent ones develop into slender hollow denticles at the summit. Suture strongly constricted.

Periphery well rounded. Base well rounded, narrowly umbilicated, marked by the continuation of the axial riblets, and within the narrow umbilicus by weak spiral threads. Last whorl solute for a tenth of a turn behind the peristome, which touches the preceding whorl. Aperture broadly ovate; peristome double, the inner slightly exerted; the outer broadly expanded on the inner lip and on the parietal wall, where it is somewhat fluted, narrowest on the outer lip, forming a conspicuous auricle at the posterior angle. Operculum typically annularid. Siphon behind the posterior angle of the aperture reflected backward into the suture.

This species appears restricted to the mountains of southern Santa Clara Province, where we are recognizing two subspecies:

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULARODES) TERNEROENSIS

Umbilicus moderately broad..... **indioensis**  
 Umbilicus narrow..... **terneroensis**

ANNULARIA (ANNULARODES) TERNEROENSIS INDIOENSIS, new subspecies

PLATE 29, FIGURE 5

This subspecies was collected by Bermudez at El Indio, near San Juan de los Yeras, Santa Clara Province.

It differs from *A. (A.) terneroensis terneroensis* in being shorter, more ovate, with a broader umbilicus and by having the axial ribs of the last whorl more closely spaced.

The type, U.S.N.M. No. 535620, has 3.4 whorls remaining and measures: Length, 12.8 mm.; greater diameter, 7.7 mm.; lesser diameter, 6.7 mm.

ANNULARIA (ANNULARODES) TERNEROENSIS TERNEROENSIS, new subspecies

PLATE 29, FIGURE 2

This race was collected by Mr. Henderson at Loma del Ternero about 7 miles southeast of San Juan de los Yeras, Santa Clara Province. It differs from *A. (A.) terneroensis indioensis* in being more elongate, in having the ribs on the last whorl a little more distantly spaced, and in having a narrow umbilicus.

The type, U.S.N.M. No. 493403, has 4.2 whorls remaining and measures: Length, 15.4 mm.; greater diameter, 8.0 mm.; lesser diameter, 7.2 mm.

ANNULARIA (ANNULARODES) CANTARILLENIS, new species

PLATE 29, FIGURE 4

Shell elongate-ovate, straw colored, with faint, interrupted spiral bands of brown. Nuclear whorls 1.8, inflated, strongly rounded, microscopically granulose, forming a rather blunt apex. Postnuclear whorls inflated, strongly rounded, marked by slender, retractively

curved axial riblets, which are a little more distantly spaced on the early turns than on the last, where they are rather closely crowded; the spaces separating them on the last whorl are only a trifle wider than the riblets; these riblets may become expanded at the summit or 2, 3, or even more, may become fused to form small hollow cusps. Of these riblets, 54 are present on the first postnuclear whorl and 112 are present on the last whorl. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs, which extend into the open umbilicus, and by 12 spiral threads on the umbilical wall, which render the axial ribs nodulose at their intersection. The last whorl is solute for about one-tenth of a turn behind the peristome. Aperture almost circular; peristome double, the inner strongly exerted, particularly so on the outer lip, slightly slit at the posterior angle; the outer broadly expanded on the inner lip and the parietal wall, and adnate to the preceding turn at the parietal wall, narrow on the outer and basal lip, forming a moderately strong auricle at the posterior angle, which is marked by the concentric laminae. Operculum typically annularid. Siphon at the posterior angle of the aperture bent backward and opening there into the suture.

The type, U.S.N.M. No. 535622, was collected by Bermudez at Loma La Cantarilla, about 3 miles west of Guaracabulla, Santa Clara Province. It is a complete specimen having 5.8 whorls and measures. Length, 13.0 mm.; greater diameter, 7.6 mm.; lesser diameter, 6.0 mm.

ANNULARIA (ANNULARODES) INDIVISA (Welch)

PLATE 29, FIGURE 3

1929. *Choanopoma uncinatum indivisum* WELCH, Nautilus, vol. 42, p. 98, pl. 5, fig. 7.  
1934. *Choanopoma (Annularodes) uncinatum indivisum* WELCH, Nautilus, vol. 47, p. 133, pl. 11, fig. 8.

Shell elongate-conic, pale wax color, or darker, with interrupted spiral bands of brown, of which 3 are present between summit and suture and 3 are on the base. The spiral bands show conspicuously on the inside of the outer lip. Nuclear whorls almost 2, inflated, well rounded, microscopically granulose, with the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls slightly inflated, strongly rounded, and marked by rather distantly spaced, slender, retractively slanting axial riblets, which either individually or by fusion of two adjacent ribs form conspicuous hollow cusps at the summit. Of these ribs 50 are present on the first, 86 on the second, 122 on the third, and 126 on the last of the remaining turns. Suture strongly constricted. Periphery well rounded. Base moderately long, well rounded, openly umbilicated, and marked by the continuation of the axial riblets and by fine spiral threads on the

umbilical wall. The last whorl is solute for about one-tenth of a turn behind the expanded peristome, which touches the preceding turn on the parietal wall, but which does not fuse with it. Aperture almost circular; peristome double, the inner fairly strongly exerted and very slightly reflected; the outer broadly expanded on the inner and parietal wall, narrow on the outer lip, forming a conspicuous auricle at the posterior angle, which is reflected backward. The outer peristome is marked by a series of concentric lamellae. Operculum typically annularid. Siphon immediately behind the peristome of the posterior angle of the aperture, reflected backward into the suture.

The specimen described and figured, U.S.N.M. No. 425685, is one received from Dr. Welch, who collected it at Loma Merino, Florencia, Camagüey Province, the type locality. It has 5.3 whorls remaining and measures: Length, 16.0 mm.; greater diameter, 7.5 mm.; lesser diameter, 6.7 mm.

We have specimens from various localities along the coast mountain range known as Sierra de Jatibonico, and the Sierra de Meneses.

This species most nearly resembles *A. (A.) terneroensis*, which, however, has the whorls shorter and more inflated, the shell more ovoid, and the color markings much stronger. The outer lip of the outer peristome is also broader.

ANNULARIA (ANNULARODES) OBSOLETA, new species

PLATE 29, FIGURE 6

Shell rather large, elongate-ovate, varying in color from straw color to pale brown. Unicolor, or marked with interrupted spiral bands of brown. Nuclear whorls almost 2, inflated, strongly rounded, microscopically granulose, forming a blunt apex. Postnuclear whorls increasing rather rapidly in size, inflated, strongly rounded, and marked by retractively curved axial ribs, of which 56 occur on the first and 127 are on the last whorl. These ribs are less wide than the spaces that separate them, and they are either singly or by a fusion of two expanded into hollow cusps at the summit. Suture well constricted. Periphery inflated, strongly rounded. Base inflated, strongly rounded, openly umbilicated, and marked by the continuation of the axial ribs, which extend into the umbilicus, the umbilical wall bearing many rather closely spaced, low, rounded spiral threads, which render the axial riblets slightly nodulose. The partial covering of the umbilicus by the reflected peristome makes it impossible to determine their actual number. Aperture circular; peristome double, the inner exerted and slightly reflected; the outer broadly expanded, mostly so on the inner lip, which quite obscures the umbilicus when viewed from the front, and on the parietal wall,

which it covers to quite an extent. The outer peristome is rendered rather irregular by the siphon at the posterior angle. Operculum typically annularid. The siphon is directed backward and opens into the suture.

The type, U.S.N.M. No. 535609, comes from the northeast slope of La Puntilla, near Remedios, Santa Clara Province. It is a complete specimen having 6.1 whorls and measures: Length, 18.8 mm.; greater diameter, 10.3 mm.; lesser diameter, 8.7 mm.

This species occurs abundantly at the type locality and in the region of Zulueta, Central San Agustín, and the north slope of the Sierra de Meneses, near Yaguajay and Juncalito; likewise at Pie Valdés and El Yigre, Yaguajay. Throughout this entire range the species maintains a remarkable concordance of characters, so that it is impossible to split it into subspecies. The large size will distinguish it at once from all the other *Annularodes*.

ANNULARIA (ANNULARODES) PEREZI, new species

Shell elongate-ovate, straw colored, with interrupted spiral bands of brown. The early nuclear whorls are also marked with brown. Nuclear whorls 2, small, inflated, microscopically granulose. Post-nuclear whorls well rounded, marked by strong, almost sublamellar, retractively curved axial ribs, which are a little more distantly spaced on the early turns than on the last. These ribs either individually, or by the combination of 2 or 3, form conspicuous hollow cusps at the summit. Suture strongly constricted. Periphery well rounded. Base moderately long, well rounded, openly umbilicated, marked by the continuation of the axial ribs, which extend over the umbilical wall, and by a series of spiral threads on the umbilical wall, which render the axial riblets nodulose. The actual number of these cannot be determined because of the reflected inner lip of the outer peristome. Aperture almost circular; peristome double, the inner exerted and slightly reflected; the outer broadly expanded on the inner and parietal wall, the latter adnate to the preceding turn, narrow on the basal and outer lip, forming a conspicuous auricle at the posterior angle, which is rendered irregular by the siphon. The outer peristome is marked by a series of concentric lamellae which are best developed at the auricle. Operculum typically annularid. Siphon reflected into the suture, where it opens. We are recognizing two subspecies, which the following key and descriptions will characterize:

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULARODES) PEREZI

- Interrupted spiral bands of brown conspicuous ..... perezi  
 Interrupted spiral bands of brown inconspicuous or absent..... guitarti

## ANNULARIA (ANNULARODES) PEREZI PEREZI, new subspecies

## PLATE 29, FIGURE 7

Bartsch collected this subspecies on the north slope of the Sierra de Jatibonico.

It is distinguished from *A. (A.) perezii guitarti* in being larger and more elongate, with the whorls less rounded, and with the interrupted spiral bands well marked.

The type, U.S.N.M. No. 535612, comes from near Vereda de los Broqueles, Mayajigua. It has 4.0 whorls remaining and measures: Length, 16.4 mm.; greater diameter, 9.5 mm.; lesser diameter, 8.2 mm.

The animals of this species, collected by Bartsch August 9, 1928, are described by him as being pale yellow with a pinkish area about the tentacles. The tentacles are of the same color as the body, but they are tipped with gray at the expanded end. The animal when at rest suspends itself by a mucous thread.

## ANNULARIA (ANNULARODES) PEREZI GUITARTI, new subspecies

## PLATE 29, FIGURE 8

This race comes from Finca San Vicente, on the boundary of Santa Clara and Camagüey Provinces. It differs from the typical race in being smaller and in having the interrupted spiral bands scarcely indicated. The axial ribs are also much more elevated.

The type, U.S.N.M. No. 535614, has 4.0 whorls remaining and measures: Length, 14.7 mm.; greater diameter, 8.3 mm.; lesser diameter, 7.2 mm.

## ANNULARODISCA, new subgenus

Shell elongate-ovate, with the umbilicus closed by the reflected posterior half of the outer peristome of the inner lip. The sculpture consists of nonarticulate axial ribs on the spire, to which are added spiral threads on the umbilical wall. Siphon connecting with the hollow axis by a slender channel behind the parietal outer lip, and through the axis with the exterior at the decollated apex.

This subgenus resembles *Annularodes*, but it differs materially from that subgenus in the arrangement of the siphon, which is like that of *Opisthocoeicum*.

Type: *Annularia (Annularodisca) pilsbryi* (Welch).

## ANNULARIA (ANNULARODISCA) PILSBRYI (Welch)

## PLATE 29, FIGURE 1

1929. *Choanopoma pilsbryi* WELCH, Nautilus, vol. 42, p. 98, pl. 5, fig. 1.

1934. *Choanopoma (Annularodes) pilsbryi* WELCH, Nautilus, vol. 47, p. 135, pl. 11, fig. 9.

Shell elongate-ovate, ranging from straw color to pale chestnut-brown, unicolor or interruptedly spirally banded. Nuclear whorls

decolated in all our specimens. Postnuclear whorls strongly rounded, marked by retractively curved, slender, rather distantly spaced axial riblets, which become expanded at the summit into narrow clawlike elements; in the dark colored specimens the axial riblets are strongly differentiated from the basic color by their white coloration. Suture strongly constricted. Periphery well rounded. Base moderately long, marked by the continuation of the axial riblets and by very strong spiral cords outside of the plugged umbilicus, which render the axial riblets here elongatedly nodulose. Aperture subcircular; peristome double, the inner well exerted and slightly reflected; the outer narrow on the anterior half of the outer lip and base, broadly expanded on the inner lip and parietal wall, forming a conspicuous auricle at the posterior angle. The inner lip of the outer peristome is inbent in the middle so as to completely cover the umbilicus. The outer peristome is marked by strong, concentric lamellae. Operculum typically annularid. The siphon is behind the peristome at the posterior angle of the aperture; it is bent into the suture and apparently communicates with the hollow axis, and through this with the truncated tip.

The specimen described and figured, U.S.N.M. No. 425683, is a cotype collected by Doctors Pilsbry and Welch on the hill east of the Chambas River near Florencia, Camagüey Province. It has 4.4 whorls remaining, and measures: Length, 15.4 mm.; greater diameter, 8.9 mm.; lesser diameter, 6.9 mm.

Subgenus ANNULAROPS Henderson and Bartsch

1920. *Annularops* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 74.

Shell ranging in form from elongate-ovate to elongate-conic. Axial riblets sublamellar, rendered articulate by the spiral sculpture. Parietal wall perforated by a breathing pore near the posterior angle. Operculum typically annularid.

Type: *Annularia* (*Annularops*) *blaini* ([Gundlach] Pfeiffer).

KEY TO THE SPECIES OF THE SUBGENUS ANNULAROPS

Last whorl solute.

Shell broadly ovate..... *sauvallei*

Shell elongate-ovate..... *vannostrandii*

Last whorl not solute.

Outer peristome of inner lip notched, umbilicus closed.

Shell broadly ovate..... *semicana*

Shell elongate-ovate.

Shell pale..... *coronadoi*

Shell reddish..... *attenuata*

Outer peristome of inner lip not notched, umbilicus open.

Outer peristome of inner lip plicate.....	plicata
Outer peristome of inner lip not plicate.	
Outer peristome of inner lip slightly infolded.	
Shell broadly ovate.....	blaini
Shell elongate-ovate.....	tryoni
Outer peristome of inner lip not infolded.....	perplexa

ANNULARIA (ANNULAROPS) SAUVALLEI ([Gundlach] Pfeiffer)

Shell broadly ovate, flesh colored to pale orange. Nuclear whorls almost 2, smooth. Postnuclear whorls inflated, strongly rounded, marked by slender, sublamellar axial ribs, which are rendered wavy by the spiral threads, and which are rather closely spaced and are considerably more pronounced at the summit than on the rest of the turn. The spiral sculpture consists of low, rounded threads, which vary considerably in strength in the different races. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs and by spiral threads, which are considerably stronger here than are those on the spire. Base umbilicated; umbilicus partly covered by the reflected outer peristome of the inner and parietal lip. Last whorl decidedly solute. Aperture circular; peristome double, the inner moderately exerted and slightly reflected; the outer moderately broadly expanded, considerably wider on the posterior half of the inner lip than the rest. Operculum typically annularid.

This species is confined to Pinar del Rio Province, and it breaks up there into several races, which are defined in the following key and descriptions:

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULAROPS) SAUVALLEI

Shell white.

Axial ribs rather strong and coarse.....	cortinai
Axial ribs not strong or coarse.	
Axial ribs slender and fine.....	sauvallei
Axial ribs exceedingly fine and slender.....	chorrerensis
Shell pale orange.....	natensoni

ANNULARIA (ANNULAROPS) SAUVALLEI CORTINAI, new subspecies

PLATE 30, FIGURE 6

This race comes from the south and the west sides of the Sierra de Güira. We have also seen it from the Abra de Caiguanabo. It is more slender than the others.

The type, U.S.N.M. No. 493450, has 82 ribs on the first whorl and 175 on the last turn. These riblets are stronger than in the other three white races, and they are also rendered somewhat sinuous by the spiral threads. The type has 3.9 whorls remaining and measures: Length, 10.6 mm.; greater diameter, 6.7 mm.; lesser diameter, 5.5 mm.

## ANNULARIA (ANNULAROPS) SAUVALLEI SAUVALLEI ([Gundlach] Pfeiffer)

## PLATE 30, FIGURE 7

1863. *Choanopoma sauvallei* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 10, p. 192.
1920. *Annularia (Annularops) sauvallei* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 74.

This subspecies comes from the shore line of the Rio San Diego, from which we have specimens from the Portales de Galalon to Catalina.

The specimen figured, U.S.N.M. No. 11016, a topotype, has 3.5 whorls remaining and measures: Length, 11.2 mm.; greater diameter, 7.9 mm.; lesser diameter, 6.2 mm. It was collected by Wright at the foot of the Sierra La Güira; it has 102 riblets on the first turn, 170 on the second, and 238 on the last. These riblets, which are much stronger than those of *A. (A.) sauvallei chorrerensis*, are also rendered slightly sinuous by the spiral sculpture.

Gundlach states of the animal: "Gathered at the foot of the Sierra de Güira on large rocks in the forest. Animal bright gray with faint olive sheen. White dots are present on the rugosities of the foot and between the antennae and a black one upon the forehead. Tentacles coral red with blackish tip. The mass of the body where it emerges from the shell is of a dark olive coloration."

## ANNULARIA (ANNULAROPS) SAUVALLEI CHORRERENSIS, new subspecies

## PLATE 30, FIGURE 1

This subspecies was collected by Arango in the Sierra de la Chorrera. It differs from the other white members in having the axial ribs exceedingly fine, slender, and closely spaced. The spiral sculpture is quite obsolete, and it renders the axial riblets slightly wavy.

The type, U.S.N.M. No. 356158, has 108 riblets on the first of the remaining turns, 116 on the second, and 184 on the last. It has almost 4 whorls remaining and measures: Length, 9.7 mm.; greater diameter, 6.8 mm.; lesser diameter, 5.6 mm.

## ANNULARIA (ANNULAROPS) SAUVALLEI NATENSONI, new subspecies

## PLATE 30, FIGURE 3

This race was collected by Natenson at La Cantera, Consolación del Sur. It is easily distinguished from the others by the fact that the entire shell, as well as the peristome, is pale orange. The axial ribs and the spiral sculpture are stouter, also.

The type, U.S.N.M. No. 493454, has 4.2 whorls remaining and measures: Length, 13.2 mm.; greater diameter, 7.8 mm.; lesser diameter, 6.2 mm.

## ANNULARIA (ANNULAROPS) VANNOSTRANDI (Arango)

## PLATE 30, FIGURE 5

1876. *Cyclostoma* (*Ctenopoma?*) *vannostrandii* ARANGO, An. Acad. Cienc. Med., Fis. Nat. Habana, vol. 12, p. 280.

Shell very elongate-ovate, almost turreted, white. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, and marked by very slender sublamellar axial riblets, of which 95 occur on the first and 181 are on the last turn. These riblets are only half the width of the spaces that separate them, and they are rendered wavy by the almost obsolete spiral threads. Suture very strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, and marked by the continuation of the axial ribs and by the same feeble spiral sculpture. Within the umbilicus the axial riblets become stronger and the spiral threads are more pronounced. Aperture circular; peristome double, the inner slightly exerted; the outer broadly expanded, forming a slightly reflected auricle at the posterior angle, free on the parietal wall from the preceding turn. Operculum typically annularid.

The specimen figured, U.S.N.M. No. 493456, is Arango's type. It has 4 whorls remaining and measures: Length, 9.8 mm.; greater diameter, 6.0 mm.; lesser diameter, 5.1 mm.

Arango stated that his unique specimen was collected on Wright's last excursion in the island of Cuba. He did not have a definite locality for it.

The collection of the United States National Museum contains four lots of specimens resembling the type, which come from mogotes near the Sierra de San Andres, namely, La Esperanza, La Cidra, and Bella Maria.

The solute last whorl is a character that is shared by *A. (A.) sawallei*, which is distinguished by its broadly ovate shell.

## ANNULARIA (ANNULAROPS) SEMICANA (Morelet)

Shell rather large, broadly ovate, varying in color from flesh color to reddish. Nuclear whorls 2, well rounded, smooth, forming a rather pointed apex. Postnuclear whorls inflated, strongly rounded, marked by retractively slanting, sublamellar axial riblets, which are developed into auriclelike elements at the summit, where they are conspicuously retractively bent over at their free edge. The spiral threads are rather strong; their junctions with the axial ribs render these slightly wavy and feebly nodulose. Suture strongly constricted. Periphery inflated, strongly rounded. Base moderately long, inflated, strongly rounded, marked by the continuation of the axial ribs and by spiral threads, which are considerably stronger than those on the spire. The junctions of the spiral threads with the axial ribs render

them nodulose. Aperture circular; peristome double, the inner slightly exerted; the outer very broadly expanded on the inner lip and the parietal wall, less so on the outer and basal lip, deeply notched on the middle of the inner lip, and reflected posterior to this over the umbilicus as a strong callus. Operculum typically annularid.

This species ranges through the Organ Mountains and adjacent mogotes from Sumidero and Pan de Azucar east to the Sierra de Galalon.

The following key and brief diagnoses will help to differentiate the three subspecies here recognized:

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULAROPS) SEMICANA

Shell large, height more than 12 mm.

Shell flesh colored..... *semicana*

Shell reddish..... *organicola*

Shell small, height less than 11 mm..... *nana*

ANNULARIA (ANNULAROPS) SEMICANA SEMICANA (Morelet)

PLATE 30, FIGURE 10; PLATE 31

1851. *Cyclostoma semicanum* MORELET, Testacea novissima insulae Cubana et Americae Centralis, pt. 2, p. 20.

Morelet cites the southern part of the Isle of Pines as type locality for this species. All the intensive subsequent collecting in this island by de la Torre and Bartsch and others has failed to produce anything corresponding to Morelet's fine description. Dr. de la Torre examined Morelet's 3 cotypes in the British Museum, and he and Bartsch agree that the name should be applied to the present race. Thanks to the kind helpfulness of the authorities of the British Museum, it is possible to reproduce photographs of Morelet's specimens and thereby to dispel any doubt that might be entertained about the authors' contentions that *semicanum* belongs to the Organ Mountain fauna and not to that of the Isle of Pines. We are restricting the name *A. (A.) semicana semicana* to the race occupying the southern border of the Sierra Galalon.

It differs from the neighbor to the west, *A. (A.) semicana organicola* in being shorter, which gives it a more rotund appearance, and in being flesh colored instead of reddish.

The specimens figured on plate 31 are photographs of Morelet's cotypes in the British Museum, while figure 10, plate 30, shows one of a series collected by Natenson north of Ceja de Galalon, U.S.N.M. No. 493460. This specimen has 3.4 whorls remaining and measures: Length, 15.0 mm.; greater diameter, 11.8 mm.; lesser diameter, 9.2 mm. A smaller specimen from the same locality having 3.3 whorls measures: Length, 12.6 mm.; greater diameter, 9.9 mm.; lesser diameter, 7.9 mm.

## ANNULARIA (ANNULAROPS) SEMICANA ORGANICOLA, new subspecies

## PLATE 30, FIGURE 9

This subspecies appears to extend through the western Organ Mountains. We have seen it from Pan de Azucar; the old Isabel Maria (of Wright); Santo Tomás; the mogotes Dos Hermanos and those adjacent to these; Cuajani in the eastern end of the Sierra del Infierno; El Queque; Sierra de Viñales; Costanera del Abra; Hato Morales.

The shells of this subspecies are more elongated than those of *A. (A.) semicana semicana* and a reddish coloration prevails.

The type, U.S.N.M. No. 356258, comes from Mogotes Dos Hermanos near Viñales. It has 4 whorls remaining which measure: Length, 14.8 mm.; greater diameter, 11.6 mm.; lesser diameter, 8.6 mm.

## ANNULARIA (ANNULAROPS) SEMICANA NANA, new subspecies

## PLATE 30, FIGURE 2

This subspecies extends over the mogotes bordering the Pinar del Rio-Luis Lazo road between Sumidero, Cabezas, and Isabel Maria, thence through some of the mogotes bordering the east side of the Organ Mountains and possibly a few spots in the Sierra del Infierno, and mogotes bordering the road between Viñales and the Puerta del Ancón, thence some mogotes in Laguna de Piedras to Hoyo Largo de San Antonio off the Sierra de San Andrés. It appears to be a mogote form, not an occupant of the main sierras.

The small size readily distinguishes it from the other races.

The type, U.S.N.M. No. 385056, was collected by Bartsch near the stone quarry, on the first mogote on the north side of the road east of Cabezas. It has 3.4 whorls remaining and measures: Length, 10.4 mm.; greater diameter, 7.0 mm.; lesser diameter, 5.8 mm.

## ANNULARIA (ANNULAROPS) CORONADOI (Arango) Pocy

Shell small, elongate-ovate, flesh colored or yellowish white. Nuclear whorls almost 2, well rounded, smooth. Postnuclear whorls inflated, strongly rounded, marked by crowded sublamellar axial ribs, which are rendered wavy by the low, rounded spiral threads. Suture strongly constricted. Periphery inflated, well rounded. Base inflated, well rounded, marked by the continuation of the axial ribs and by spiral threads, the latter a little stronger than those on the spire. Aperture circular; peristome double, the inner moderately exerted; the outer rather broadly expanded, notched on the middle of the inner lip with the part posterior to the notch reflected over the umbilicus, which it plugs, extending as a broad callus upon the parietal wall of the outer peristome; the rest is of about the same width and is

slightly fluted and marked by concentric lines of growth. Operculum typically annularid.

This species ranges over the central portion of Pinar del Rio, breaking up into several subspecies.

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULAROPS) CORONADOI

Shell small, height less than 7 mm.....	coronadoi
Shell larger, height more than 10 mm.	
Axial riblets projecting strongly above the suture.....	acervata
Axial riblets not projecting strongly above the suture.....	spurca

ANNULARIA (ANNULAROPS) CORONADOI CORONADOI ([Arango] Poey)

PLATE 32, FIGURE 4

1867. *Cyclostoma coronadoi* [Arango] POEY, Repert fisico natural Isla de Cubana, vol. 2, p. 174.

Poey credits the manuscript for his description to Arango and states that Arango collected it at "Jaruco." This is undoubtedly Hoyo de Jaruco, a famous sink in the Sierra de la Chorrera. The race ranges from the Costanera de San Vicente and El Queque through the mogotes of Laguna de Piedras.

It is easily distinguished from the other two subspecies by its much smaller size.

The specimen figured, U.S.N.M. No. 356171, was collected by Wright at Viñales. It has a little more than 3 whorls remaining and measures: Length, 6.8 mm.; greater diameter, 5.1 mm.; lesser diameter, 3.8 mm.

ANNULARIA (ANNULAROPS) CORONADOI ACERVATA (Arango)

PLATE 32, FIGURE 3

1881. *Choanopoma acervatum* ARANGO, Proc. Acad. Nat. Sci. Philadelphia, p. 15.

This subspecies was described by Arango as coming from "Las Lagunitas," Pinar del Rio. It ranges from there north through Cayos de San Felipe and the mogotes at Kilometer 14, between Pinar del Rio and Viñales.

It almost reaches the size of *A. (A.) coronadoi spurca*, but differs from that in having the lamellose axial ribs developed into much more prominent projections, which here extend up on the preceding whorl.

The specimen figured, U.S.N.M. No. 483464, is a cotype from Arango. It has almost 4 whorls remaining and measures: Length, 9.8 mm.; greater diameter, 6.3 mm.; lesser diameter, 5.2 mm.

ANNULARIA (ANNULAROPS) CORONADOI SPURCA (Aguayo)

PLATE 32, FIGURE 1

1856. *Cyclostoma sordidum* (Gundlach) PFEIFFER, Malakozool. Blätter, vol. 3, p. 39. Not *Cyclostoma (Cyclotus) sordidum* Pfeiffer, Proc. Zool. Soc. London, 1855, p. 103.

1920. *Annularia (Annularops) sordidum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 74.
1934. *Annularia spurca* AGUAYO, Mem. Soc. Cubana Hist. Nat. Felipe Poey, vol. 8, p. 89.

*Cyclostoma sordidum* (Gundlach) Pfeiffer was, unfortunately, preoccupied by Pfeiffer's earlier name, as set forth in the above synonymy. This was discovered by Aguayo, who substituted *Annularia spurca* for it. Gundlach says that his species comes from the mountains near San Diego de los Baños. We have it from the mogotes on both sides of the river north to La Catalina.

The shells of this subspecies are a little larger than those of *A. (A.) coronadoi acervata* and they have the axial ribs less strongly developed and less projecting above the suture at the summit. The specimen figured, U.S.N.M. No. 493465, is from the mogote at Cuatro Caminos. It has 3.9 whorls remaining and measures: Length, 11.0 mm.; greater diameter, 6.3 mm.; lesser diameter, 5.4 mm.

ANNULARIA (ANNULAROPS) ATTENUATA, new species

Shell very elongate-ovate, ranging from pinkish to rose-colored, the early whorls being always more intensely colored than the rest; the interior of the aperture and peristome varies from flesh color to pale red in the different subspecies. Nuclear whorls 2, small, well rounded, microscopically granulose. Postnuclear whorls well rounded, marked by sublamellar, retractively slanting, wavy axial riblets, which vary much in strength and spacing in the different races. The axial riblets are slightly exserted at the summit, where they project in varying degrees. The spiral sculpture, while pronounced, also varies much in strength in the different subspecies. The junctions of the spiral threads with the axial riblets render these slightly wavy and feebly nodulose. Suture strongly constricted. Periphery inflated, strongly rounded. Base moderately long, inflated, strongly rounded, marked by the continuation of the axial ribs and by the spiral threads, which are much stronger than those on the spire, and which render the riblets nodulose. Aperture circular; peristome double, the inner slightly exserted; the outer broadly expanded, decidedly more so, however, on the inner and parietal wall than on the rest, marked by a series of concentric lamina, and deeply notched on the middle of the inner lip. Posterior to the notch the peristome is reflected over the umbilicus, which it covers with a broad callus. Operculum typically annularid.

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULAROPS) ATTENUATA

Interior of aperture and peristome reddish.....	<i>minaensis</i>
Interior of aperture and peristome white.	
Axial ribs coarse.....	<i>morsei</i>
Axial ribs fine.....	<i>attenuata</i>

## ANNULARIA (ANNULAROPS) ATTENUATA MINAENSIS, new subspecies

## PLATE 32, FIGURE 10

This subspecies appears restricted to Mogote La Mina, sometimes called Encinar Alto, northeast of Baños de San Vicente.

It is easily distinguished from the other two subspecies by the reddish peristome and interior of aperture.

The type, U.S.N.M. No. 356260, has 3.8 whorls remaining and measures: Length, 15.8 mm.; greater diameter, 10.0 mm.; lesser diameter, 8.2 mm.

## ANNULARIA (ANNULAROPS) ATTENUATA MORSEI, new subspecies

## PLATE 32, FIGURE 6

This subspecies was collected on Pan de Azucar during the *Tomas Barrera* Expedition. It is named for C. K. Morse, the engineer in charge of the Matahambre Mine, who was very helpful on that expedition.

In this, the westernmost known race, the axial ribs are strong and more distantly spaced than in the other races. The junctions of the axial ribs and spiral threads form somewhat pointed tubercles, which are retractively bent so that they almost overlap like tiles.

The type, U.S.N.M. No. 356239, has 4 whorls remaining and measures: Length, 13.7 mm.; greater diameter, 8.3 mm.; lesser diameter, 7.0 mm.

## ANNULARIA (ANNULAROPS) ATTENUATA ATTENUATA, new subspecies

## PLATE 32, FIGURE 5

This subspecies is known from the eastern end of the Sierra de San Andrés; Pico Grande, El Zumbido; Sitio de la Sierra and Mogotes de Talavera and Vegas Nuevas, near La Palma.

In coloration it resembles *A. (A.) attenuata morsei*, from which its very fine and closely spaced axial ribs will at once distinguish it.

The type, U.S.N.M. No. 493466, comes from Pico Grande; it is a complete specimen having 6.4 whorls and measuring: Length, 14.9 mm.; greater diameter, 8.4 mm.; lesser diameter, 6.7 mm.

## ANNULARIA (ANNULAROPS) PLICATA, new species

## PLATE 30, FIGURE 8

Shell elongate-ovate, flesh colored, with a pinkish tinge on the last whorl, turning consecutively deeper pink toward the first of the post-nuclear whorls. Nuclear whorls flesh colored; peristome flesh colored. Nuclear whorls 2, well rounded, microscopically granulose, forming a conspicuous apex. Postnuclear whorls inflated, strongly rounded, marked by almost vertical, strong, closely spaced axial riblets, of

which 72 occur on the first, 128 on the second, 180 on the third, and 248 on the last. The spiral sculpture is also rather strong. On the first turn, however, it is obsolete; 4 spiral threads are present on the second, 10 on the third, and 11 on the last between summit and suture. The junction of the spiral threads and axial ribs renders the latter wavy and slightly nodulose. Suture strongly constricted. Periphery inflated, well rounded. Base short, inflated, well rounded, marked by the continuation of the axial ribs and by 8 spiral threads, which grow consecutively stronger from the periphery to the umbilicus; within the umbilicus 9 additional weak spiral threads are present. Aperture circular; peristome double, the inner slightly exerted; the outer broadly expanded, considerably more so on the inner and the parietal wall, strongly plicate on the middle of the inner lip, and reflected as a broad flap over the umbilicus, which it does not completely cover. Operculum typically annularid.

The type, U.S.N.M. No. 356263, comes from Mogote de la Jagua, Pinar del Rio. It has 6.2 whorls and measures: Length, 15.4 mm.; greater diameter, 10.7 mm.; lesser diameter, 8.3 mm.

The peculiar folding—plication—of the inner lip of the outer peristome readily distinguishes this from the other species.

ANNULARIA (ANNULAROPS) BLAINI ([Gundlach] Pfeiffer)

Shell broadly ovate, varying greatly in size in the two races. The color shades from flesh color through yellowish to pale reddish, usually darkest on the early turns. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, marked by closely spaced, somewhat wavy, sublamellar axial riblets, which vary considerably in strength in the two races; the axial riblets are more strongly developed at the summit, where they project as feeble auricles. The spiral sculpture is also variable in the two races; it is poorly expressed in *A. (A.) blaini cumbrensis*, while in *A. (A.) blaini blaini* it consists of low, rounded cords. Suture strongly constricted. Periphery inflated, well rounded. Base short, well rounded, marked by the continuation of the axial riblets and by spiral cords, the latter are also weaker in *A. (A.) blaini cumbrensis*. Aperture circular; peristome double, the inner slightly exerted; the outer broadly expanded on the inner lip and parietal wall, and less so on the outer and basal lip, somewhat infolded on the middle of the inner lip. Umbilicus partly hidden by the reflected peristome, but showing the spiral cords on the umbilical wall. Operculum typically annularid.

This species ranges through the mountains of La Güira and east to La Cumbre, near San Diego de los Banos, Pinar del Rio Province.

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULAROPS) BLAINI

Spiral sculpture pronounced.....	<b>blaini</b>
Spiral sculpture obsolete.....	<b>cumbrensis</b>

## ANNULARIA (ANNULAROPS) BLAINI BLAINI ([Gundlach] Pfeiffer)

## PLATE 32, FIGURE 8

1863. *Choanopoma blaini* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 10, pp. 191-192.

1920. *Annularia (Annularops) blaini* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 74.

This subspecies inhabits the Sierra de La Güira and the mogotes adjacent to it. At first sight this shell may be confused with its neighbor, *A. (A.) semicana semicana*, with which it agrees in size. The open umbilicus, owing to the absence of the cut in the middle of the outer peristome of the inner lip and to the absence of its reflection over the umbilicus, will easily differentiate it from that shell. The specimen figured is one of a series, U.S.N.M. No. 356265, and has 3.8 whorls remaining which measure: Length, 17.2 mm.; greater diameter, 12.2 mm.; lesser diameter, 9.7 mm. Its large size will easily distinguish it from *A. (A.) blaini cumbrensis*.

Gundlach states of this subspecies (Malakozool. Blätter, vol. 10, p. 192, 1863): "After showers this mollusk can be found upon large stones in the crevices of which it withdraws in unfavorable seasons. Animal dark gray with whitish dots which group themselves into spots upon the foot and head. Head rose red within. Forehead with a dark suffusion. Tentacles coral red with blackish tip."

## ANNULARIA (ANNULAROPS) BLAINI CUMBRENSIS, new subspecies

## PLATE 32, FIGURE 2

This race, which was collected by Henderson on La Cumbre, is much smaller than typical *A. (A.) blaini blaini*. It also has the axial riblets much finer and more closely spaced and the spiral threads obsolete.

The type, U.S.N.M. No. 356161, has 3.5 whorls remaining and measures: Length, 10.7 mm.; greater diameter, 7.1 mm.; lesser diameter, 5.9 mm.

## ANNULARIA (ANNULAROPS) TRYONI (Arango)

Shell elongate-ovate, pale yellow. Nuclear whorls 2, strongly rounded, smooth, microscopically granulose. Postnuclear whorls moderately inflated, strongly rounded, marked by rather strong, sublamellar, almost vertical axial riblets, of which 104 occur on the first, 140 on the second, and 164 on the last whorl in the type of *A. (A.) tryoni tryoni*, and 76 on the first, 104 on the second, and 184 on the last of the remaining whorls in *A. (A.) tryoni vinalensis*. The axial riblets are a little more strongly developed near the summit and the suture than on the middle of the turns. The spiral sculpture consists of poorly developed threads, of which 8 are present on the last whorl

between the summit and suture. Suture strongly constricted. Periphery strongly rounded. Base short, strongly rounded, marked by the continuation of the axial riblets and by 5 spiral threads in *A. (A.) tryoni tryoni* and 8 in *A. (A.) tryoni vinalensis*, which are a little stronger than those on the spire; within the umbilicus 4 additional spiral threads are apparent. Aperture circular; peristome double, the inner moderately exerted; the outer rather broadly, flaringly expanded, a little wider on the parietal wall than on the rest, slightly notched in the middle of the inner lip, but not reflected to cover the umbilicus posterior to the notch, and marked by concentric lines of growth. Umbilicus open. Operculum typically annularid.

## KEY TO THE SUBSPECIES OF ANNULARIA (ANNULAROPS) TRYONI

Spiral sculpture feeble.....	<b>tryoni</b>
Spiral sculpture not feeble.....	<b>vinalensis</b>

## ANNULARIA (ANNULAROPS) TRYONI TRYONI (Arango)

## PLATE 32, FIGURE 9

1879. *Ctenopoma tryoni* ARANGO, Contribucion a la fauna malacologica Cubana, p. 173.  
 1898. *Choanopoma tryoni* KOBELT and MÖLLENDORFF, Nachr. Deutsch. Malak. Ges., vol. 30, p. 183.  
 1920. *Annularia (Annularops) tryoni* HENDERSON and BARTSCH, Proc. U. S. Nat. Museum, vol. 58, p. 74.

The type of this species, U.S.N.M. No. 356163, which we have described and figured, was collected at Bebedero, Pinar del Rio. We have collected it abundantly on the Mogotes del Cerro de Cabras, at Kilometer 14, on the road between Pinar del Rio and Luis Lazo, which was the ancient watering place (called Bebedero).

It is distinguished from *A. (A.) tryoni vinalensis* by being a little more slender and by having the spiral sculpture only very feebly developed. The type has a little more than 3 whorls remaining and measures: Length, 7.5 mm.; greater diameter, 5.8 mm.; lesser diameter, 4.3 mm.

## ANNULARIA (ANNULAROPS) TRYONI VINALENSIS, new subspecies

## PLATE 32, FIGURE 7

We have seen this race from the Sierra de Viñales, mogotes de la Chorrera, and the type locality El Cuajani, the east end of the Sierra del Infierno.

It differs from typical *A. (A.) tryoni tryoni* in being a little less elongate-ovate, in having the spiral threads more strongly developed, and in rib count.

The type, U.S.N.M. No. 356160, has 3 whorls remaining and measures: Length, 8.0 mm.; greater diameter, 6.0 mm.; lesser diameter, 4.7 mm.

## ANNULARIA (ANNULAROPS) PERPLEXA, new species

## PLATE 30, FIGURE 4

Shell small, broadly ovate, straw colored. Nuclear whorls decollated in all our specimens. Postnuclear whorls very strongly inflated and rounded, marked by retractively curved, sublamellar axial ribs, which are stronger near the summit, where there is a slight inclination toward the formation of tufts by the projection of some of these riblets a little above an interval of shorter ones. Of these axial ribs, 65 occur on the first, and 159 on the last of the remaining turns. These riblets are a little narrower than the spaces that separate them. The spiral sculpture consists of rather broad, low, feebly developed cords, of which 6 are present between the summit and the suture on the last turn. The junction of the axial ribs and spiral cords produces thickenings and slight projections which are directed backward. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, and marked by the continuation of the axial ribs, which pass into the open umbilicus, and by 5 spiral cords of the same strength as those on the spire and which produce the same effect in their junction with the axial riblets. On the umbilical wall there are at least 6 additional spiral threads of about the same strength. Aperture circular; peristome double, the inner slightly exerted; the outer broadly expanded, tending toward the formation of a slight auricle at the posterior angle and a little wider on the posterior half of the inner lip, where it is almost flat without plication or infolding. Operculum typically annularid.

The type, U.S.N.M. No. 535682, comes from the Sierra del Abra. It has 3.2 whorls remaining and measures: Length, 8.0 mm.; greater diameter, 5.6 mm.; lesser diameter, 4.7 mm.

This species is distinguished from the other *Annularops* by the flat inner lip of the outer peristome.

## ANNULARODELLA, new subgenus

Shell elongate-ovate, openly umbilicated, marked by regular, non-articulate axial ribs on the spire, to which are added spiral threads on the umbilical wall. There is a puncture at the posterior angle of the aperture, which communicates directly with the exterior without a siphon.

Type: *Annularia (Annularodella) morenoi*, new species.

This group resembles the subgenus *Annularodes*, but lacks the siphon of that subgenus.

## ANNULARIA (ANNULARODELLA) MORENOI, new species

## PLATE 33, FIGURE 7

Shell very broadly ovate, almost turbate, of pale straw color, the ground color marked by interrupted spiral bands of brown. Peristome pale yellow, the outer rayed. The early nuclear whorls have the suture chestnut brown and a diffusion of this color extends to adjacent parts. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming a somewhat blunt apex. Postnuclear whorls strongly inflated and strongly rounded, and marked by sublamellar, retractively curved, rather distantly spaced axial ribs, of which 24 occur on the first of the remaining turns, which is probably the first postnuclear turn, and 90 on the last whorl. These riblets become slightly expanded at the summit, where they form feeble denticles. Sometimes a second row of small nodules appears immediately below the summit. Suture strongly constricted. Periphery very strongly inflated, well rounded. Base short, inflated, strongly rounded, and widely openly umbilicated, marked by the continuation of the axial ribs and by about 16 spiral threads on the umbilical wall, which render the axial riblets slightly nodulose at their junction. Aperture subcircular; peristome double, the inner moderately exerted and strongly reflected, fusing on the outer lip with the outer; the outer peristome strongly expanded on the inner and parietal wall, adnate to the preceding turn at the parietal wall, a little less so on the basal wall and even less on the outer lip, marked by concentric laminae, and forming a moderately strong auricle at the posterior angle. There is a breathing puncture at the posterior angle of the aperture. Operculum typically annularid.

The type, U.S.N.M. No. 535633, comes from Ayongo, Las Jumaguas, Sagua, Santa Clara Province. It has 4.1 whorls remaining and measures: Length, 10.5 mm.; greater diameter, 7.9 mm.; lesser diameter, 5.8 mm.

## Subgenus EUTUDORA Henderson and Bartsch

1920. *Eutudora* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 78.

Shell varying from broadly ovate to turbate in form. Spiral sculpture much stronger than the axial. A breathing pore is present in the parietal wall a little distance from the posterior angle of the aperture.

Operculum with the lamella reflected to parallel the chondroid basal plate, but not reaching to the outer edge of the whorls, thus leaving a narrow channel of the basal chondroid plate visible at the outer edge of the whorls.

Type: *Annularia (Eutudora) limbifera* ([Menke] Pfeiffer).

## KEY TO THE SPECIES OF THE SUBGENUS EUTUDORA

Shell broadly turbinate.....	<b>cabreraei</b>
Shell turbinate.	
Surface of the shell wax glossy.....	<b>limbifera</b>
Surface of the shell not wax glossy.	
Peristome moderately expanded.....	<b>transitoria</b>
Peristome broadly expanded.....	<b>latistoma</b>

## ANNULARIA (EUTUDORA) CABRERAI, new species

## PLATE 33, FIGURE 1

Shell very broadly turbinate, almost helicoid, very widely openly umbilicated, flesh colored, with interrupted spiral bands of brown. The dots composing these bands are also arranged in axial series. Peristome white. Nuclear whorls 2, strongly rounded, microscopically granulose. The postnuclear whorls are marked by very strong spiral cords, of which 6 are present on the first and second whorls. On the last whorl there is an intercalated cord a little weaker than the heavier ones between each of the stronger, thus totaling 12 between the summit and the periphery. These cords are much narrower than the spaces that separate them. The axial sculpture consists of rather distantly spaced, feeble, threadlike riblets. Base short, strongly rounded, broadly openly umbilicated, marked by 7 spiral cords, which are of the same strength and spacing as those on the spire. The umbilical wall bears 13 additional spiral cords, which are rendered crenulated by the well marked, slender axial riblets. The last whorl is solute for about one-tenth of a turn. Aperture broadly oval; peristome double, the inner expanded and reflected and appressed to the outer; the outer is rather broadly expanded, a little wider on the anterior half of the columella, expanded into an auricle at the summit, and slightly fluted. A breathing pore is usually present on the parietal wall a little anterior to the posterior angle; sometimes this is absent. Operculum typically eutudorid.

The type, U.S.N.M. No. 356378, comes from Portugalete, near Cuatro Caminos, Habana Province. It has 5.5 whorls and measures: Length, 12.5 mm.; greater diameter, 12.5 mm.; lesser diameter, 9.0 mm.

## ANNULARIA (EUTUDORA) LIMBIFERA ([Menke] Pfeiffer)

Shell almost trochid in shape, of flesh-colored, yellow, or pale brown ground color, marked by interrupted spiral series of brown spots; the peristome varies in color from white to soiled yellow; the interior of the aperture varies from flesh color to pale orange, usually showing the external color markings within. The entire surface has a dull waxy luster. Nuclear whorls 2, well rounded, microscopically granulose, except for the last portion of the last whorl, which shows the beginning of the postnuclear sculpture. Postnuclear whorls strongly

inflated and strongly rounded. marked by poorly expressed incremental lines and spiral threads, which amount almost to narrow keels; the first and second spiral threads at the summit are slightly crenulated. Suture strongly constricted. Periphery well rounded. Base short, well rounded, openly umbilicated, marked by lines of growth and by spiral threads equaling those on the spire in strength. On the umbilical wall the axial lines of growth become somewhat intensified and the spiral threads become somewhat reduced. Aperture broadly oval; peristome double, the outer broadly, flaringly expanded and reflected; the inner narrow, exerted, and slightly reflected. A breathing pore is present on the parietal wall a little anterior to the posterior angle and within the edge of the aperture. Operculum typically eutudorid.

This species is confined to Matanzas Province, where it breaks up into two subspecies:

## KEY TO THE SUBSPECIES OF ANNULARIA (EUTUDORA) LIMBIFERA

Umbilicus narrow.....	ternata
Umbilicus broad.....	limbifera

## ANNULARIA (EUTUDORA) LIMBIFERA TERNATA (Reeve)

## PLATE 33, FIGURE 5

1844. *Cyclostoma interruptum* GOULD, Proc. Boston Soc. Nat. Hist., vol. 4, p. 494.  
 Not *C. interruptum* Lamarck, 1822, Histoire naturelle des animaux sans vertèbres, vol. 6, pt. 2, p. 145.
1863. *Chondropoma ternatum* REEVE, Conchologia iconica, No. 65.

Reeve figured a specimen which he had received from Gould; Gould, in turn, received his material from Bartlett; and Bartlett collected near Matanzas. Reeve's figure shows the large race which we have in abundance from the region about the cave of Bellamar. We are therefore applying Reeve's name to the large race.

The specimen figured, U.S.N.M. No. 356399, comes from Bellamar and has 5.3 whorls and measures: Length, 16.2 mm.; greater diameter, 12.6 mm.; lesser diameter, 10.2 mm.

Under the name of *Cyclostoma interruptum* Sowerby, Gould says of the animal (Proc. Boston Soc. Nat. Hist., vol. 4, p. 494, 1844): "Animal light pea green, neck reddish, tentacles bright ferruginous, nearly carmine. When in rapid motion 'instead of proceeding directly ahead with the shell steady, it rests the shell on the ground until the body is extended as far as the shell will permit without dragging, and then by a sudden jerk, throws the shell forward, and so on alternately, much more rapidly than one would suppose possible. First one side of the animal moves, then the other, like an elephant.' "

## ANNULARIA (EUTUDORA) LIMBIFERA LIMBIFERA ([Menke] Pfeiffer)

## PLATE 33, FIGURE 6

1846. *Cyclostoma limbiferum* [Menke] PFEIFFER, Zeitschr. Malak., vol. 3, p. 45.  
 1847. *Chondropoma limbiferum* PFEIFFER, Zeitschr. Malak., vol. 4, p. 109.  
 1852. *Cistula limbifera* PFEIFFER, Conspectus cyclostomaceorum, p. 41.  
 1858. *Cistula catenata* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 1, p. 130, in part.  
 1920. *Eutudora (Eutudora) limbifera* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 78.

Pfeiffer, in describing this species, cites as locality the Island of Cuba. He says the shells were communicated to him by Menke, and he gives as measurements: Length, 11 mm.; diameter, 7.5 mm. This marks as the typical race the smaller of the two subspecies. The name has usually been attached to the larger form.

This race ranges from La Cidra eastward to the upper reaches of the Canimar River past Limonar to the neighborhood of Matanzas. Its smaller size, little broader outline, and little wider umbilicus will differentiate it from *A. (E.) limbifera ternata* Reeve.

The specimen figured, U.S.N.M. No. 356576, comes from Limonar. It has 5.2 whorls and measures: Length, 12.0 mm.; greater diameter, 9.5 mm.; lesser diameter, 7.1 mm.

The animals of this subspecies, collected by Bartsch July 24, 1928, on the paredones of the Rio Canimar below the central highway, were described as follows: Animal short, smoke colored above; sides of the body somewhat paler toward the edge of the foot; sole of the foot the same color as this edge. Tentacles and eye ring flesh-colored, the rest pale orange with buff suffusion, dark red at the tip. The animal when in motion moves the shell along with a sidewise jerk, which gives it the appearance of progressing by a series of jumps. This species appears to range eastward through Cardenas to Sagua La Grande, Santa Clara Province.

## ANNULARIA (EUTUDORA) TRANSITORIA, new species

Shell trochoid, flesh colored, with interrupted spiral bands of brown, which are rather closely spaced; these are present on spire and base. The elements composing these bands are arranged in both axial and spiral series. The peristome is white; the interior of the aperture is almost white. Nuclear whorls 2, well rounded, microscopically granulose, except the last portion of the last whorl, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by very strong lamellar spiral cords; the first of these is rendered slightly crenulated by indications of axial riblets near the summit. Suture strongly channeled. Pe-

riphery inflated, strongly rounded. Base inflated, strongly rounded, openly umbilicated, marked by spiral cords, which are as strong as those on the spire; the umbilical wall and the anterior portion of the base are marked by slender, closely spaced, axial riblets; the umbilical wall, in addition to this, bears slender spiral threads, which render these riblets slightly nodulose. Aperture broadly oval; peristome double, the outer moderately broadly expanded, the inner inconspicuously reflected over and appressed to the outer, separated at the posterior angle. The breathing pore on the parietal wall is a little anterior to the posterior angle and within the edge of the aperture. Operculum typically eutudorid.

We are recognizing two subspecies, which the following key and descriptions will help to differentiate:

KEY TO THE SUBSPECIES OF ANNULARIA (EUTUDORA) TRANSITORIA

Shell of trochid outline.....	transitoria
Shell of very broadly trochid outline.....	distincta

ANNULARIA (EUTUDORA) TRANSITORIA TRANSITORIA, new subspecies

PLATE 33, FIGURE 4

1878. *Cistula limbifera* ARANGO, Contribucion a la fauna malacologica Cubana, pp. 22-23, in part.

This subspecies has the shell much more narrowly turbinate than *A. (E.) transitoria distincta*. In the type 6 of the strong spiral cords are present between the summit and suture on the first postnuclear turn, 7 on the second, and 14 on the last. The umbilical wall bears 15 slender spiral threads.

The type, U.S.N.M. No. 386051, was collected by Bartsch on the Sierra del Grillo, Habana Province. It has 6.0 whorls and measures: Length, 13.3 mm.; greater diameter, 10.2 mm.; lesser diameter, 8.0 mm.

This subspecies ranges from Sabana de Robles east, through the Sierra del Grillo, Madruga to El Mogote, Ceiba Mocha, and to Cabezas; in other words, it occupies those interior hills on the east end of Habana Province, extending across the line into Matanzas Province.

The animals of this species were collected by Bartsch in a stone fence of the Finca El Ingles, near the Sierra del Grillo on July 15, 1928. He described them as follows: Flesh-colored with smoky suffusion, darker on the sides. Head gray, modified by an endless number of white dots. Snout a little paler than the dorsum. Tentacles sooty, tipped with pale orange. Foot deeply, medially cleft, smoky gray. Motion of the sides alternate. When in motion the animal moves the shell along sidewise with a jerk. The shell is thus carried forward in a series of jumps.

## ANNULARIA (EUTUDORA) TRANSITORIA DISTINCTA, new subspecies

## PLATE 33, FIGURE 2

This subspecies was collected by Dr. de la Torre at El Volcan on the road between Habana and Managua. It is readily distinguished from *A. (E.) transitoria transitoria* by its much more broadly trochid outline. It also has the inner lip of the outer peristome not so broadly expanded.

The type, U. S. N. M. No. 493469, has 5.3 whorls and measures: Length, 12.0 mm.; greater diameter, 10.4 mm.; lesser diameter, 7.3 mm.

## ANNULARIA (EUTUDORA) LATISTOMA, new species

## PLATE 33, FIGURE 3

Shell of turbinate outline, orange in ground color, marked by interrupted spiral bands of brown. Nuclear whorls 2, well rounded, microscopically granulose. Postnuclear whorls inflated, strongly rounded, marked by slender, lamellar spiral threads, of which the two near the summit are minutely denticulated. The spaces separating the spiral threads are wider than the threads. The axial sculpture consists of scarcely perceptible lines of growth and occasional resting stages, which appear as retractively slanting pale lines. Suture channeled. Periphery inflated, well rounded. Base short, inflated, strongly rounded, broadly, openly umbilicated, marked by the same sculpture as that characterizing the spire, except that the axial sculpture here becomes intensified and assumes the nature of fine, closely spaced threads, which are particularly conspicuous in the spaces between the spiral threads. The umbilical wall is likewise marked by spiral threads and by the continuation of the axial sculpture, which here renders the spiral sculpture minutely denticulated. Aperture broadly ovate; peristome double, the inner slightly exerted, reflected over and appressed to the outer; the outer expanded and slightly reflected. Breathing pore on the parietal wall a little anterior to the posterior angle of the aperture, and a little within the edge of the peristome. Operculum typically tudorid.

This species occupies the southern part of the island, on both sides of the boundary between Pinar del Rio and Habana Provinces. While it resembles *A. (E.) limbifera* in general shape, it can at once be distinguished from that by lacking the dull wax coloration and by having stronger spiral sculpture.

## FOSSULARIA, new subgenus

Shell elongate-ovate, marked by axial ribs, which are slightly, regularly wavy, suggesting spiral sculpture; base and umbilical wall

are marked by feeble spiral cords. Aperture very broadly ovate; peristome double, with a slight notch at the posterior angle. Operculum with reflected lamella, which does not reach to the outer margin of the chondroid basal whorls.

Type: *Annularia (Fossularia) boqueronensis*, new species.

KEY TO THE SPECIES OF THE SUBGENUS FOSSULARIA

Axial ribs fine and closely spaced----- *inquisita*  
 Axial ribs not fine or distantly spaced----- *boqueronensis*

ANNULARIA (FOSSULARIA) INQUISITA (Pilsbry)

PLATE 34, FIGURE 5

1929. *Choanopoma inquisita* PILSBRY, *Nautilus*, vol. 42, p. 80, pl. 5, fig. 2.

Shell elongate-conic, flesh colored, with interrupted spiral bands of brown, 4 of which are between the summit and suture, and 4 are on the base; peristome corresponding to the ground color. Nuclear whorls decollated in all our specimens. Postnuclear whorls inflated, strongly rounded, marked by retractively curved, well elevated axial riblets, which are a little narrower than the spaces that separate them. Of these, 178 are present on the last whorl. These riblets become a little paler and slightly intensified on the summit and therefore are more differentiated here than on the rest of the turn. Suture well constricted. Periphery inflated, strongly rounded. Base rather short, inflated, strongly rounded, marked by the continuation of the axial ribs, and near the umbilical wall marked by several obsolete threads. The umbilicus is moderately broad and its wall is marked by hairline continuations of the axial ribs and apparently by no spiral sculpture. The last whorl is solute for about one-tenth of a turn. Aperture broadly oval; peristome double, the inner slightly exerted, reflected and appressed to the outer, which is narrowly expanded, and which develops into a channel at the posterior angle. Operculum typically fossularid.

The specimen described and figured, U.S.N.M. No. 426045, a paratype received from Dr. H. A. Pilsbry, comes from Florencia, Camagüey Province. It has 4.3 whorls remaining and measures: Length, 14.7 mm.; greater diameter, 10.3 mm.; lesser diameter, 7.8 mm.

ANNULARIA (FOSSULARIA) BOQUERONENSIS, new species

PLATE 34, FIGURE 6

Shell elongate-conic, pale yellow, with the faintest indication of 6 interrupted spiral bands of brown between summit and suture; similar, much fainter bands are indicated on the base. Nuclear whorls

decolated in all our specimens. Postnuclear whorls rather high between summit and suture, marked by decidedly retractively slanting, slender, sublamellar axial riblets, of which 115 are present on the last turn. These riblets are only about one-fourth as wide as the spaces that separate them. They become slightly intensified and a trifle expanded at the summit. Suture well constricted. Periphery well rounded. Base moderately long, well rounded, openly umbilicated. The umbilical wall is marked by the continuation of the axial riblets and by weakly developed spiral threads, which extend up on the anterior half of the base. Last whorl solute for about one-eighth of a turn. Aperture broadly oval; peristome double, the inner decidedly exerted and slightly reflected, forming a slender notch at the posterior angle, where it is backward deflected, suggesting a siphon. The outer peristome is rather broadly expanded and reflected and it is likewise bent backward at the posterior angle. Operculum typically fossularid.

The type, U.S.N.M. No. 493488, comes from Boquerón del Jaticónico, Santa Clara Province. It has almost 5 whorls remaining and measures: Length, 18.7 mm.; greater diameter, 10.3 mm.; lesser diameter, 8.3 mm.

#### Subgenus EUTUDORISCA Henderson and Bartsch

1920. *Eutudorisca* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 78.

1920. *Eutudorella* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 78.

Shell almost turbinate in form, spiral cords much stronger than the axial sculpture, which is decidedly reduced, almost obsolete. A notch in the parietal callus near its junction with the outer lip leaves a breathing space here, when the animal is withdrawn. Operculum with the lamella reflected outward to parallel the chondroid basal plate, but falling short of reaching the outer edge of the whorls, thus leaving a zone of the chondroid plate showing in each turn.

Type: *Annularia* (*Eutudorisca*) *jimenoii* ([Arango] Pfeiffer).

We now believe that there is not sufficient distinction between *Eutudorisca* and *Eutudorella* for subgeneric designation, and we therefore merge the second name under the first.

#### KEY TO THE SPECIES OF THE SUBGENUS EUTUDORISCA

Peristome broadly expanded.....	<i>jimenoii</i>
Peristome not broadly expanded.	
Notch at the posterior angle of aperture scarcely perceptible..	<i>camoensis</i>
Notch at the posterior angle of aperture well developed.	
Shell broadly conic.....	<i>agassizi</i>
Shell broadly ovate.....	<i>catenata</i>

## ANNULARIA (EUTUDORISCA) JIMENOI ([Arango] Pfeiffer)

## PLATE 34, FIGURE 1

1864. *Cistula jimenoï* [Arango] PFEIFFER, Malakozool. Blätter, vol. 11, p. 160.

1867. *Cyclostoma jimenoï* ARANGO, Repert físico natural Isla de Cubana, p. 75.

1920. *Eutudora (Eutudorisca) jimenoï* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 78.

Shell broadly conic, almost turbate, flesh colored with interrupted spiral bands of brown. Nuclear whorls almost 2, well rounded, microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls strongly inflated, strongly rounded, marked by feeble incremental lines and by strong spiral threads, of which 8 occur on the first whorl, 9 on the second, 14 on the third, and 15 on the last between the summit and suture; the addition of the spiral threads always begins in an inconspicuous manner, and as the shell increases the threads increase in size. The spiral thread at the summit is feebly crenulated, and some of the others show mere indications of minute nodules. Suture strongly constricted. Periphery inflated, strongly rounded. Base inflated, strongly rounded, narrowly, openly umbilicated, marked by 11 spiral threads and by incremental lines; the latter render the summit of the spiral threads feebly nodulose. The umbilical wall is marked by the continuation of the axial riblets and by 18 spiral threads, the junction of the two rendering the spiral threads serrated. Aperture broadly oval; peristome simple, broadly expanded, notched on the parietal wall near the posterior angle to fit the preceding turn, to which it is adnate, and to leave a breathing space when the operculum is withdrawn. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 356369, is a cotype collected by Arango at the ancient Ingenio San Luis, Jaruco, Habana Province. It has 5.7 whorls and measures: Length, 16.9 mm.; greater diameter, 14.6 mm.; lesser diameter, 9.9 mm.

This species seems to range through the surrounding hills extending from a little west of Tapaste to Jaruco.

The animal of this species was collected by Bartsch on July 28, 1928. He describes it as follows: Animal short, upper surface darker than the rest, marked by numerous white dots. A ring about the base of the tentacles is almost white. There is a short pinkish streak immediately behind this; sides of body smoke gray with a bluish tinge, a little paler than the dorsum. Tentacles white at base, the rest orange tipped with brownish buff. Sole of the foot same color as the sides. The animal when at rest suspends itself by a mucous thread.

## ANNULARIA (EUTUDORISCA) CAMOENSIS, new species

## PLATE 34, FIGURE 2

Shell very broadly conic, pale orange, with a little paler tip and with interrupted spiral bands of brown; the peristome is pale yellow, while the interior of the aperture is orange. Nuclear whorls almost 2, well rounded, microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls strongly inflated, strongly rounded, marked by incremental lines and by 8 spiral threads on the first and second turns, 13 on the third, and 20 on the last. The first two spirals near the summit are rendered finely serrated by the axial threads. The spiral threads vary in strength, the intercalated ones being always weaker than the stronger ones, between which they occur. Suture strongly impressed. Periphery strongly rounded. Base rather short, inflated, strongly rounded, marked by 21 spiral threads of varying strength, those near the umbilicus being finely denticulated. The umbilical wall is marked by rather rough incremental lines, which assume almost the strength of axial riblets, and by 20 spiral threads. Last whorl solute for about one-fifth of a turn. Aperture broadly ovate; peristome simple, moderately broad, flaringly reflected, narrower on the posterior half than the anterior. Operculum typically annularid.

The type, U.S.N.M. No. 356370, was collected by Mr. Henderson at Loma de Camoa, Habana Province. It has 5.6 whorls and measures: Length, 15.2 mm.; greater diameter, 11.8 mm.; lesser diameter, 9.3 mm.

## ANNULARIA (EUTUDORISCA) AGASSIZI ([Charpentier] Pfeiffer)

## PLATE 34, FIGURE 4

1852. *Cistula agassizii* [Charpentier] PFEIFFER, Catalogue of Phaneropneumona . . . in the British Museum, p. 183.  
 1853. *Cyclostoma agassizii* PFEIFFER, Martini-Chemnitz Conchylien Cabinet, vol. 1, sect. 19, pp. 280-281, pl. 38, figs. 1, 2.  
 1863. *Chondropoma agassizi* REEVE, Conchologia iconica, No. 64.  
 1920. *Eutudora (Eutudorella) agassizii* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 78.

Shell almost turbinate, yellow, with the peristome and the interior a little paler, and with the spire and base marked by interrupted spiral bands of brown, which are narrow and distantly spaced. Nuclear whorls almost 2, well rounded, microscopically granulose, except the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by sublamellar spiral threads, of which 8 occur on the first and second turns, and 15 on the last between summit and suture. The spiral threads near the summit show indications of fine serrations due to their being crossed by lines of growth. Suture narrowly channeled,

strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, openly umbilicated, marked by 7 spiral threads, which equal those on the spire in strength. The anterior half of the base is marked by slender axial riblets, which extend into the umbilicus, and which at their crossing with the spiral threads render these slightly crenulose; within the umbilicus 12 spiral threads are present, which likewise render the axial riblets crenulated. Last whorl solute for about one-fifth of a turn. Aperture broadly ovate; peristome simple, moderately expanded, slightly scalloped on the inner lip and deeply, obliquely notched on the parietal wall near the posterior angle to form a breathing space. Operculum typically annularid.

The type, U.S.N.M. No. 356373, was collected by Mr. Henderson at Loma de Candela, Habana Province. It has 5.1 whorls and measures: Length, 10.2 mm.; greater diameter, 9.2 mm.; lesser diameter, 7.0 mm.

ANNULARIA (EUTUDORISCA) CATENATA (Gould)

Shell broadly ovate, flesh colored with a buffish tinge; the spiral keels are marked with interrupted spots of brown. The interior of the aperture is the same as the exterior. Nuclear whorls 2, well rounded, microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by sublamellar spiral cords, of which 7 occur on the first, 10 on the second, and 14 on the last. The axial sculpture consists of incremental lines, which render the first 2 or 3 spiral threads next the summit slightly nodulose. Suture strongly constricted. Periphery inflated, strongly rounded. Base short, inflated, strongly rounded, marked by 6 spiral threads, which are a trifle stronger than those on the spire; on the umbilical wall the axial sculpture assumes the strength of slender riblets, and the spiral threads are reduced in size and spacing, 19 of them being present in the typical race and 11 in *A. (E.) catenata blanesi*. The junction of the axial riblets with the spiral threads forms slender nodules. The last whorl is solute for one-fifth of a turn. Aperture broadly oval; peristome simple, only slightly expanded. Operculum typically annularid.

This species is rather widely distributed in Matanzas Province, ranging from Limonar to Coliseo to Cardenas.

We are recognizing two subspecies, which the following key will help to differentiate:

KEY TO THE SUBSPECIES OF ANNULARIA (EUTUDORISCA) CATENATA

Spiral threads on umbilical wall many, closely spaced..... *catenata*  
 Spiral threads on umbilical wall few, distantly spaced..... *blanesi*

ANNULARIA (*EUTUDORISCA*) *CATENATA CATENATA* (Gould)

## PLATE 34, FIGURE 7

1843. *Cyclostoma catenatum* GOULD, Proc. Boston Soc. Nat. Hist., vol. 1, p. 138.  
 1847. *Chondropoma catenatum* PFEIFFER, Zeitschr. Malak., vol. 4, p. 109.  
 1852. *Cistula catenatum* PFEIFFER, Catalogue of Phaneropneumona . . . in the British Museum, pp. 182-183.  
 1920. *Tudora (Eutudorisca) catenata* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 78.

This race extends from Limonar through Coliseo. It is larger than *A. (E.) catenata blanesi*, and it has many more spiral threads on the umbilical wall, 19 being present in the specimen figured, while *A. (E.) catenata blanesi* shows only 11.

The specimen figured, U.S.N.M. No. 493490, was collected by Bartsch on a limestone bluff near the rifle range at Limonar. It has 5.5 whorls and measures: Length, 12.5 mm.; greater diameter, 8.7 mm.; lesser diameter, 7.0 mm.

The animal of this species, collected at the rifle range 2 miles south of Limonar July 23, 1928, is described by Bartsch as having a short body, the entire animal being buff except for a dark band across the head immediately in front of the tentacles, behind which there is a pinkish flush. Tentacles orange, except for a dark short streak on the dorsal side near the base; the extreme tip, which is slightly stouter than the part preceding, is brownish. Sole of the foot deeply medially cleft, of the same color as the body. The motion of the foot is alternate on the two sides. The animal when at rest suspends itself by a mucous thread.

ANNULARIA (*EUTUDORISCA*) *CATENATA BLANESI*, new subspecies

## PLATE 34, FIGURE 3

This is a small race from Cardenas. It also has much fewer spiral threads on the umbilical wall.

The type, U.S.N.M. No. 493491, has 5.1 whorls and measures: Length, 10.4 mm.; greater diameter, 7.8 mm.; lesser diameter, 6.8 mm.

Subgenus *DIPLOPOMA* Pfeiffer

1859. *Diplopoma* PFEIFFER, Malakozool. Blätter, vol. 6, p. 73.

Shell varying from elongate-ovate to elongate-conic. Postnuclear whorls marked by sublamellar axial riblets and spiral threads. Operculum with a broad calcified lamella, which bends obliquely outward to almost parallel the basal plate on its outer half. This lamella is reinforced by numerous strong, obliquely retractively curved, slender lamellae.

Type: *Annularia (Diplopoma) architectonica* ([Gundlach] Pfeiffer).

## KEY TO THE SPECIES OF THE SUBGENUS DIPLOPOMA

Axial ribs fused in groups to form broad hollow tufts at the summit.

Outer peristome broad.

Peristome adnate..... *torrei*

Peristome solute..... *ramsdeni*

Outer peristome narrow..... *architectonica*

Axial ribs not fused in groups to form broad hollow tufts at the summit.

Axial sculpture well developed.

Spiral sculpture obsolete on spire..... *pilsbryi*

Spiral sculpture not obsolete on spire..... *songoensis*

Axial sculpture obsolete..... *obsoleta*

## ANNULARIA (DIPLOPOMA) TORREI (Ramsden)

## PLATE 35, FIGURE 1

1915. *Diplopoma torrei* RAMSDEN, Nautilus, vol. 28, pp. 34-35.

1920. *Diplopoma torrei* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 80.

Shell elongate-conic, flesh colored, straw colored, or pale brown, marked by interrupted spiral bands of brown. Nuclear whorls 2, well rounded, microscopically granulose, the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls well rounded, marked by almost vertical or slightly retractively curved axial riblets, which are frequently hollow. These riblets are gathered into tufts at the summit, 2 to 8 forming a tuft, the tufts being rather irregular in width and spacing; of these axial ribs, 48 occur on the first, 58 on the second, 82 on the third, 124 on the fourth, and 204 on the last in the specimen described and figured. The spiral sculpture consists of rather strong threads, which render the axial riblets slightly nodulose at their junction. Of these threads, 5 occur on the second, 6 on the third, and 9 on the remaining turns between summit and suture. Suture moderately constricted. Periphery well rounded. Base short, well rounded, narrowly, openly umbilicated, marked by the continuation of the axial ribs and by 5 strong spiral threads, which render the axial ribs conspicuously nodulose. The axial ribs extend feebly upon the umbilical wall where 11 additional spiral threads are visible, which also render the axial ribs nodulose at their junction. The last whorl has the outer peristome adnate to the preceding turn. Aperture broadly oval; peristome double, the inner slightly exerted; the outer broadly expanded, fluted, forming a conspicuous auricle at the posterior angle and marked by concentric laminae. Operculum typically diplopomid.

The specimen described and figured, U.S.N.M. No. 356501, is a cotype received from Dr. Torre and it was collected by Dr. Ramsden at Ojo de Agua, near Filipinas, Guantánamo, Oriente Province. It

has a little over 5 whorls and measures: Length, 13.7 mm.; greater diameter, 7.7 mm.; lesser diameter, 5.6 mm.

This species is easily distinguished from the rest by its broadly expanded peristome and by having the parietal wall of the peristome adnate to the preceding turn instead of being solute.

ANNULARIA (DIPLOPOMA) RAMSDENI, new species

PLATE 35, FIGURE 7

Shell very large, elongate-conic, chestnut-brown, with the summit of the turns soiled white. The umbilical wall and the peristome are white with a faint yellowish tinge, which is also the color of the interior of the aperture. Nuclear whorls decollated except for the last portion of the last turn, which is well rounded and minutely granulose. Postnuclear turns moderately well rounded, marked by rather strong, slightly wavy, almost vertical or slightly retractively curved, sublammellar axial ribs, which become fused at the summit to form strong, broad denticles which project greatly above the sutural line; 2 to 8 of the ribs may be united into a single denticle. Of the axial ribs, 37 occur on the first of the remaining turns, 41 on the second, 60 on the third, 112 on the fourth, 166 on the fifth, and 235 on the last. In addition to the axial ribs, the whorls are marked by quite strongly developed spiral cords, which render the junction with the axial ribs slightly scalloped. The spiral sculpture is absent on the first turn; on the second and third 7 cords are present, on the fourth, 9; while the fifth and last have 12. Suture strongly constricted. Periphery well rounded. Base short, well rounded, openly umbilicated, marked by the continuation of the axial ribs and 9 spiral cords, equaling those of the spire in strength. On the umbilical wall 10 spiral cords are present, which grow consecutively stronger from the inner toward the outside, and which render the axial ribs nodulose. The last whorl is solute for about one-fifth of a turn, with a decided carina at the posterior angle, above which the axial ribs extend as strong cusps. Aperture almost circular; peristome double, the inner slightly exerted and slightly reflected; the outer thickened, rather broadly expanded, fluted all around except at the posterior angle, where it forms a conspicuous auricle, and marked by concentric laminae. Operculum typically diplopomid.

The type, U.S.N.M. No. 535637, was collected by Dr. Ramsden at La Pujanza, Monte Toro, northwest of Guantánamo, Oriente Province. It has 6.2 whorls remaining and measures: Length, 21.3 mm.; greater diameter, 13.3 mm.; lesser diameter, 9.3 mm.

Its splendid size will differentiate it from all the other Diplopomas.

## ANNULARIA (DIPLOPOMA) ARCHITECTONICA ((Gundlach) Pfeiffer)

Shell very elongate-conic, flesh colored, straw colored, or slightly pinkish. Nuclear whorls almost 2, well rounded, microscopically granulose, the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls well rounded, marked by retractively slanting, rather closely spaced, somewhat wavy axial riblets, of which 4 to 10 are gathered into broad hollow cusps at the summit; these cusps are separated by narrow intervals of shorter ribs; the spiral sculpture consists of low rounded threads. Suture strongly constricted. Periphery well rounded. Base short, openly umbilicated, marked by the continuation of the axial ribs and by spiral threads. Last whorl solute for almost half a turn. The umbilical wall is marked by the continuation of the axial riblets and by spiral threads, the junctions of which here and on the anterior portion of the base form feeble scallops. Aperture broadly oval; peristome double, the inner moderately exerted and moderately reflected; the outer moderately expanded, forming a conspicuous auricle at the posterior angle. Operculum typically diplopomid.

This species occupies parts of Oriente Province, where it breaks up into the subspecies noted below.

## KEY TO THE SUBSPECIES OF ANNULARIA (DIPLOPOMA) ARCHITECTONICA

Sculpture strongly developed.

Axial ribs fine and closely spaced..... *libanoensis*

Axial ribs not fine and more distantly spaced..... *architectonica*

Sculpture feebly developed..... *tanamensis*

## ANNULARIA (DIPLOPOMA) ARCHITECTONICA LIBANOENSIS, new subspecies

## PLATE 35, Figure 8

This subspecies appears to range from Monte Toro through Monte Libano to Monte Verde, north of Guantánamo, Oriente Province.

The smaller size and greater number of axial ribs will readily distinguish this from *A. (D.) architectonica architectonica*.

The type, U.S.N.M. No. 356449, was collected by Henderson and Bartsch on Guaso River, Monte Libano, Guantánamo, Oriente Province. It has a little over 4 whorls and measures: Length, 14.0 mm.; greater diameter, 7.6 mm.; lesser diameter, 5.7 mm.

## ANNULARIA (DIPLOPOMA) ARCHITECTONICA ARCHITECTONICA ((Gundlach Pfeiffer)

## PLATE 35, FIGURE 3

1859. *Cyclostoma (Diplopoma) architectonicum* (Gundlach) PFEIFFER, Malakozool. Blätter, vol. 7, p. 73.

1861. *Diplopoma architectonicum* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.

1920. *Diplopoma architectonicum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, pp. 79, 80.

This subspecies comes from the region of Yateras, northeast of Guantánamo. It is larger than *A. (D.) architectonica libanoensis* and it has the axial ribs coarser and more distantly spaced. Of these ribs, 58 occur on the first of the remaining turns, 96 on the second, 124 on the third, 162 on the fourth, and 188 on the last.

The specimen described and figured, U.S.N.M. No. 356495, is one of five received from Poey collected at Yateras by Gundlach. It has a little over 5 whorls and measures: Length, 18.2 mm.; greater diameter, 8.8 mm.; lesser diameter, 7.0 mm.

Gundlach states of this subspecies (Malakozool. Blätter, vol. 7, p. 73, 1859): "Found on cliffs at Yateras. Animal white with rosy suffusion on the neck. Feelers rose or almost cinnabar red with grayish apex. Some dark dots are present on the head."

ANNULARIA (DIPLOPOMA) ARCHITECTONICA TANAMENSIS, new subspecies

PLATE 35, FIGURE 2

This is the northern representative of the species. This race is easily distinguished from the other two by its much enfeebled sculpture.

The specimen which we have described and figured, U.S.N.M. No. 57324, was collected by Arango at Ingenio el Coco, about 3 miles southeast of Sagua de Tánamo. The type has 70 axial riblets on the first of the remaining turns, 98 on the second, 118 on the third, and 196 on the last. It has a little over 4 whorls and measures: Length, 13.0 mm.; greater diameter, 6.8 mm.; lesser diameter, 5.7 mm.

ANNULARIA (DIPLOPOMA) PILSBRYI, new species

PLATE 35, FIGURE 6

Shell small, thin, elongate-ovate, semitranslucent, straw colored; early whorls decollated, those remaining strongly rounded, marked by strong, rather distantly spaced, lamellar axial ribs, the ribs extending prominently above the suture as conspicuous expanded auricles, but not fusing into tufts. Of these ribs 34 are present on the first of the remaining turns, 95 on the second and third, 139 on the fourth, and 88 on the last eight-tenths of a whorl. The spiral sculpture is obsolete on all the turns on the spire. On the base, however, there are 6 cords, which grow consecutively stronger from the anterior backward, the last forming decided scallops. The umbilical wall is marked by 14 spiral threads, which render the axial riblets elongatedly nodulose. Suture strongly constricted, bridged over by the riblets at the summit. Periphery strongly rounded. Base moderately long, strongly rounded.

The last whorl is solute for one-fifth of a turn, the posterior angle of the solute portion is not conspicuously denticulate. Aperture broadly oval; peristome double, the inner slightly exerted; the outer broadly expanded on the outer and inner lip, less so on the parietal wall. Operculum typically diplopomid.

The type, U.S.N.M. No. 535638, was collected by Dr. Ramsden at Vereda de Mata Yeguas, Sierra de Bucuey, Oriente Province. It has 4.7 whorls remaining and measures: Length, 13.8 mm.; greater diameter, 7.0 mm; lesser diameter, 5.5 mm.

The absence of tufting at the summit, the broadly expanded outer lip, stronger axial ribs and obsolete spiral sculpture will differentiate this from the other species.

ANNULARIA (DIPLOPOMA) SONGOENSIS, new species

PLATE 35, FIGURE 5

Shell elongate-ovate, pale brown, with the early whorls chestnut-brown. Nuclear whorls decollated in all our specimens. Post-nuclear whorls strongly rounded, marked by slender, sinuous, sub-lamellar axial ribs, which are expanded at the summit but which do not form tufts. Of these, 48 occur on the first of the remaining turns, 61 on the second, 126 on the third, and 122 are on the last. In addition to this, the whorls are marked by fine spiral threads, which render the axial ribs sinuous. These are absent on the first of the remaining turns, 5 are present on the second, 8 on the third, and 9 on the last between summit and suture. Suture well constricted. Periphery well rounded. Base narrowly, openly umbilicated, marked by the continuation of the axial ribs and by 6 spiral threads. Nine additional threads, stronger than those on the base, are present on the outer two-thirds of the umbilical wall. The last whorl is solute for about one-fourth of a turn. The posterior angle, while carinated, is not marked by conspicuous auricles. Aperture broadly oval; peristome double, the inner rather strongly exerted and slightly reflected; the outer broadly expanded except on the parietal wall, where it is a little narrower, forming a feeble auricle at the posterior angle, fluted and marked by concentric laminae. Operculum typically diplopomid.

The type, U.S.N.M. No. 535639, was collected by Dr. Ramsden at Florida Blanca near Alto Songo, Oriente Province. It has 4.8 whorls remaining and measures: Length, 12.0 mm.; greater diameter, 6.6 mm.; lesser diameter, 5.3 mm.

This species belongs to the group without tufts at the summit and it is distinguished from the other members of the same group by its comparatively strong axial and spiral sculpture.

We have seen additional specimens also collected by Dr. Ramsden at La Lechuza between Ajenjibre and Joturos, Oriente Province.

## ANNULARIA (DIPLOPOMA) OBSOLETA, new species

## PLATE 35, FIGURE 4

Shell elongate-ovate, thin, translucent, pale yellow. Nuclear whorls decollated in our specimens. Postnuclear whorls somewhat inflated, well rounded, marked by distantly spaced axial riblets on the early turns, which on the later whorls become quite obsolete, being prominent only at the suture in the shape of slender expanded auricles. The spiral sculpture appears entirely absent. Suture well constricted. Periphery somewhat inflated, well rounded. Base moderately long, openly umbilicated, marked by a continuation of the axial ribs, and by 9 spiral threads on the umbilical wall. The last whorl is solute for about one-fourth of a turn, with a slightly denticulate carina at the posterior angle. Aperture broadly oval; peristome double, the inner moderately exerted and reflected; the outer broadly expanded, slightly fluted, and marked by concentric laminae, which are a little narrower on the parietal wall than on the rest.

The type, U.S.N.M. No. 535641, probably a male, was collected by Dr. Ramsden at La Cueva, Diego Cobas, Majaguabos, Oriente Province. It has 5 whorls remaining and measures: Length, 9.3 mm.; greater diameter, 5.7 mm.; lesser diameter, 4.2 mm.

Dr. de la Torre's collection contains another specimen from the same locality which is considerably larger, evidently a female. A female specimen, U.S.N.M. No. 535642, collected by Dr. Ramsden at Subida a La Campana por Reuter, has 4.3 whorls and measures: Length, 11.4 mm.; greater diameter, 6.5 mm.; lesser diameter, 5.2 mm.

The exceeding thinness and translucence of the shell, combined with the obsolete sculpture, will differentiate this from the other species of the genus.

## JUANNULARIA, new subgenus

Annularias with elongate-ovate shell; strong sublamellar spiral cords as well as the spaces between them are crossed by numerous closely crowded, fine axial threads, which render the spiral cords finely denticulated. Peristome double. Operculum typically annularid.

Type: *Annularia (Juannularia) perplicata* (Gundlach).

## KEY TO THE SPECIES OF THE SUBGENUS JUANNULARIA

Suture channeled..... *perplicata*  
 Suture not channeled..... *arguta*

## ANNULARIA (JUANNULARIA) PERPLICATA (Gundlach)

## PLATE 37, FIGURE 5

1857. *Cyclostoma (Choanopoma) perplicatum* GUNDLACH, Malakozool. Blätter, vol. 4, pp. 177-178.

1865. *Choanopoma perplicatum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 2, p. 103.
1920. *Annularia (Annularia) perplicata* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.
1924. *Chondropoma perplicatum* BAKER, Nautilus, vol. 39, p. 90.

Shell elongate-conic, pale yellow, with the early whorls pale chestnut-brown, the rest pale yellow, which is also the color of the peristome. Nuclear whorls 1.5, inflated, well rounded, microscopically granulose, forming a blunt apex. Postnuclear whorls inflated, strongly rounded, marked by slender, retractively slanting, sublamellar axial riblets, of which 96 occur on the first turn, 116 on the second, 150 on the third, and 172 on the last. The spiral sculpture consists of strong cords, of which 6 are present on the first, 7 on the second, and 8 on the remaining turns between the summit and the suture. These cords are not all of exactly the same strength or spacing. The first of them is at the summit of the turns. The axial riblets, in joining the cords, form strongly elongated, narrow nodules, while the spaces enclosed between them are more or less rectangular areas. Suture strongly constricted, channeled. Periphery well rounded. Base moderately long, well rounded, narrowly umbilicated, marked by the continuation of the axial riblets and by 5 spiral threads. Within the umbilicus are 4 additional spiral threads, which are a little less strong. The junctions of the axial riblets and spiral threads on the base and in the umbilicus also form slender nodules. The last whorl is solute for about one-sixth of a turn. Aperture broadly ovate; peristome double, the inner scarcely exerted, reflected over and appressed to the outer; the outer moderately, broadly expanded, a little narrower on the parietal wall, forming a conspicuous auricle at the posterior angle, somewhat produced at the junction of the outer and basal lip, and marked by a series of concentric lamellae. Operculum typically annularid.

U.S.N.M. No. 355893 contains 2 specimens collected by Gundlach at Cabo Cruz, Oriente Province. The larger of these we have described and figured. It has a little over 4 whorls and measures: Length, 10.2 mm.; greater diameter, 6.0 mm.; lesser diameter, 4.8 mm.

ANNULARIA (JUANNULARIA) ARGUTA Pfeiffer

Shell elongate-conic, pale yellow. Nuclear whorls a little more than 2, inflated, strongly rounded, microscopically granulose, forming a pupoid apex. Postnuclear whorls inflated, strongly rounded, marked by sublamellar, retractively slanting axial riblets. In addition to these axial riblets, the whorls are marked by strong spiral keels, of which the first at the summit is weaker than the rest. These spiral keels are separated by broad, concave channels, the width of which is about four times that of the keels. The junctions of the axial ribs

and the spiral keels form slender elongated nodules having their long axis parallel with the axial sculpture, while the spaces enclosed between them are almost impressed lines about twice as wide as the axial ribs. Suture strongly constricted, but not channeled. Periphery well rounded. Base moderately long, strongly rounded, very narrowly umbilicated, marked by the continuation of the axial ribs and by strong spiral keels; several less strong spiral keels are present within the umbilical area. Here, as on the spire, the junction of the axial and spiral sculpture forms weak tubercles. Aperture broadly oval; peristome double, the inner scarcely exerted and reflected; the outer moderately broadly expanded, a little narrower on the inner lip than the outer. Operculum typically annularid.

This species ranges through the region about Santiago, Oriente Province, and a number of the keys of the Doce Leguas group.

KEY TO THE SUBSPECIES OF ANNULARIA (JUANNULARIA) ARGUTA

Spiral cords between summit and suture 5..... *arguta*  
 Spiral cords between summit and suture 6..... *insularis*

ANNULARIA (JUANNULARIA) ARGUTA ARGUTA (Pfeiffer)

PLATE 37, FIGURE 4

1858. *Ctenopoma argutum* PFEIFFER, Malakozool. Blätter, vol. 5, pp. 188-189.

1858. *Chondropoma argutum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 1, pp. 138-139.

1878. *Chondropoma elongatum* ARANGO, Contribucion a la fauna malacologica Cubana, p. 10.

This subspecies comes from the region of Santiago, Oriente Province. It is easily distinguished from *A. (J.) arguta insularis* by the fact that it has one less spiral keel, that is 5, between the summit and the suture, and on the base.

The specimen described and figured, U.S.N.M. No. 355896, was collected by Gundlach at Santiago. It has a little more than 4 whorls remaining and measures: Length, 9.8 mm.; greater diameter, 5.3 mm.; lesser diameter, 4.6 mm.

ANNULARIA (JUANNULARIA) ARGUTA INSULARIS, new subspecies

PLATE 37, FIGURE 6

Bartsch collected this race on Cachiboca Cay and Cayo de Cruz, both of the Doce Leguas group, off the south coast of Camagüey Province. It differs from typical *A. (J.) arguta arguta* in having the extra spiral keel between the suture and on the base. The axial riblets are also a little stronger and less closely spaced than in the typical race.

The type, U.S.N.M. No. 391832, comes from Cachiboca Cay. It has 3.9 whorls remaining and measures: Length, 16.0 mm.; greater diameter, 5.4 mm.; lesser diameter, 4.7 mm.

Subgenus ANNULARITA Henderson and Bartsch

1920. *Annularita* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

Shell ovate-conic, marked by both axial riblets and spiral threads. Peristome not expanded into a broad thin disk, but much thickened, slightly flattening to a thin edge. Operculum typically annularid.

Type: *Annularia* (*Annularita*) *majuscula* (Morelet).

ANNULARIA (*ANNULARITA*) MAJUSCULA (Morelet)

Shell very large, elongate-ovate, varying in color from white through flesh color to pale yellow to buff; unicolor, or banded with interrupted spiral bands of brown, zigzag or arrow-shaped markings, depending upon the race to which the subspecies in question may belong. The base is as variable in coloring as the spire; the peristome as a rule is a little paler than the rest of the shell, unicolor, or rayed. Nuclear whorls almost 2, smooth, well rounded, forming a small apex. Postnuclear whorls well rounded, marked by almost vertical or slightly retractively slanting axial riblets, which vary greatly in strength in the different races. Some of these riblets become projected and fused at quite regular intervals at the summit, lending to the summit a strongly denticulated aspect. The strength of this denticulation likewise varies materially in the different subspecies. The spiral sculpture consists of threads, which also vary from almost obsolete to quite strong in the various races. Periphery of the last whorl strongly rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial riblets or by lines of growth and spiral threads, which vary very much in strength in the different races. The umbilicus is moderately open and the umbilical wall is marked by the continuation of the axial ribs and by obsolete or a little stronger spiral threads. The last whorl may be appressed or very slightly solute at the aperture. Aperture broadly oval; peristome double, the inner reflected and appressed to the outer, sometimes almost coextensive with it; the outer moderately broadly expanded, thick, forming an inconspicuous auricle at the posterior angle, wider on the outer and basal lip than on the parietal wall, marked by concentric threads. In the male the outer lip is concave below the summit. Operculum with the nucleus halfway between subcentral and submarginal, having a strong obliquely slanting lamella, which is reinforced by oblique threads.

This species ranges over the eastern half of the mountains of Pinar del Rio Province from Guajaibón La Cumbre to Candelaria. It

breaks up into a number of subspecies in this range, descriptions of which follow:

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULARITA) MAJUSCULA

Outer peristome greatly thickened.

Auricle at the posterior angle of the aperture conspicuous.

Parietal wall of aperture detached from preceding whorl..... *narcisi*

Parietal wall of aperture not detached from the preceding whorl..... *cumbrensis*

Auricle at the posterior angle of the aperture not conspicuous.

Outer peristome of inner lip broad..... *majuscula*

Outer peristome of inner lip not broad.

Outer lip very greatly thickened..... *crassilabris*

Outer lip not very greatly thickened..... *macta*

Outer peristome not greatly thickened.

Shell large, length of decollated shell more than 31 mm..... *excelsa*

Shell small, length of decollated shell less than 25 mm..... *catalinensis*

ANNULARIA (ANNULARITA) MAJUSCULA NARCISI, new subspecies

PLATE 36, FIGURE 3

This subspecies comes from the limestone blocks adjacent to Candelaria, Pinar del Rio Province. It is readily distinguished from the others by having a decided auricle at the posterior angle and by the parietal wall usually being free, leaving a depression between it and the preceding turn. The peristome of the outer lip is also immensely thickened and it extends back for some distance. By the presence of the auricle it suggests *A. (A.) majuscula cumbrensis*.

The type, U.S.N.M. No. 356227, was collected near the Escuela de Frias, Candelaria. It is an almost complete specimen having 6.0 whorls remaining and measuring: Length, 26.0 mm.; greater diameter, 14.6 mm.; lesser diameter, 12.5 mm.

ANNULARIA (ANNULARITA) MAJUSCULA CUMBRENSIS, new subspecies

PLATE 36, FIGURE 7

This race comes from La Cumbre, north of San Diego de los Baños, Pinar del Rio Province. In shape, color pattern, and thickened outer peristome it resembles typical *A. (A.) majuscula majuscula*. Its small size and rather conspicuous auricle at the posterior angle of the aperture will distinguish it from that race.

The type, U.S.N.M. No. 356206, has 3.5 whorls remaining and measures: Length, 27.0 mm.; greater diameter, 18.7 mm.; lesser diameter, 14.6 mm.

## ANNULARIA (ANNULARITA) MAJUSCULA MAJUSCULA (Morelet)

## PLATE 36, FIGURE 6

1851. *Cyclostoma majusculum* MORELET, Testacea novissima insulae Cubana et Americae Centralis, pt. 2, p. 19.  
 1852. *Choanopoma majusculum* PFEIFFER, Catalogue of Phaneropneumona . . . in the British Museum, p. 109.  
 1920. *Annularia (Annularita) majuscula* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

This subspecies was described by Morelet from Pan de Guajaibón, Pinar del Rio Province. It is a large race with greatly thickened reflected peristome. It is readily distinguished from the other race, which comes from the extreme height of Guajaibón, by its less conic form and by the thickening of the outer lip.

The specimen figured, U.S.N.M. No. 356208, one of a series, has 3.5 whorls remaining and measures: Length, 30.5 mm.; greater diameter, 19.7 mm.; lesser diameter, 15.4 mm.

## ANNULARIA (ANNULARITA) MAJUSCULA CRASSILABRIS, new subspecies

## PLATE 36, FIGURE 2

This race comes from Cafetal La Villa, and Rio Hondo, Lomas de Candelaria, Pinar del Rio Province. In this subspecies the outer lip is very greatly thickened, in which respect it suggests *A. (A.) majuscula narcisi*, from which, however, it can at once be distinguished by the absence of the auricle at the posterior angle.

The type, U.S.N.M. No. 356219, has 3.5 whorls remaining and measures: Length, 25.4 mm.; greater diameter, 16.9 mm.; lesser diameter, 13.7 mm.

## ANNULARIA (ANNULARITA) MAJUSCULA MACTA (Poey)

## PLATE 36, FIGURE 1

1852. *Cyclostoma mactum* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 1, pp. 97, 444, pl. 8, figs. 6-12.

This race extends over the Sierra Limones and the region of Rangel and Santa Cruz River, Pinar del Rio Province. It differs from *A. (A.) majuscula majuscula* in having the outer peristome of the inner lip much narrower and not very greatly thickened.

The type, U.S.N.M. No. 566221, comes from Rangel. It has 3.5 whorls remaining and measures: Length, 27.8 mm.; greater diameter, 18.8 mm.; lesser diameter, 15.3 mm.

## ANNULARIA (ANNULARITA) MAJUSCULA EXCELSA, new subspecies

## PLATE 36, FIGURE 5

This race comes from the extreme height of Pan de Guajaibón, Pinar del Rio Province. It is distinguished from the typical *A. (A.) majuscula majuscula* by being much more elongate-conic, that is, slender, and by lacking the immense thickening of the peristome; in this subspecies the peristome is rather sharp.

The type, U.S.N.M. No. 535594, has 5.0 whorls remaining and measures: Length, 37.8 mm.; greater diameter, 21.5 mm.; lesser diameter, 16.8 mm.

## ANNULARIA (ANNULARITA) MAJUSCULA CATALINENSIS, new subspecies

## PLATE 36, FIGURE 4

This subspecies comes from La Catalina, between Pan de Guajaibón and the Sierra de La Güira, Pinar del Rio Province. We have also seen it from the Mogote del Bosque and Mogote del Indio on the east side of the Rio San Diego. It is a small race, with a thin outer peristome.

The type, U.S.N.M. No. 356215, has 3.6 whorls remaining and measures: Length, 21.1 mm.; greater diameter, 14.0 mm.; lesser diameter, 10.6 mm.

## Subgenus TROSCHELVINDEX H. B. Baker

1924. *Troschelvindex* H. B. BAKER, Nautilus, vol. 37, p. 90.

Shell elongate-conic, marked by rounded axial ribs and by spiral cords, the combination forming a fenestrated pattern. Some of the axial ribs are gathered into conspicuous tufts at the summit. Peristome double. Operculum typically annularid.

Type: *Annularia (Troschelvindex) candeana* (Orbigny).

Dr. Baker, *loc. cit.*, reestablished the fact mentioned by Troschel that the rachidian tooth of the radula in "*Cyclostoma illustre* Poey" had an extra minute denticle on each side of the central cusp, suggesting affinity with the European Pomatias. He therefore placed all of the American annularids in the family Pomatiasidae. The mere presence of an extra ultra-reduced denticle in one or two species hardly leads us to concur with him in this arrangement. Why may this not be a sport character whose variance from the norm may not represent genetic affinities? Cuba has a rather large assemblage of species which, in shape and sculpture of shell as well as in opercular characters, form a natural group. To this group we shall assign the name *Troschelvindex*.

## KEY TO THE SPECIES OF THE SUBGENUS TROSCHELVINDEIX

Shell cylindro-conic.

Outer peristome broadly expanded.

Outer peristome rayed..... *tracta*

Outer peristome not rayed..... *jiguanensis*

Outer peristome not broadly expanded.

Axial and spiral sculpture conspicuous..... *candeana*

Axial and spiral sculpture subobsolete..... *inculta*

Shell not cylindro-conic.

Shell elongate-conic.

Junction of axial ribs and spiral cords forming cusps..... *arangiana*

Junction of axial ribs and spiral cords not forming cusps..... *bebini*

Shell not elongate-conic but elongate-ovate.

Sculpture decidedly reduced in strength.

Tufts at the summit strongly developed..... *barbouri*

Tufts at the summit feebly developed..... *minia*

Sculpture not decidedly reduced in strength.

Inner lip of outer peristome crenulated..... *rocai*

Inner lip of outer peristome not crenulated..... *agrestis*

ANNULARIA (TROSCHELVINDEIX) TRACTA ([Gundlach] Poey)

## PLATE 37, FIGURE 7

1858. *Cyclostoma tractum* [Gundlach] POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 2, p. 4, *nomen nudum*.

1858. *Cyclostoma tractum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 5, p. 45.

1865. *Choanopoma tractum* [Gundlach] PFEIFFER, Monographia pneumonopomorum viventium, suppl. 2, p. 102.

1920. *Annularia (Annularia) tracta* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

Shell very cylindro-conic, flesh colored, with rather broad interrupted spiral bands of brown; the dots composing these bands are arranged in both axial and spiral series, which give to the shells a somewhat varicoid appearance. Nuclear whorls decollated. Post-nuclear whorls well rounded, marked by feeble, slightly retractively slanting axial riblets, of which two or more are gathered into hollow denticles at the summit. The spiral sculpture consists of feeble threads a little stronger than the axial ribs, of which eight are present between the summit and the suture on the last turn. The junctions of the axial ribs and spiral threads scarcely form nodules, while the spaces enclosed between them are shallow, elongated pits having their long axis parallel with the axial sculpture. Suture well constricted. Periphery strongly rounded. Base rather long, scarcely rounded, narrowly, openly umbilicated, marked by the continuation of the axial ribs and seven spiral threads, which are a trifle heavier than those on the spire. Seven additional spiral threads are present within the umbilicus. These are of about the same strength as those on the base. The spiral threads and the axial ribs on the base and in the

umbilicus form feeble nodules. Aperture subcircular; peristome double, the outer broadly expanded, somewhat auriculated at the posterior angle and adnate to the preceding turn on the parietal wall, marked by a series of concentric lamellae; the inner slightly exerted and slightly reflected. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 355878, was received from Poey and was collected by Gundlach at Guisa, Oriente Province. It has 5 whorls remaining and measures: Length, 15.4 mm.; greater diameter, 7.6 mm.; lesser diameter, 5.8 mm.

ANNULARIA (TROSCHELVINDEX) JIGUANENSIS (Pfeiffer)

Shell cylindro-conic, varying from flesh color to pale brown in ground color, with interrupted spiral bands of brown; the elements composing these bands are arranged in both axial and spiral series, but they are not regularly distributed, the spaces separating them varying greatly in width; the peristome may be rayed with brown or white, the brown markings when present coinciding with the external spiral bands, which show conspicuously in the aperture. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly rounded, marked by slightly retractively slanting, rather closely spaced, threadlike axial riblets, of which two, three, four, or even more may be gathered together to form tufts at the summit. The spiral sculpture consists of threads about as strong as or a little stronger than the axial ribs. The junctions of these with the axial ribs form slender, elongated nodules, with their long axis parallel with the axial sculpture. These nodules lend to the axial riblets a somewhat wavy outline. The spaces enclosed between the axial riblets and the spiral threads are oval pits having their long axis parallel with the axial sculpture. Suture strongly constricted. Periphery strongly rounded. Base moderately long, well rounded, marked by spiral threads, which are a little stronger than those on the spire. Within the umbilicus additional spiral threads are present. The base is also marked by the continuation of the axial ribs, which at their junction with the spiral threads on the base and on the umbilical wall form weak nodules. Aperture broadly oval; peristome double, the inner slightly exerted and reflected; the outer well expanded, a little narrower on the parietal wall than on the rest, and slightly auriculated at the posterior angle, adnate to the outer on the outer lip.

The species is confined to Oriente Province, where it breaks up into the several subspecies here defined:

KEY TO THE SUBSPECIES OF ANNULARIA (TROSCHELVINDEX) JIGUANENSIS

Last whorl solute.....	<i>jiguanensis</i>
Last whorl adnate.	
Outer peristome rayed.....	<i>negrosensis</i>
Outer peristome not rayed.....	<i>bairensis</i>

## ANNULARIA (TROSCHELVINDEX) JIGUANENSIS JIGUANENSIS (Pfeiffer)

## PLATE 37, FIGURE 2

1861. *Choanopoma jiguanense* PFEIFFER, Malakozool. Blätter, vol. 8, p. 223.

1920. *Annularia (Annularia) jiguanensis* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 53, p. 73.

This, the typical subspecies, comes from Jiguani, Oriente Province. It differs from *A. (T.) jiguanensis negrosensis* in being much paler and from *A. (T.) jiguanensis bairensis* in having the axial riblets more slender and less strongly developed, and in having the peristome rayed.

The specimen described and figured, U.S.N.M. No. 355882, is one of five listed under that number. It has a little more than 4 whorls remaining and measures: Length, 13.9 mm.; greater diameter, 7.3 mm.; lesser diameter, 5.6 mm.

## ANNULARIA (TROSCHELVINDEX) JIGUANENSIS NEGROSENSIS, new subspecies

## PLATE 37, FIGURE 8

This subspecies comes from Alto de los Negros, Sierra Maestra Oriente Province. It agrees with the typical race in having the peristome rayed, but it has the axial ribs much stronger and the last whorl not solute, but adnate, to the preceding turn. The whole color scheme presents a marbled effect, and there are decided axial, almost zigzag, fulgurations of darker brown than the general coloration. There is also a mottling of flesh color, and the denticles at the summit are white.

The type, U.S.N.M. No. 535546, has 4.9 whorls remaining and measures: Length, 14.3 mm.; greater diameter, 7.0 mm.; lesser diameter, 5.5 mm.

## ANNULARIA (TROSCHELVINDEX) JIGUANENSIS BAIRENSIS, new subspecies

## PLATE 37, FIGURE 9

This subspecies comes from Baire, southeast of Jiguani, Oriente Province. It has the last whorl adnate, in which respect it agrees with *A. (T.) jiguanensis negrosensis*, but it has the ribs a little more strongly developed and it lacks the radiating rays on the outer peristome. The color scheme approximates that of the typical race, but it is a little darker.

The type, U.S.N.M. No. 535548, has almost 5 whorls remaining and measures: Length, 14.7 mm.; greater diameter, 7.0 mm.; lesser diameter, 5.9 mm.

## ANNULARIA (TROSCHELVINDEX) CANDEANA (Orbigny)

Shell cylindro-conic, varying from flesh color to pale brown in ground color, marked with interrupted spiral bands of brown, which vary materially in strength. The elements composing these bands are also arranged in axial series, so that not infrequently the axial disposition of the color bands is more pronounced than the spiral. Peristome rayed. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. The postnuclear whorls are well rounded, marked by retractively curved axial riblets, which vary considerably in strength and spacing. These riblets may form slender hollow cusps at the summit or 2 or 3 of them may be gathered to form a stronger tuft. The spiral sculpture consists of threads equaling the riblets in strength, and the combination of the two gives to the shell a screenlike pattern. The junctions of the axial ribs and the spiral threads form scarcely perceptible nodules. Suture well constricted. Periphery well rounded. Base short, well rounded, openly umbilicated, marked by the continuation of the axial ribs and by spiral threads equaling those on the spire, which continue the same type of pattern characterizing the spire. The last whorl is usually solute, though at times the outer peristome touches the preceding whorl. Aperture broadly oval; peristome double, the inner very strongly exerted and reflected; the outer expanded, of about the same width on the outer, basal, and inner lip, but narrower on the parietal wall. The inner lip is fluted and crenulated at the edge, while at the posterior angle the outer peristome forms a moderately strong auricle. Operculum typically annularid.

This species is a rather common Cuban shell. It ranges from the eastern end of Pinar del Rio Province east to Santa Clara. Throughout its range it maintains a rather constant expression. It is only in the extreme eastern part of the range that we have sufficient differentiation to merit a subspecific designation.

This species has been responsible for considerable controversy. First of all came the question as to whether or not *candeana* and *illustris* are synonymous; then the presence of the extra rachidian denticle on the radula raised a doubt as to whether the American species should constitute a distinct family from the European; we think they should. The characters differentiating the two races which we now recognize are set forth in the key and descriptions that follow:

## KEY TO THE SUBSPECIES OF ANNULARIA (TROSCHELVINDEX) CANDEANA

Denticles at summit very strongly developed..... fallax  
 Denticles at summit less strongly developed..... candeana

## ANNULARIA (TROSCHELVINDEX) CANDEANA FALLAX, new subspecies

## PLATE 37, FIGURE 3

This subspecies occupies the region about Sagua la Grande, Santa Clara Province. It differs from the typical species in having many more ribs and spiral threads, and in having them very closely spaced, so that the combination instead of producing a fenestrated pattern yields small rounded pits between the ribs and the spiral cords. The denticles at the summit are much more strongly developed and embrace more riblets. The peristome is usually adnate, and it is narrower than in the typical race.

The type, U.S.N.M. No. 535581, which comes from Loma Iradi at Sagua, Santa Clara Province, has 4.8 whorls remaining and measures: Length, 13.5 mm.; greater diameter, 6.2 mm.; lesser diameter, 5.4 mm,

## ANNULARIA (TROSCHELVINDEX) CANDEANA CANDEANA (Orbigny)

## PLATE 37, FIGURE 1

1842. *Cyclostoma candeanum* ORBIGNY, in Sagra's Histoire physique, politique et naturelle de l'Île de Cuba, vol. 1, pp. 261-262, pl. 22, figs. 15, 17.  
 1852. *Cistula candeanum* PFEIFFER, Conspectus cyclostomaceorum, pp. 42, 392.  
 1857. *Cistula candeanum* TROSCHEL, Das Gebiss der Schnecken zur Begründung einer natürlichen Classification untersucht, vol. 1, p. 75, pl. 5, fig. 1 (Radula).  
 1858. *Cyclostoma illustre* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 1, pp. 1, 33, 89.  
 1878. *Cistula illustris* ARANGO, Contribucion a la fauna malacologica Cubana, p. 23.  
 1920. *Annularia illustris* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.  
 1924. *TroschelvindeX illustris* BAKER, Natuilus, vol. 37, p. 90.  
 1935. *TroschelvindeX candeanum* AGUAYO, Mem. Soc. Cubana, Hist. Nat., vol. 9, pp. 1-5.

This subspecies differs from the eastern race in usually being paler, in having the outer lip more expanded, more denticulated, and usually free from the parietal wall. Also the axial ribs and the spiral threads are more distantly spaced and the denticles at the summit are less numerous.

The specimen described and figured, U.S.N.M. No. 355908, is one received from Poey. It comes from the region of Habana, the type locality. It has 5.0 whorls remaining and measures: Length, 13.0 mm.; greater diameter, 6.3 mm.; lesser diameter, 5.0 mm.

## ANNULARIA (TROSCHELVINDEX) INCULTA (Poey)

## PLATE 38, FIGURE 7

1851. *Cyclostoma incultum* POEY, Memorias sobre la historia natural de la isla de Cuba, vol. 1, p. 98, pl. 8, figs. 3-5.  
 1861. *Cistula inculta* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.

1863. *Chondropoma incultum* REEVE, *Conchologia iconica*, No. 63.

1920. *Annularia (Annularia) inculta* HENDERSON and BARTSCH, *Proc. U. S. Nat. Mus.*, vol. 58, p. 73.

Shell cylindro-conic, pale buff, marked by interrupted spiral bands of brown; peristome unicolor. Nuclear whorls 1.7, strongly rounded, the first one and one-fourth smooth, the rest showing the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by closely spaced, rather broad, poorly developed, retractively slanting axial riblets, of which 92 occur on the first turn, 106 on the second, 120 on the third, and 90 on the last. On the last turn they are very much enfeebled, broadened and irregular, and almost obsolete. Two, 3, or even more of the riblets become fused at the summit to form conspicuous denticles. The spiral sculpture consists of rather broad, low, poorly developed threads, of which 9 occur on the first turn, 11 on the second, and 13 on the third, while on the last they are too poorly developed to be counted. The junction of the axial ribs and spiral threads scarcely forms nodules on the early whorls. The spaces enclosed between them are either mere lines or they are narrow rectangular pits having their long axis parallel with the axial sculpture. Suture moderately constricted. Periphery inflated, well rounded. Base moderately long, narrowly, openly umbilicated, marked by the feeble continuation of the axial riblets and by 9 almost obsolete spiral threads, while within the umbilicus 10 additional feeble spiral threads are present. The last whorl is solute for about one-fifth of a turn. Aperture very broadly oval; peristome double, the inner scarcely at all exerted but strongly reflected and adnate to the outer almost entirely, except at the posterior angle; the outer only narrowly expanded, forming a feeble auricle at the summit.

The specimen described and figured, U.S.N.M. No. 535550, is one of a series collected at La Vigía, Trinidad, Santa Clara Province. It has a little over 4 whorls and measures: Length, 15.5 mm.; greater diameter, 7.9 mm.; lesser diameter, 6.5 mm.

ANNULARIA (TROSCHELVINDEX) ARANGIANA ([Gundlach] Pfeiffer)

Shell broadly elongate-conic, pale buff, variously spotted with interrupted spiral bands of brown; the dots composing these bands are not exactly arranged in axial and spiral series; peristome rayed. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly rounded, marked by slender, retractively curved axial riblets, which may become expanded at the summit into hollow cusps, or sometimes two or more may fuse to form such a cusp. The spiral sculpture consists of slender threads, which render the axial ribs tuberculated, while the spaces enclosed between the axial ribs and the spiral threads are more or less square or rectangular areas. Suture strongly con-

stricted. Periphery well rounded. Base short, strongly rounded, openly umbilicated, marked by the continuation of the axial ribs and spiral threads. Within the umbilicus additional spiral threads considerably stronger than those on the outside are present. Aperture almost subcircular; peristome double, the inner moderately exerted and slightly reflected; the outer broadly expanded, somewhat fluted, and denticulated on the free margin. Operculum typically annularid.

Three races of this species are before us, all from Oriente Province. The following key and descriptions will help to characterize them:

KEY TO THE SUBSPECIES OF ANNULARIA (TROSCHELVINDEX) ARANGIANA

Axial ribs of last whorl very closely spaced.....	arangiana
Axial ribs of last whorl less closely spaced.	
Outer peristome very strongly fluted.....	cautoensis
Outer peristome less strongly fluted.....	magistra

ANNULARIA (TROSCHELVINDEX) ARANGIANA ARANGIANA (Gundlach)

PLATE 38, FIGURE 6

1857. *Cyclostoma (Choanopoma) arangianum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 4, p. 177.

1920. *Annularia (Annularia) arangiana* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

The typical race comes from near Cabo Cruz, Oriente Province. It is smaller than the other two races here recognized and has the junctions of the axial ribs and spiral threads finer cusped; in that respect, it resembles *A. (T.) arangiana magistra*. The axial ribs in this form are more closely spaced than they are in *A. (T.) arangiana magistra*.

The specimen described and figured, U.S.N.M. No. 355887, is one of 2 collected by Gundlach at Júcaro near Cabo Cruz. It has a little more than 4 whorls remaining and measures: Length, 10.0 mm.; greater diameter, 6.5 mm.; lesser diameter, 5.7 mm.

ANNULARIA (TROSCHELVINDEX) ARANGIANA CAUTOENSIS, new subspecies

PLATE 38, FIGURE 2

1878. *Choanopoma arangianum* ARANGO, Contribucion a la fauna malacologica Cubana, p. 11, in part.

This subspecies was collected by Wright at Brazo de Cauto, Oriente Province. It is larger than the typical race, with the axial ribs much more distantly spaced and the junctions of these with the spiral threads less conspicuous. The outer peristome is conspicuously denticulated, particularly so on the outer margin of the inner lip. The denticles at the summit are also heavier than those of the typical race.

The type, U.S.N.M. No. 355888, has a little more than 5 whorls remaining and measures: Length, 13.5 mm.; greater diameter, 7.5 mm.; lesser diameter, 5.7 mm.

ANNULARIA (TROSCHELVINDEX) ARANGIANA MAGISTRA, new subspecies

PLATE 38, FIGURE 4

We have seen this race from Loma del Gato and from Buena Vista, south of Bayamo, both in the Sierra Maestra. It differs from the typical race in being much more conspicuously spinulose at the junctions of the axial riblets and spiral cords, and in having the outer peristome much more strongly fluted and much more denticulated on the inner lip.

The type, U.S.N.M. No. 535551, which comes from the Loma de Gato, has 5.6 whorls remaining and measures: Length, 12.8 mm.; greater diameter, 7.0 mm.; lesser diameter, 5.3 mm.

ANNULARIA (TROSCHELVINDEX) BEBINI (Arango)

PLATE 38, FIGURE 9

1865. *Choanopoma bebbini* ARANGO, in Pfeiffer, Monographia pneumonopomorum viventium, suppl. 2, pp. 100-101.

1920. *Annularia (Annularia) bebbini* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

Shell very elongate-conic, flesh colored, with irregular dots and streaks of brown, the heaviest of which are usually on the spiral threads; the decollated end is brown and the peristome is conspicuously rayed with brown, corresponding to the dark spiral lines which are conspicuously shown within the aperture; the nuclear whorls are chestnut brown at the suture. Nuclear whorls 2.2, rather large, inflated, strongly rounded, forming a rather blunt apex, microscopically granulose except for the last part, which shows the beginning of the postnuclear sculpture. Postnuclear whorls moderately well rounded, marked by slender, retractively slanting, rather closely spaced axial riblets, of which 2 or 3 become fused into small denticles at the summit. The spiral sculpture consists of spiral threads, which are a little stronger than the axial ribs. Of these 15 occur between the summit and the suture on the last turn. The junction of the axial riblets and the spiral threads does not form conspicuous nodules, but the pits between them give to the whorl a somewhat fenestrated pattern. Suture strongly constricted. Periphery of the last whorl strongly inflated, well rounded. Base rather short, moderately rounded, marked by the continuation of the axial riblets and 8 spiral threads. Eight additional spiral threads are present on the umbilical wall. The latter are a little stronger than those on the outside, while

those on the base are a little weaker than those on the spire. Aperture very broadly ovate; peristome double, the inner slightly exerted and reflected, and fused with the outer on the outer and the basal lip; the outer narrowly expanded, a little narrower on the parietal wall than on the rest, adnate to the preceding turn. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 355877, is a cotype collected by Arango at Lomas del Cuzco, Pinar del Rio. It has a little over 4 whorls and measures: Length, 13.7 mm.; greater diameter, 8.3 mm.; lesser diameter, 6.2 mm.

ANNULARIA (TROSCHELVINDEX) BARBOURI, new species

PLATE 38, FIGURE 5

Shell elongate-ovate, of flesh-colored ground color, marked by interrupted spiral bands of brown. The spots composing these give one the impression of ink spots diffusing laterally; that is, they are not sharply cut at the border. Nuclear whorls almost 2, well rounded, microscopically granulose, forming a slightly blunt, tapering apex. Postnuclear whorls increasing rapidly in size, inflated, strongly rounded, and marked by slightly retractively slanting axial ribs, which are very faint on the middle of the turns, where they are almost obsolete, but which form very conspicuous, hollow tufts at the summit, either individually or by the diffusion of several riblets. The spiral sculpture consists of slender threads, which are also obsolete, and they look almost as if they were in the interior of the shell substance. The combination of the axial riblets and the spiral threads forms a netlike pattern. Suture channeled. Periphery decidedly inflated, strongly rounded. Base short, openly umbilicated, strongly rounded, marked by spiral threads, which increase in strength from the periphery anteriorly. The umbilicus is marked by the feeble continuation of the axial riblets, which are narrower at this point, and by a series of spiral cords, which increase in size from within toward the outside; the last two bordering the umbilicus are much stronger than the rest. Aperture broadly oval; peristome double, the inner exerted and slightly reflected; the outer broadly expanded, somewhat fluted and crenulated on the inner lip, forming a very conspicuous auricle at the posterior angle, and marked by concentric laminae. Operculum typically annularid.

The type, U.S.N.M. No. 535554, was collected by Drs. de la Torre and Barbour at Mina de Pozo Prieto, Alto de los Negros, Sierra Maestra. It is a complete specimen of 6.6 whorls and measures: Length, 14.3 mm.; greater diameter, 8.6 mm.; lesser diameter, 7.0 mm.

## ANNULARIA (TROSCHELVINDEX) MINIA ([Gundlach] Poey)

## PLATE 38, FIGURE 1

1858. *Cyclostoma minium* [Gundlach] POEY, *Memorias sobre la historia natural de la isla de Cuba*, vol. 2, p. 4.
1861. *Choanopoma minium* BLAND, *Ann. Lyceum Nat. Hist. New York*, vol. 7, p. 27.
1920. *Annularia (Annularia) minium* HENDERSON and BARTSCH, *Proc. U. S. Nat. Mus.*, vol. 58, p. 73.

Shell thin, elongate-ovate, pale orange with the spiral bands flecked here and there with white; the cusps at the summit and the peristome are yellowish white. Nuclear whorls 2, well rounded, smooth, forming a rather high apex. Postnuclear whorls inflated, strongly rounded, marked by almost vertical axial riblets, which vary considerably in strength, and of which 2 or more unite at the summit into a slender hollow cusp. The spiral sculpture consists of slender threads, of which 9 occur between the summit and the suture on the last turn. The junctions of the axial riblets and spiral threads scarcely form nodules, but the impressed spaces between them give the shell an almost malleated aspect. Periphery strongly rounded. Base moderately long, strongly rounded, marked by the continuation of the axial riblets and by 8 spiral threads. Eight additional spiral threads are present on the umbilical wall, of which the outer 2 are much stronger than the rest. The last whorl is decidedly solute for about one-sixth of a turn. Aperture very broadly oval; peristome double, the inner slightly exerted and slightly reflected; the outer well expanded all around except on the parietal wall, where it is rather narrow, forming a conspicuous auricle at the posterior angle. The outer peristome is marked by thin, concentric lamellae. Operculum typically annularid.

U.S.N.M. No. 355870 is a cotype collected by Gundlach at Guisa, Bayamo, Oriente Province. It has a little over 6 whorls remaining and measures: Length, 14.8 mm.; greater diameter, 8.2 mm.; lesser diameter, 6.2 mm.

## ANNULARIA (TROSCHELVINDEX) ROCAI, new species

## PLATE 38, FIGURE 3

Shell elongate ovate, of yellowish flesh color, with interrupted spiral bands of brown. Nuclear whorls thin, translucent, only the last one, which is smooth, remaining. Postnuclear whorls marked by numerous very narrow, slender, sublamellar axial riblets, of which 47 occur on the first turn and 120 on the last. In addition to this, the whorls are marked by spiral threads, of which the first 2 at the summit are much stronger than the rest. Here they cause the axial riblets to become somewhat expanded and reflected upward, while the rest cause the junctions of the two to form not very strong, elongated nodules, the long axis of which corresponds to the axial sculpture.

Of these spiral cords 11 are present between the summit and the periphery on the last whorl. Suture strongly constricted. Base short, inflated, strongly rounded, and marked by the continuation of the axial ribs, which extend into the umbilicus, becoming narrower, more lamellar, and more closely approximated on the umbilical wall. On the base 9 spiral cords are present, which also render the intersection with the ribs nodulose. The umbilical area is marked by 11 spiral cords, which cause the axial riblets at their junction with the cords to form very conspicuous, narrow, clawlike denticles. The umbilicus is open and the last whorl is solute for about one-fifth of a turn. Aperture broadly oval; peristome double, the inner slightly exerted and reflected, and adnate to the outer on the outer and basal lips; less so on the inner lip. The outer peristome is broadly expanded, a little narrower at the junction of the basal and inner lips, decidedly fluted on the inner lip, conspicuously crenulated at its outer margin, forming a very strong reflected auricle at the posterior angle, and marked by concentric laminae.

The type, U.S.N.M. No. 535557, was collected by Father Roca at Las Barraqueras, Hongolosongo, Oriente Province. It has 4.9 whorls remaining and measures: Length, 16.5 mm.; greater diameter, 10.3 mm.; lesser diameter, 7.8 mm.

## ANNULARIA (TROSCHELVINDEX) AGRESTIS (Pfeiffer)

## PLATE 38, FIGURE 8

1862. *Cistula agrestis* PFEIFFER, Malakozool. Blätter, vol. 7, p. 216.

Shell rather stout, elongate-ovate, of buff color with obsolete, interrupted spiral bands. Nuclear whorls decollated. Postnuclear whorls strongly inflated and strongly rounded, marked by somewhat irregular, retractively slanting, slender axial riblets, which are moderately distantly spaced on the early turns, but which become more crowded as the shell increases in size. Of these riblets 76 occur on the first turn, 98 on the second, 114 on the third, and 156 on the last. At irregular intervals some of these riblets become expanded into hollow denticles at the summit, or 2 or 3 of them may join together to form a stronger denticle. The spiral sculpture consists of moderately broad threads, of which 9 occur on the first and second, 13 on the third, and 14 on the last turn between the summit and the suture. The junctions of the axial ribs and spiral cords form rather strong tubercles. The spiral threads are not all of the same strength, and the resulting tubercles therefore also differ in strength. Suture strongly constricted. Periphery strongly rounded. Base short, inflated, strongly rounded, openly umbilicated, marked by the continuation of the axial ribs, which extend into the umbilicus, and by 7 spiral threads of about the same strength as those on the spire,

Within the umbilicus 9 additional spiral threads of almost the same strength are also present. On the base and in the umbilicus the junction of the axial riblets and spiral threads produces weak nodules. Aperture broadly oval; peristome double, the inner rather strongly exerted and slightly reflected; the outer thick, broadly expanded and reflected, narrower on the parietal wall than on the rest of the shell and marked by a series of concentric lamellae. Operculum ?

The specimen described and figured, U.S.N.M. No. 355892, a cotype, was collected by Gundlach at Rio Seco, Pico Turquino, Oriente Province, the type locality. It has 4.5 whorls and measures: Length, 14.0 mm.; greater diameter 8.1 mm.; lesser diameter, 6.6 mm.

Subgenus *BLAESOSPIRA* Crosse

1890. *Blaesospira* CROSSE, Journ. Conchyl, vol. 38, p. 280.

Shell ranging from ovate-conic to corkscrew-shaped. All of the postnuclear whorls or only the last part of the last turn solute. The axial sculpture consists of slender lamellar ribs, upon which at regular intervals hollow spines are located. This regular disposition of the spines suggests spiral sculpture, which, however, is not apparent in the intercostal spaces. The intercostal spaces are marked by a varying number of axial threads, which range in strength from mere hairlines to slender lamellae. Operculum with a strongly elevated multispiral lamella, which is slightly outbent at the free edge. The nucleus of the turns is subcentral.

Type: *Blaesospira echinus* ([Wright] Pfeiffer).

The genotype was brought to the attention of collectors by Charles Wright, who distributed specimens far and wide with the designation "Viñales." Until comparatively recently, subsequent collectors failed to rediscover it. The National Museum collection contains a large series of specimens from American collectors, as well as from foreign collectors, but all of these had their source in Wright's collecting. Recently Dr. de la Torre's collectors have discovered this species on El Queque, and we are giving a figure of the El Queque specimens, as well as a figure of a specimen collected by Wright to show that they are consubspecific.

We have likewise two collectings from the Sierra del Infierno, evidently from two different places, as they show subspecific differentiation, which we are here recognizing. In this connection let us mention that Father Roca also obtained a distinct species in the Sierra San Andres, which we diagnose here, also.

KEY TO THE SPECIES OF THE SUBGENUS *BLAESOSPIRA*

Spiral rows of strong spines 4..... *echinus*  
Spiral rows of strong spines 3..... *rocai*

## ANNULARIA (BLAESOSPIRA) ECHINUS ([Wright] Pfeiffer)

Shell decidedly solute in all the postnuclear whorls, ranging in color from yellowish white to pale buff, with the hollow spines and the peristome a little paler. Nuclear whorls 2, well rounded, smooth, not solute, forming a pupoid apex. Postnuclear whorls forming an openly coiled tube with 4 rows of strongly elevated, thin, hollow spines between the summit and the umbilicus; these spines are arranged in axial as well as in spiral series, and they are connected axially by slender threads, which pass up on the sides of the spines. The spines are very thin and oval in cross-section. There are also feeble threads on the lateral sides of the spines. Between the spines, 4 to 7 slender axial threads are present, which are of about the same strength and spacing. The stronger axial threads upon which the spines are placed are also well developed on the parietal wall, and the finer threads between them are of the same strength here as on the rest of the whorls. Aperture circular; peristome double, the inner slightly exerted, scarcely reflected; the outer expanded into fimbriations, which are strongest on the outer wall corresponding with the stronger spines; on the parietal wall they are more feeble and the spaces between them are less broadly expanded. Operculum with subcentral nucleus and a strong lamella rising almost vertically from the outer edge of the turns to considerable height, slightly reflected at the free margin and marked by obliquely slanting threads.

We are recognizing three subspecies, which the following key and descriptions will help to differentiate:

## KEY TO THE SUBSPECIES OF ANNULARIA (BLAESOSPIRA) ECHINUS

Digitations of the outer lip very strongly developed.	
Digitations on the parietal lip well developed.....	<b>echinus</b>
Digitations on the parietal lip feeble.....	<b>lucifer</b>
Digitations of the outer lip not very strongly developed.....	<b>infernalis</b>

## ANNULARIA (BLAESOSPIRA) ECHINUS ECHINUS ([Wright] Pfeiffer)

## PLATE 39, FIGURES 1, 2

1864. *Cyclostoma (Choanopoma) echinus* [Wright] PFEIFFER, Malakozool. Blätter, vol. 11, p. 102.  
 1865. *Choanopoma echinus* (Wright) PFEIFFER, Monographia pneumonopomorum viventium, suppl. 2, p. 106.  
 1890. *Blaesospira echinus* CROSSE, Journ. Conchyl., vol. 38, p. 282, pl. 5, fig. 3.

This subspecies comes from the north side of El Queque, sometimes spoken of as Ensenada del Grillo, Palmarito. It has the digitations of the outer lip very strongly developed. Those on the inner and parietal lip are also well developed and in this respect this subspecies differs from *A. (B.) echinus lucifer*, where the converse is true.

Wright's specimen, U.S.N.M. No. 11022, has 2.3 whorls remaining and measures: Length, 6.9 mm.; greater diameter, 5.8 mm.; lesser

diameter, 4.5 mm. A complete specimen, U.S.N.M. No. 468839, with the nucleus and 4.4 whorls, measures: Length, 10.8 mm.; greater diameter, 7.0 mm.; lesser diameter, 6.0 mm.

ANNULARIA (BLAESOSPIRA) ECHINUS LUCIFER, new subspecies

PLATE 39, FIGURE 4

This subspecies comes from the Sierra del Infierno. It is a pale race, quite slender, with strong digitations on the outer and basal lip and feeble ones on the parietal lip.

The type, U.S.N.M. No. 535591, has 2.1 whorls remaining and measures: Length, 8.1 mm.; greater diameter, 7.0 mm.; lesser diameter, 5.7 mm.

ANNULARIA (BLAESOSPIRA) ECHINUS INFIERNALIS, new subspecies

PLATE 39, FIGURE 3

This subspecies also comes from the Sierra del Infierno. It is a buff-colored race with the digitation of the outer lip not strongly developed, while the digitation of the inner lip almost equals that of the outer lip.

The type, U.S.N.M. No. 535590, has 2.3 whorls remaining and measures: Length, 7.5 mm.; greater diameter, 6.1 mm.; lesser diameter, 4.0 mm.

ANNULARIA (BLAESOSPIRA) ROCAI, new species

PLATE 39, FIGURE 5

Shell of buff color, with all the postnuclear whorls solute. Nuclear whorls decollated in all our specimens. Postnuclear whorls strongly rounded, marked by distantly spaced, slender axial riblets, which bear 3 long, laterally compressed, hollow spines on each turn between the summit and the base. The intercostal spaces are marked by slender axial hairlines. The parietal wall bears mere indications of feeble spinules placed on the same axial element upon which the heavier spines are placed on the spire. Here these lamellae are very poorly developed, while the spaces between them are crossed by the same threadlike elements described for the spire. Aperture circular; inner peristome slightly solute and slightly reflected; the outer marked by digitations of which the 3 on the outer lip are stronger than the rest. There are 7 others covering the left basal portion, the inner and parietal lip. These digitations are marked by feeble concentric laminations.

This species was collected by Father Roca at Sitio de la Sierra, north side of Sierra de San Andres. We take pleasure in naming this for him. It is easily distinguished from the other species by the fact that it has one less series of spines on the whorls.

The type, U.S.N.M. No. 535592, has 2.3 whorls remaining and measures: Length, 8.0 mm.; greater diameter, 6.0 mm.; lesser diameter, 5.2 mm.

GUAJAIBONA, new subgenus

Shell ovate-conic, sculpture like *Blaesospira*, but with only the last part of the last whorl solute.

Type: *Annularia (Guajaibona) pretrei* d'Orbigny.

ANNULARIA (GUAJAIBONA) PRETREI (Orbigny)

PLATE 39, FIGURE 7

1842. *Cyclostoma pretrei* ORBIGNY, in Sagra's Histoire physique, politique et naturelle de l'Ile de Cuba, vol. 1, p. 260, pl. 22, figs. 9-11.  
 1850. *Choanopoma pretrei* GRAY, Nomenclature of molluscous animals and shells in the collection of the British Museum, p. 51.  
 1916. *Annularia pretrei* HENDERSON, Cruise of the *Tomas Barrera*, p. 281.  
 1920. *Blaesospira pretrei* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 74.

Shell broadly conic, thin, yellowish white, with the nuclear tip suffused with orange; peristome yellowish white, faintly rayed with brown in the depressions of the outer lip. Nuclear whorls 2.3, well rounded, smooth, except for the last portion of the last turn, which shows the beginning of the axial sculpture. Postnuclear whorls inflated, strongly rounded, marked by rather strong, more or less distantly but irregularly spaced, lamellar axial ribs, which bear slender hollow tubercles. Of these tubercles 5 are present on the first and second turns between the summit and the periphery, and 6 are on the last. The spaces between these stronger riblets are marked by slender, wavy axial threads, which vary in number and spacing. In some spaces only 2 occur, between the stronger ribs, while in others as many as 7 are present. Suture strongly constricted. Periphery inflated, strongly rounded. Base broadly, openly umbilicated, marked by the continuation of the axial sculpture, which extends strongly over the base into the umbilicus, where it becomes somewhat enfeebled. On the base the stronger riblets bear 6 spines, of which the outer 4 are heavier than the rest, the fifth being very slender, while the sixth series marks the edge of the umbilicus. On the umbilical wall 5 rows of feeble spines are present. Aperture circular; peristome double, the inner moderately exerted; the outer broadly expanded on the outer and basal lip and fluted, less strongly expanded on the inner lip, and marked all around by feeble, concentric lamellae. Operculum with subcentral nucleus, bearing a strong calcified spiral lamella, which rises slightly obliquely from the basal plate and which is slightly out-bent at the outer margin.

Gundlach says of this species (Malakozool. Blätter, vol. 3, p. 124, 1856): "The animal is pale with still lighter dots; the anterior portion of the neck and head are dark, and the feelers of the same color as the body."

This species comes from Pan de Guajaibon, Pinar del Rio. The specimen described and figured is one of a series, U.S.N.M. No. 11023, collected by C. Wright. It has 5.7 whorls and measures: Length, 7.9 mm.; greater diameter, 6.8 mm.; lesser diameter, 5.3 mm.

#### SUBANNULARIA, new subgenus

Small elongate-conic shells, having slender lamellose or sublamellar axial ribs, which on all the whorls, or only on the early ones, bear slender, elongated nodules at regularly spaced intervals. These nodules give an appearance of spiral threads on the spire, which is an illusion, for none are apparent in the intercostal spaces. Some of the axial ribs terminate as individual cusps, or several of them may become fused into a cusp at the summit. Last whorl solute. Peristome double. Operculum with a very oblique, strong lamella, whose outer edge does not extend to the outer limit of the whorls of the basal plate, which leaves the turns well separated. The lamella is marked by slender, retractively curved lamellae.

Type: *Annularia (Subannularia) storchi* (Pfeiffer).

#### KEY TO THE SPECIES OF THE SUBGENUS SUBANNULARIA

Outer, basal, and inner lip of outer peristome crenulated.

Axial ribs very slender..... lachneri

Axial ribs not very slender..... jeannereti

Outer, basal, and inner lip of outer peristome not crenulated..... storchi

#### ANNULARIA (SUBANNULARIA) LACHNERI (Pfeiffer)

#### PLATE 39, FIGURE 9

1861. *Choanopoma lachneri* PFEIFFER, Malakozool. Blätter, vol. 8, p. 223.

1920. *Annularia (Annularia) lachneri* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

Shell small, elongate-conic, flesh colored. Nuclear whorls decolated in all our specimens. Postnuclear whorls inflated, strongly rounded, marked by retractively slanting, wavy, threadlike axial riblets, which are more or less grouped in series. The series do not possess a definite number of these threads. Of these riblets 52 occur on the first whorl, 76 on the second, 86 on the third, and 104 on the last. The spiral sculpture consists of very fine microscopic striations, which are best seen between the riblets. Suture strongly constricted. Periphery inflated, strongly rounded. Base moderately long, inflated, strongly rounded, openly umbilicated, marked by the continuation of the axial riblets and by 5 obsolete spiral threads on the umbilical wall. Last whorl solute for a little more than half a turn.

Aperture almost subcircular; peristome double, the inner slightly exerted and slightly reflected; the outer broadly expanded on the outer and basal lip and narrower on the parietal wall, decidedly auriculated at the posterior angle and very strongly fluted on the inner lip, marked by a series of concentric laminae. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 10995, is one of 6 collected by C. Wright at La Catalina, Sagua de Tanamo, Oriente Province. It has a little over 4 whorls remaining and measures: Length, 8.5 mm.; greater diameter, 4.4 mm.; lesser diameter, 3.4 mm.

ANNULARIA (SUBANNULARIA) JEANNERETI (Pfeiffer)

PLATE 39, FIGURE 6

1861. *Ctenopoma jeannereti* PFEIFFER, Malakozool. Blätter, vol. 8, p. 223.

1920. *Parachondria (Parachondrops) jeannereti* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 67.

Shell small, elongate-conic, pale yellow. Nuclear whorls 2, inflated, strongly rounded, microscopically granulose, forming a pupoid apex. Postnuclear whorls somewhat inflated, strongly rounded, marked by rather strong, slightly retractively curved, axial riblets, which become slightly expanded at the summit, or several of them may become fused to form a hollow cusplike element. These ribs are not of the same strength, but at irregular intervals they become intensified, with smaller ribs between them, which gives the shell a somewhat scalariform appearance. The riblets are nodulose at regular intervals, which gives the shell the appearance of having spiral cords, a fact not borne out in the intercostal spaces. Of the axial ribs 31 are present on the first whorl and 88 on the last turn. Suture strongly constricted. Periphery well rounded, marked by the continuation of the axial ribs, which cross the base, which is marked by 3 rather strong spiral cords, which form narrow, well elevated tubercles at their junction with the axial ribs. Last whorl solute for one-fourth of a turn, without spiral sculpture on the umbilical wall. Aperture broadly oval; peristome double, the inner moderately exerted and reflected; the outer broadly expanded except at the parietal wall, somewhat fluted and slightly denticulated at the edge.

The specimen described and figured, U.S.N.M. No. 355386, is a cotype received by Dr. de la Torre from Jeanneret who secured it on Monte Líbano, near Guantánamo City, Oriente Province. It has 5.1 whorls remaining and measures: Length, 7.7 mm.; greater diameter, 3.4 mm.; lesser diameter, 3.0 mm.

We have quite a series of specimens from the same region, which were collected by Henderson and Bartsch.

## ANNULARIA (SUBANNULARIA) STORCHI (Pfeiffer)

Shell very elongate-conic, varying in color from flesh color to pale brown. Nuclear whorls 2, inflated, strongly rounded, smooth, forming a mammillated apex. Postnuclear whorls inflated, strongly rounded, marked by retractively slanting axial riblets, which vary in spacing from closely approximated to a separation by a space about the width of the riblet in the different subspecies. These riblets may become expanded at the summit to form hollow blisterlike denticles; at times 2 or more of these may become fused in this effort. At regular intervals these riblets bear slender nodules, which give the whorls the appearance of having spiral threads but which are not present in the intercostal spaces. Suture strongly constricted. Periphery inflated, strongly rounded. Base broadly, openly umbilicated, marked by the continuation of the nodulose axial riblets. The last whorl is solute for almost half a turn. Aperture very broadly oval; peristome double, the inner is moderately exerted and scarcely reflected; the outer moderately, broadly expanded, usually auriculated at the posterior angle, where the auricle is bent back in some of the subspecies to almost form a channel; the outer lip is a little narrower on the parietal wall than on the rest of the peristome, and is marked by a series of concentric lamellae. Operculum typically annularid.

This species occupies the region about Cayo del Rey, Mayari, Oriente Province, where it appears to break up into two subspecies, characterized here.

## KEY TO THE SUBSPECIES OF ANNULARIA (SUBANNULARIA) STORCHI

Axial ribs strong and rather stout.....	<i>nipensis</i>
Axial ribs not strong and rather fine.....	<i>storchi</i>

## ANNULARIA (SUBANNULARIA) STORCHI NIPENSIS, new subspecies

## PLATE 39, FIGURE 8

This subspecies comes from the Farallones de Nipe, near Sabanilla. It differs from the typical race in having the ribs much larger, fewer, and a little more distantly spaced, and in having the denticles at the summit much more pronounced.

The type, U.S.N.M. No. 355883, has a little more than 5.0 whorls remaining and measures: Length, 9.3 mm.; greater diameter, 4.1 mm.; lesser diameter, 3.3 mm.

## ANNULARIA (SUBANNULARIA) STORCHI STORCHI (Pfeiffer)

## PLATE 39, FIGURE 10

1861. *Choanopoma storchi* PFEIFFER, Malakozool. Blätter, vol. 8, pp. 222-223.  
 1920. *Annularia (Annularia) storchi* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

The type of this subspecies was collected by Wright at Cayo del Rey, Oriente Province. This subspecies differs from *A. (S.) storchi nipensis* in having the axial ribs much smaller and more closely spaced, and the denticles at the summit much less strongly developed.

The specimen described and figured, U.S.N.M. No. 11001, is one collected by Wright at Cayo del Rey. It has a little more than 5.0 whorls remaining and measures: Length, 8.6 mm.; greater diameter, 3.8 mm.; lesser diameter, 3.1 mm.

Subgenus ANNULARISCA Henderson and Bartsch

1920. *Annularisca* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 72.

Shell depressed-helicoid, widely, openly umbilicated, marked by axial riblets on spire and base. Spiral sculpture absent, or restricted to the umbilical wall, or sometimes consisting of microscopic lines.

Type: *Annularia (Annularisca) eburnea* ([Gundlach] Pfeiffer).

KEY TO THE SPECIES OF THE SUBGENUS ANNULARISCA

Spiral sculpture absent.

Interior of aperture white..... **eburnea**  
Interior of aperture chestnut brown..... **prestoni**

Spiral sculpture present.

Umbilical wall with spiral threads.

Shell decidedly depressed.

Spiral sculpture on spire present..... **aberrans**  
Spiral sculpture on spire absent.

Interior of aperture orange..... **auricomma**

Interior of aperture pale..... **pallens**

Shell moderately elevated.

Axial ribs rounded..... **alata**

Axial ribs sharp..... **tacrensis**

ANNULARIA (ANNULARISCA) EBURNEA ([Gundlach] Pfeiffer)

PLATE 41, FIGURES 4-6

1858. *Choanopoma eburneum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 5, p. 188.

1862. *Cyclostoma eburneum* REEVE, Conchologia iconica, No. 159.

1920. *Annularia (Annularisca) eburnea* HENDERSON and BARTSCH, Proc. U. S., Nat. Mus., vol. 58, p. 72.

Shell very depressed-helicoid, very broadly openly umbilicated, milk-white. Nuclear whorls almost 2, well rounded, microscopically granulose, forming a depressed spire. Postnuclear whorls strongly rounded, marked by slightly retractively curved, fairly regularly spaced axial threads only. Suture strongly impressed. Periphery of the last whorl well rounded, the basal portion of the whorls well rounded, all of the turns showing to the apex in the broad, open umbilicus, marked by the continuation of the axial riblets, which

extend over the umbilical wall. No spiral sculpture whatsoever is present. Aperture broadly oval; peristome simple, except at the posterior angle, where a shelf bridges across the slight auricle, which suggests an inner peristome; the outer lip is moderately broadly expanded, while the inner is narrow. Operculum almost subcircular, with subcentral nucleus; the calcified, thin, but very broad lamella rises slightly obliquely from the chondroid basal plate; this lamella is marked by slightly curved incremental lines.

The specimen described and figured, U.S.N.M. No. 355899, is one received from Gundlach. It has 4.0 whorls and measures: Length, 7.1 mm.; greater diameter, 13.9 mm.; lesser diameter, 10.7 mm. While this shell is marked "Cuba," it is more than probable that it came from the type locality.

Gundlach says of this species: (Malakazool. Blätter, vol. 5, p. 188; 1858): "On limestone cliffs in the Cafetal Santa Maria, District Ramon (Oriente Province). Animal light gray with olive colored sheen; small whitish dots form spots on the sides of the foot and almost cover the neck. Tentacles white at the base, the rest ochre colored. One can see the dark gray or marbled intestines shine through the shell. While creeping, the shell is held almost horizontal."

ANNULARIA (ANNULARISCA) PRESTONI Ramsden

PLATE 40, FIGURES 1-3

1914. *Annularia eburnea prestoni* RAMSDEN, Nautilus, vol. 28, p. 50.

Shell depressed-helicoid, flesh colored, with livid blotches and areas, and toward the aperture with a tinge of brown. The edge of the peristome is white; behind the edge of the peristome, within the aperture, there is a broad zone of chestnut brown, which gradually fades backward. Nuclear whorls 1.5, small, well rounded, microscopically granulose. Postnuclear whorls somewhat inflated, well rounded, marked by retractively curved, slender axial riblets, which gradually gain in strength as the shell increases in size. These riblets are about as wide as the spaces that separate them, and they extend over the strongly rounded periphery, base, and over the umbilical wall. Base very broadly openly umbilicated, showing all the whorls within. Aperture very broadly oval; peristome simple?, the outer lip broadly expanded, forming an auricle at the posterior angle; the inner lip very narrow. There is a shelf which stretches across the base of the auricle, leaving a free space behind, which might indicate a possible double peristome. Operculum with almost central nucleus, and broadly, obliquely flaring lamella, which is marked by fine recurved threads.

The specimen figured, U.S.N.M. No. 535601, a topotype, was collected by Dr. Charles T. Ramsden on the Ojo de Agua Range, between

Guantánamo and Ramón de las Yaguas, 9 leagues from the former and 4 leagues from the latter. It has 4.4 whorls remaining and measures: Length, 7.5 mm.; greater diameter, 17.9 mm.; lesser diameter, 13.6 mm. The species can at once be differentiated from *A. (A.) eburnea* by the brown coloration of the interior of the aperture, and by the heavier and more pronounced axial ribs.

## ANNULARIA (ANNULARISCA) ABERRANS, new species

## PLATE 41, FIGURES 1-3

Shell helicoid, bright straw yellow, marked with diaphanous whitish spots and more or less zigzag or vermiculated lines of brown, much paler on the under side than on the upper; the peristome is white; the interior of the aperture is orange. Nuclear whorls 1.5, well rounded, smooth, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by strongly, retractively slanting narrow, almost sharp axial riblets, which on the early whorls are about as wide as the spaces that separate them. On the last turn they are a little closer spaced; at irregular intervals these riblets become enfeebled and more closely grouped, indicating resting stages. The intercostal spaces under high magnification show incised spiral lines, which are irregularly developed and disposed. Suture strongly constricted. Periphery well rounded. Base short, inflated, strongly rounded, openly umbilicated, marked by the continuation of the axial ribs and by incised spiral lines. On the umbilical wall the axial ribs become closely approximated; here, also, 12 raised spiral threads are present, which render the riblets feebly nodulose. Aperture subcircular; peristome double, the outer and inner fused except for an indication of separation at the posterior angle. Operculum typically annularid.

The type, U.S.N.M. No. 25100, was collected by C. Wright at Monte Verde, northeast of Guantánamo, Oriente Province. It has a little over 3 whorls and measures: Length, 10.4 mm.; greater diameter, 14.9 mm.; lesser diameter, 11.8 mm.

## ANNULARIA (ANNULARISCA) AURICOMA ([Gundlach] Pfeiffer)

Shell depressed-helicoid, flesh colored, marked with hydrophanous spots, which sometimes give to the surface of the shell a painted or vermiculated, blotched or spotted appearance; the early whorls are usually a little darker than the rest, while the base is usually paler than the upper half; the peristome is white and the interior of the aperture is orange, densest at the junction of the white zone of the peristome and of the colored interior. Nuclear whorls almost 2, well rounded, smooth, except for the last portion of the last turn,

which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by rather coarse, more or less regular, retractively slanting, low, rounded axial riblets, which are always broader than the spaces that separate them; in addition to this there is an indication of rather broad obsolete spiral threads. Suture narrowly channeled; periphery well rounded. Base short, very broadly openly umbilicated, marked by the continuation of the axial ribs and by indications of obsolete spiral threads; the umbilical wall is marked by the continuation of the axial riblets and by spiral threads, which vary in number and strength in the two races here recognized. Aperture broadly oval; peristome double, the inner and outer co-extensive and fused, separated by a mere line except at the posterior angle where the separation is a little more marked; the fusing of the two peristomes is so complete as to lead one easily to mistake it for a simple structure. Operculum typically annularid.

This species comes from the environs of Guantánamo Bay and extends eastward to the mouth of the Yateras River.

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULARISCA) AURICOMA

Axial ribs depressed..... auricoma  
 Axial ribs not depressed..... putre

ANNULARIA (ANNULARISCA) AURICOMA AURICOMA ([Gundlach] Pfeiffer)

PLATE 42, FIGURES 4-6

1859. *Cyclostoma auricomum* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 6 pp. 71-72.  
 1862. *Choanopoma auricomum* PFEIFFER, Novitates conchologicae, vol. 2, pp. 194-195, pl. 51, figs. 19-21.  
 1920. *Tudora (Tudorellata) auricoma* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 76.

Henderson and Bartsch gathered this subspecies in immense quantities from the various digitations and rocky cliffs jutting out into Guantánamo Bay. Here specimens were found under rocks and other objects, which sheltered them from the sun's rays and from hot winds.

These gatherings present some interesting variations in size and color and would furnish a splendid subject for a biometrist.

Our specimens, gathered on a hillside 1 mile from the Amusement House on the Boquerón Trail, agree most nearly with Gundlach and Pfeiffer's descriptions and measurements. One hundred of these yield the following measurements:

	Length	Greater diameter	Lesser diameter
	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>
Greatest.....	11. 8	17. 7	15. 4
Least.....	8. 0	13. 3	11. 0
Average.....	9. 7	15. 3	13. 0

The specimen figured is U.S.N.M. No. 356352.

One hundred specimens from the small island at the head of Cumberland Inlet measure:

	Length	Greater diameter	Lesser diameter
	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>
Greatest.....	10. 0	15. 8	13. 8
Least.....	6. 7	9. 2	8. 0
Average.....	8. 5	13. 2	11. 3

The specimen figured is U.S.N.M. No. 356354.

One hundred specimens from the limestone hill bayward from the rifle range measure:

	Length	Greater diameter	Lesser diameter
	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>
Greatest.....	9. 5	14. 8	13. 2
Least.....	7. 0	11. 2	9. 6
Average.....	8. 2	13. 0	11. 2

The specimen figured is U.S.N.M. No. 356356.

We have selected an average specimen from each of these localities for figuring.

The broader, less elevated, and more rounded axial ribs differentiate this subspecies from *Annularia* (*Annularisca*) *auricoma putre* ([Gundlach] Pfeiffer).

ANNULARIA (ANNULARISCA) AURICOMA PUTRE ([Gundlach] Pfeiffer)

PLATE 42, FIGURES 1-3

1863. *Choanopoma putre* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 10, p. 193.

1920. *Tudora* (*Tudorellata*) *putre* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 76.

This subspecies comes from the mouth of Yateras River, some 13 miles east of the Naval Station in Guantánamo Bay. It is easily distinguished from *A. (A.) auricoma auricoma* by its greater elevation, more narrow umbilicus, and sharper axial ribs.

The specimen figured, U.S.N.M. No. 356358, is a cotype collected by Gundlach. It has 4 whorls and measures: Length, 9.2 mm.; greater diameter, 16.2 mm.; lesser diameter, 13.0 mm.

Gundlach says of the animal (Malakozool. Blätter, vol. 10, p. 193, 1863): "Animal gray with greenish suffusion; sides of foot marked by spots composed of white dots. Tentacles coral red becoming paler from the tip to the middle. The edge of the snout is of the same (coral red) color. The rest of the snout to the forehead is blackish. Forehead and the region about the eyes much paler than the body."

ANNULARIA (ANNULARISCA) PALLENS, new species

PLATE 43, FIGURES 4-6

Shell depressed-helicoid, straw yellow, with the peristome whitish and the interior of the aperture of the same color as the exterior. Nuclear whorls 1.5, smooth except for the last portion of the last turn, which shows the beginning of the postnuclear axial sculpture. Postnuclear whorls inflated, strongly rounded, marked by well-developed, very closely spaced, regular, retractively slanting axial riblets, which are separated by spaces about as wide as the riblets. Suture narrowly channeled. Periphery strongly rounded. Base short, strongly rounded, openly umbilicated, marked by the continuation of the axial sculpture. On the umbilical wall 11 spiral threads are present in addition to the axial riblets, which render the latter wavy and feebly nodulose. Aperture broadly oval; peristome double, the inner and outer coextensive and fused, narrowly reflected, differentiated only at the posterior angle, where the inner peristome is indicated as a slight shelf. Operculum typically annularid.

The type, U.S.N.M. No. 104552, is one of three collected by Gundlach, and it is labeled Guantánamo. It has 4.2 whorls and measures: Length, 8.3 mm.; greater diameter, 13.5 mm.; lesser diameter, 10.6 mm.

A series of 20 specimens, all from old collections, are in the United States National Museum.

This species differs from the others in being in every way less heavy, in having the ribs much narrower and more closely spaced, in being practically unicolor, and in having the inside of the aperture straw-colored instead of orange.

ANNULARIA (ANNULARISCA) ALATA (Pfeiffer)

PLATE 43, FIGURES 1-3

1851. *Cyclostoma alatum* PFEIFFER, Proc. Zool. Soc. London, p. 250.

1852. *Choanopoma? alatum* PFEIFFER, Catalogue of Phaneropneumona . . . in the British Museum, p. 117.

1852. *Choanopoma alatum* PFEIFFER, *Conspectus cyclostomaceorum*, p. 60.

1920. *Tudora (Tudorellata) alatum* HENDERSON and BARTSCH, *Proc. U. S. Nat. Mus.*, vol. 58, p. 76.

Shell depressed-helicoid, moderately elevated, of flesh-colored ground color on upper surface, marked by slender, short dashes, which have their long axis spirally arranged. These are present on both spire and base. The base is a little paler than the spire. Peristome white; interior of the aperture orange. Nuclear whorls 1.7, well rounded, microscopically granulose. Postnuclear whorls marked by retractively curved axial riblets, which are moderately well elevated, and which are narrower than the spaces that separate them; the spiral sculpture consists of obsolete threads, which are scarcely indicated. Suture moderately well impressed. Periphery well rounded. Base short, strongly rounded, marked by the continuation of the axial ribs and feebly indicated spiral threads. On the umbilical wall, however, the spiral threads, while slender, are much more pronounced and quite numerous. The umbilicus is open but narrower than that of *A. (A.) auricoma*. Aperture almost circular; peristome double, the inner and outer coextensive and fused except at the posterior angle, where the inner forms a slight shelf separating it from the outer. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 535643, is one of six from Imías. It has 4.6 whorls and measures: Length, 10.3 mm.; greater diameter, 16.7 mm.; lesser diameter, 12.7 mm. This is the largest of the six. We selected it because it most nearly approaches the measurements of the one described by Pfeiffer. The smallest specimen of the lot has 4.6 whorls and measures: Length, 9.2 mm.; greater diameter, 13.3 mm.; lesser diameter, 10.7 mm.

Pfeiffer, when he described this species, stated that it came from "S. Yago de Cuba," i. e., Santiago. In 1856 (*Malakozool. Blätter*, vol. 3, p. 124) he stated that "S. Yago de Cuba" was the locality designation in Cuming's collection. This is undoubtedly an error, since the group does not range west to this point. We are giving three views of Pfeiffer's type, for which we are indebted to the authorities of the British Museum; also similar figure of a specimen from Imías, which is about 33 miles east of Guantánamo, on the south coast of Oriente Province, which we believe identical. The region about Imías, therefore, is probably the type locality for *A. (A.) alata*.

ANNULARIA (ANNULARISCA) TACRENSIS, new species

PLATE 40, FIGURES 4-6

Shell small, depressed-helicoid, pale horn colored, with peristome white. Interior of the aperture brownish orange. Nuclear whorls 1.5, well rounded, microscopically granulose. Postnuclear whorls well

rounded, marked by retractively curved, slender, well elevated, narrow ribs. There is no indication of obsolete spiral threads on spire or base. Suture well constricted. Periphery inflated, strongly rounded. Base short, strongly rounded, narrowly, openly umbilicated, marked by the continuation of the axial ribs and on the parietal wall by feebly developed, slender spiral threads, which are rather few in number, and which are rather distantly spaced. Aperture circular; peristome double, the inner coextensive on the outer lip with the outer, separated from the outer on the inner lip and the parietal wall by an impressed line. On the inner lip and the parietal wall the outer peristome becomes flaringly expanded and attenuated and forms a conspicuous projection at the posterior angle. Operculum typically annularid.

The type, U.S.N.M. No. 535645, comes from Tacre, west of Cajobabo, Oriente Province. It has 4.2 whorls and measures: Length, 8.9 mm.; greater diameter, 11.0 mm.; lesser diameter, 8.4 mm.

The extremely small size and the sharp axial ribs will distinguish this species from all the others.

#### ANNULAREX, new<sup>7</sup>subgenus

Shell as in *Annularella*, but with spiral sculpture on the spire.

Type: *Annularia (Annularex) intercis*, new species.

#### KEY TO THE SPECIES OF THE SUBGENUS ANNULAREX

Spiral sculpture of spire strong.

Outer peristome of inner lip broadly expanded..... *intercis*

Outer peristome of inner lip not broadly expanded..... *mackinlayi*

Spiral sculpture of spire not strong.

Spiral threads on umbilical wall strong..... *incerta*

Spiral threads on umbilical wall feeble..... *ramsdeni*

#### ANNULARIA (ANNULAREX) INTERCISA, new species

#### PLATE 44, FIGURES 1-3

Shell moderately large, depressed-helicoid, flesh colored with a brownish flush; peristome white, with the interior of the aperture pale orange. Nuclear whorls 1.5, small, well rounded, microscopically granulose. The postnuclear whorls are inflated and strongly rounded; the first turn has 75 very slender, retractively curved axial riblets, the same type of sculpture continuing for another fraction of a whorl; this sculpture is followed by a stage in which there is a differentiation between the stronger, distantly spaced axial ribs and the fine intercalated threads, the latter gaining rapidly in strength so that on the last half of the last turn it is difficult to distinguish them from the stronger. In addition to this, the whorls are marked by spiral threads, which are a little stronger than the axial ribs. These are not apparent on the first postnuclear whorl, but on the second 6 are present between

the summit and the suture, and 9 on the last. The spiral threads render the stronger axial riblets slightly nodulose and the finer wavy. Suture slightly channeled. Periphery of the last whorl well rounded. Base short, strongly rounded, marked by the continuation of the axial ribs and by 10 spiral threads, which are of almost equal strength. The umbilicus is broadly open and marked by the feeble continuation of the axial ribs and by 8 spiral threads, which become consecutively stronger and a little more distantly spaced from within toward the outside, the outermost being the strongest. Aperture almost circular; peristome double, the inner and outer being coextensive on the outer and basal lip and differentiated only by an impressed line on the inner lip and at the posterior angle. At the posterior angle the outer peristome forms an auricle. Operculum typically annularid.

The type, U.S.N.M. No. 535661, was collected by Dr. Ramsden at Ocuja, Vega Grande, Oriente Province. It has 4.5 whorls and measures: Length, 8.3 mm.; greater diameter, 12.7 mm.; lesser diameter, 9.5 mm.

ANNULARIA (ANNULAREX) MACKINLAYI ((Gundlach) Pfeiffer)

PLATE 44, FIGURES 4-6

1859. *Cyclostoma mackinlayi* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 6, pp. 73-74.

1861. *Cistula mackinlayi* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.

1920. *Tudora (Tudorellata) mackinlayi* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 75.

Shell broadly turbinate, straw colored. Nuclear whorls and the peristome a little paler; interior of the aperture pale orange. Nuclear whorls 2, well rounded, microscopically granulose, except the last portion of the last turn, which shows the beginning of the postnuclear axial sculpture. Postnuclear whorls inflated, very broad, marked by retractively slanting, sublamellar axial riblets, between which finer axial threads are present; the coarser riblets are slightly expanded at their summit. Of the coarser riblets, 54 occur on the third, and 74 are on the last whorl. The finer riblets between the stronger lamellar ribs vary from 2 to 5 in number; in addition to the axial sculpture, the postnuclear whorls are marked by spiral threads, of which 6 occur on the third and 13 on the last whorl between summit and suture. The junctions of the spiral threads and the sublamellar axial riblets form feeble nodules, while the intercalated riblets are merely rendered somewhat wavy by the spiral threads. Suture channeled. Periphery well rounded. Base short, strongly rounded very openly umbilicated, marked by the continuation of the axial sculpture and 11 spiral threads, the latter a trifle weaker than those on the spire; but they also affect the axial riblets in the same manner as they do on the spire. The

umbilical wall is marked by the closely crowded axial riblets, which here are a trifle weaker, and by 10 spiral threads, of which the outermost is much stronger than those within, which are of equal strength and almost equal spacing. Aperture subcircular; peristome double, the two peristomes coextensive on the outer and basal lip, while on the inner lip the outer extends slightly beyond the inner; at the posterior angle the outer forms an auricle which is adnate to the preceding turn, while the inner projects as a strong shelf. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 356331, is a topotype collected by Gundlach at Cafetal Ermitano, Yateras, Oriente Province. It has 4.4 whorls and measures: Length, 8.8 mm.; greater diameter, 11.9 mm.; lesser diameter, 9.3 mm.

Gundlach states of the animal of this species (*Malakozool. Blätter*, vol. 6, p. 74, 1859): "On cliffs. Animal gray with whitish dots, especially so on the rosy colored head. Feelers from the middle to the base red but with brownish tip. Snout reddish, red at the edge and brown at the base."

ANNULARIA (ANNULAREX) INCERTA, new species

PLATE 45, FIGURES 1-3

Shell broadly turbinate, flesh colored, with whitish diaphanous spots that are arranged in spiral series; peristome white; interior of the aperture orange. Nuclear whorls 1.6, small, inflated, strongly rounded, forming a rather elevated spire. Postnuclear whorls inflated, strongly rounded, marked by very strong, almost lamellar axial ribs, of which 38 are present on the first postnuclear whorl. On the succeeding turn there is a differentiation into stronger ribs with finer threads between them. These, however, are few in number, varying from 1 to 3, which gain rapidly in strength so that on the last turn there is a complete confusion of strong and fine threads; sometimes 5, 6, or 8 of the finer threads may be present between the coarser ribs; again, they may be absent altogether, about 80 of the stronger threads being present on the last turn. The strong axial ribs form rather conspicuous auricles at the summit. The spiral sculpture consists of feeble threads which scarcely render the axial riblets weakly nodulose. Suture strongly, deeply channeled. Periphery well rounded. Base short, strongly rounded, openly umbilicated, and marked by the continuation of the axial ribs and weak indications of spiral threads. On the umbilical wall, however, the spiral sculpture becomes decidedly pronounced, 11 strong threads being present, of which the outermost one marks the edge of the umbilicus, which is much stronger than the rest. The junction of the axial ribs and spiral threads within the umbilicus forms sharp nodules. Aperture broadly oval; peristome

double, the inner and outer coextensive on the basal and anterior half of the outer lip, separated by an impressed groove on the inner lip and decidedly differentiated at the posterior angle, where the inner peristome forms a conspicuous shelf, while the outer forms a decided auricle which may bear a number of concentric lamellae. Both peristomes are moderately expanded and reflected and are of about the same width all around except at the parietal wall, where they are a little narrower. Operculum typically annularid.

The type, U.S.N.M. No. 535663, was collected by Dr. Ramsden at La Cobreira, east of Guantánamo. It has 5 whorls and measures: Length, 10.0 mm.; greater diameter, 11.0 mm.; lesser diameter, 8.0 mm.

ANNULARIA (ANNULAREX) RAMSDENI (Pilsbry and Henderson)

PLATE 45, FIGURES 4-6

1912. *Annularia ramsdeni* PILSBRY and HENDERSON, Nautilus, vol. 26, p. 42.  
 1913. *Annularia ramsdeni* PILSBRY and HENDERSON, Nautilus, vol. 27, p. 37, pl. 3, figs. 5, 6.  
 1920. *Tudora (Tudorellata) ramsdeni* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 75, MS.?

Shell very broadly turbinate, straw colored. Nuclear whorls 2, well rounded, microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear axial riblets. Postnuclear whorls very broad, inflated, strongly rounded, marked by retractively slanting, sublamellar axial riblets, between which finer riblets occur; this is particularly true on the middle whorl. On the last turn the intercalated threads attain almost the size of the stronger. The stronger riblets become slightly expanded at the summit, particularly so on the middle whorl. There are 46 of the stronger axial riblets on the first postnuclear whorl, 62 on the second, while on the last they cannot be differentiated from the finer threads. The finer threads vary from 2 to 7. The spiral sculpture consists of feeble threads, which are too poorly defined on the first postnuclear whorl to be counted, 7 are present on the second, and 12 are on the last between the summit and suture. The junction of the stronger axial riblets and spiral threads forms very feeble nodules, while the finer threads are merely rendered slightly wavy. Suture very deeply channeled. Periphery well rounded. Base short, openly umbilicated, well rounded, marked by the continuation of the axial sculpture and by 10 spiral threads equaling those on the spire in strength. The umbilical wall is marked by the continuation of the axial riblets, which here are slightly diminished in strength and closely crowded; 13 spiral threads are present, of which the outermost is much stronger than the 12 within, which are of subequal strength and spacing. Aperture subcircular, very oblique; peristome double, the inner and outer

coextensive on the outer and basal lip; on the inner lip the outer projects slightly beyond the inner, while at the posterior angle it is developed into a very strong auricle, while the inner peristome here forms a conspicuous shelf. Operculum typically annularid.

A cotype, U.S.N.M. No. 356337, from El Jigüe de la Argolla, east of Quantánamo, Oriente Province, has 5 whorls and measures: Length, 10.5 mm.; greater diameter, 14.2 mm.; lesser diameter, 10.4 mm.

#### BERMUDEZIA, new subgenus

Shell of turbinate outline, having both axial and spiral sculpture on the spire. The axial ribs are not of two strengths, but are of uniform development. Umbilicus open, forming a hollow axis. Peristome simple. Operculum provided with a strong calcified lamella, which is outward deflected to parallel the basal chondroid plate; the outer edge of the lamella does not extend to the outer limit of the whorls of the basal plate, but it leaves a rather broad zone of the chondroid base showing, as in typical *Annularia*. The lamella is marked by fine, retractively curved threads.

Type: *Annularia (Bermudezia) bermudezi*, new species.

#### KEY TO THE SPECIES OF THE SUBGENUS BERMUDEZIA

Spiral sculpture stronger than axial.	
Axial sculpture feeble.....	<i>bermudezi</i>
Axial sculpture not feeble.....	<i>payroli</i>
Spiral sculpture not stronger than axial.	
Spiral and axial sculpture both obsolete.....	<i>obliterata</i>
Spiral and axial sculpture not obsolete.	
Axial sculpture stronger than spiral.	
Operculum with prominent lamella.....	<i>capestanyi</i>
Operculum with obsolete lamella.....	<i>euglypta</i>

#### ANNULARIA (BERMUDEZIA) BERMUDEZI, new species

#### PLATE 46, FIGURE 1

Shell of turbinate outline, thin, varying from flesh to straw color in ground color, marked by interrupted spiral bands of brown, which are also arranged in axial series. The elements composing these bands are not uniform and they sometimes produce a slightly zigzag pattern. This color scheme extends over the spire and base and is present also on the umbilical wall. There is a dark sutural line in the nuclear whorls, while the interior of the aperture shows the external color scheme through the thin wall of the shell. Nuclear whorls 2, well rounded, microscopically granulose. Postnuclear whorls well rounded, marked by feeble, retractively slanting, incremental lines and strong rounded spiral cords, which are about as wide as the spaces that separate them. Of these cords 4 occur on the first, 8 on the second, 12 on the third, and 16 on the last whorl between the summit and the periph-

ery. Suture well constricted. Periphery inflated, strongly rounded. Base short, openly umbilicated, well rounded, and marked by spiral cords like the spire but here the axial sculpture becomes intensified and forms slight fenestrations between the spiral cords. The umbilical wall is marked by slender axial riblets and by feebly expressed spiral threads. The last whorl is slightly solute. Aperture broadly oval; peristome simple, the lip slightly reflected. Operculum typically bermudezid. The lamella is marked by fine, retractively curved, incremental lines.

The type, U.S.N.M. No. 493492, was collected by Bermudez at Loma Murciélagos, Vega Alta, Santa Clara Province. It has 5.8 whorls and measures: Length, 15.2 mm.; greater diameter, 11.6 mm.; lesser diameter, 9.6 mm.

This species ranges through the lomas of the region about Vega Alta. In addition to the type locality we have it from Lomas Sinaloa, Vereda del Abra and El Mamey, Fincas El Mirador and San Miguel, Loma del Infierno, Cueva Galana, and Loma Sola.

Bartsch describes the animals of this species, collected by him at Loma Vereda del Abra on August 13, 1928, as having the dorsal part pale smoky gray, marked with many papillae, which are covered by numerous white dots. There is a pinkish area behind the tentacles on the dorsum. Tentacles flesh colored tipped with pale orange. Sides smoky with a pale olivaceous tinge, which is also the color of the deeply cleft sole of the foot. The shell is carried free, and the motion is direct.

ANNULARIA (BERMUDEZIA) PAYROLLI, new species

PLATE 46, FIGURE 3

Shell of turbinate outline, of pale yellowish ground color with interrupted spiral bands of brown. The dots composing these bands may be in axial series or they may be diversely scattered. The nuclear whorls are darker than the rest of the shell and they show the dark sutural line, the first postnuclear whorl being the darkest of all. There is a moderately broad band of brown slightly within the umbilicus. Nuclear whorls 1.5, small, inflated, well rounded, microscopically granulose. Postnuclear whorls inflated and marked by weak axial riblets, which are rather closely spaced, and by strong spiral cords. Of the latter, 4 are present on the first, 8 on the second, while on the third slender intercalated cords make their appearance, the combination totaling 16. On the last whorl 25 cords are present between summit and suture. Base short, inflated, strongly rounded, openly umbilicated, marked by 13 spiral cords which are of the same strength and spacing as those on the spire. Here, as well as on the spire of the last turn, the axial riblets, in combination with the spiral

cords, produce a fenestrated pattern. The edge of the umbilicus, which is practically the middle of the base, is marked by a strong cord. Between that and the inner umbilical wall there are 3 additional strong cords, with 5 between the first and the next strong cord, and a slender one between the other two. The umbilical wall itself shows 21 spiral cords and rather well elevated, slender, closely spaced, axial riblets. The last whorl is solute for about one-tenth of a turn. Aperture broadly oval; peristome simple. Operculum bermudezid.

The type, U.S.N.M. No. 493493, comes from Lomas del Purio, Calabazar, Santa Clara Province. It has 6 whorls and measures: Length, 16.2 mm.; greater diameter, 13.3 mm.; lesser diameter, 10.4 mm.

The species seems to be present on all the limestone blocks surrounding the Central Purio.

ANNULARIA (BERMUDEZIA) OBLITERATA, new species

PLATE 46, FIGURE 4

Shell of turbinate outline, rather large, very thin, translucent, straw colored, with interrupted spiral bands of brown; the irregular spots composing these bands are broad and irregularly spaced; they are arranged in both axial and spiral series. They are present on the spire, base, and umbilical wall. The nuclear whorls do not have a broad sutural band. Nuclear whorls 2, well rounded, microscopically granulose. The first 2 postnuclear whorls are marked by retractively slanting, slender, axial riblets while on the succeeding whorls these riblets become reduced, until on the last whorl only incremental lines are present. On the first postnuclear whorl there are indications of microscopic spiral striations, which also vanish as the shell increases in size. Suture well impressed. Periphery strongly rounded. Base moderately long, openly umbilicated, strongly rounded, and marked by the continuation of the lines of growth, and obsolete spiral threads and weak malleations. The umbilical wall is marked by fine, rather closely spaced, axial threads. The last whorl is slightly solute. Aperture broadly oval; peristome simple. Operculum typical bermudezid.

The type, U.S.N.M. No. 493494, which comes from Cerro de Guajabana, Santa Clara Province, has lost the nucleus. The 5 remaining whorls measure: Length, 19.2 mm.; greater diameter, 15.2 mm.; lesser diameter, 12.7 mm.

ANNULARIA (BERMUDEZIA) CAPESTANYI new species

PLATE 46, FIGURE 5

Shell of turbinate outline, thin, semitranslucent, pale straw colored, with interrupted spiral bands of chestnut brown, which are composed of rather elongated streaks, arranged in both axial and spiral series.

These bands are present on both spire and base. No dark sutural line is present on the nuclear whorls. Nuclear whorls 2, well rounded, microscopically granulose. Postnuclear whorls marked by retractively slanting axial ribs, which are quite regular and about half as wide as the spaces that separate them. Spiral sculpture absent on the spire. Suture well impressed. Periphery strongly rounded. Base short, moderately, openly umbilicated, marked by the continuation of the axial ribs, and on the umbilical wall by feebly developed spiral threads. The last whorl is very slightly solute. Aperture broadly oval; peristome simple. Operculum typically bermudezid.

The type, U.S.N.M. No. 493495, comes from Palenque de Taguayabón, near Remedios, Santa Clara Province. It has 6 whorls and measures: Length, 18.1 mm.; greater diameter, 13.4 mm.; lesser diameter, 11.2 mm.

ANNULARIA (BERMUDEZIA) EUGLYPTA, new species

PLATE 46, FIGURE 6

Shell of turbinate outline, thin, pale yellow, with interrupted spiral bands of dark chestnut-brown. The spots composing these bands are round and distantly spaced, and they are present on both spire and base. On the umbilical wall there are almost continuous lines of brown. The nuclear whorls do not show a brown sutural line. Nuclear whorls 2, well rounded, microscopically granulose. Postnuclear whorls inflated, strongly rounded, marked by decidedly retractively slanting, quite well elevated axial ribs, which are about half as wide as the spaces that separate them. Suture well constricted. Periphery well rounded. Base moderately broadly openly umbilicated, marked by the continuation of the axial ribs. The umbilical wall, in addition to the axial ribs, shows feeble spiral threads. The last whorl is slightly solute. Aperture very broadly oval, almost subcircular; peristome simple. Operculum typically bermudezid.

The type, U.S.N.M. No. 493496, has 6 whorls and measures: Length, 17.9 mm.; greater diameter, 13.9 mm.; lesser diameter, 11.2 mm. This species comes from Loma Platero, which is a little east of Jagüeyar, Santa Clara Province.

The animals of this species were described by Bartsch from material collected at Loma Platero August 10, 1928. The upper side pinkish buff in general tone, with a sooty smudge between the tentacles, this smudge extending forward toward the snout. The posterior portion of dorsum pale olivaceous; base of tentacles of the same color as the body, the rest black, except the extreme attenuated tip, which is grayish flesh colored. Sides of the body a little paler than the back, covered by numerous fine whitish tubercles. Sole of the foot pale buff, deeply cleft medially. The animal when at rest suspends itself by a mucous thread.

## LUGARENIA, new subgenus

Shell varying from broadly elongate-conic to turbinate in outline. Axial ribs present on spire and base. The spiral sculpture may be confined to the umbilicus or it may extend over the entire shell. Base openly umbilicated. Peristome double. Operculum with a broadly expanded lamella, which is reflected outward to parallel the chondroid plate, not marked by fine, retractively curved threads; the lamellae of succeeding turns do not extend to the edge of the turns, but they leave a band of the basal plate exposed.

Type: *Annularia* (*Lugarenia*) *najazaensis*, new species.

## KEY TO THE SPECIES OF THE SUBGENUS LUGARENIA

Junctions of axial ribs and spiral threads strongly nodulose.....	<b>eurystoma</b>
Junctions of axial ribs and spiral threads weakly nodulose.	
Nodules obsolete on last whorl.	
Shell turbinate.....	<b>biayensis</b>
Shell elongate-ovate.....	<b>najazaensis</b>
Nodules not obsolete on last whorl.	
Last whorl adnate.....	<b>lirata</b>
Last whorl solute.....	<b>sifontesi</b>

## ANNULARIA (LUGARENIA) EURYSTOMA, new species

Shell turbinate, pale yellow, with interrupted spiral bands of brown on spire and base. The elements composing these bands are also arranged in axial series. There is a dark sutural band on the nuclear turns. Nuclear whorls 2, small, well rounded, microscopically granulose. Postnuclear whorls decidedly inflated, strongly rounded, marked by slender, retractively curved axial threads, which are about one-fourth as wide as the spaces that separate them, and by spiral threads a little stronger than the axial, which render the axial riblets granulose at their junctions. At the summit of the whorl the axial riblets project slightly into the suture and appear finely spinulose. Suture narrowly channeled. Periphery inflated, well rounded. Base short, well rounded, openly umbilicated, and marked by the continuation of the axial riblets and spiral threads, the junctions of which likewise form granulations. On the umbilical wall the spiral threads become emphasized and the axial riblets reduced, but here also the junction forms slender nodulations, the long axis of which coincides with the axial sculpture. Aperture broadly oval; peristome double, the inner either moderately exerted or reflected and appressed to the outer. Operculum typically lugarenid.

This species comes from southern Camagüey Province. We are recognizing two subspecies, which the following key will help to differentiate:

## KEY TO THE SUBSPECIES OF ANNULARIA (LUGARENIA) EURYSTOMA

Posterior half of inner lip broadly expanded..... *eurystoma*  
 Posterior half of inner lip not broadly expanded..... *chorrillensis*

## ANNULARIA (LUGARENIA) EURYSTOMA EURYSTOMA, new subspecies

## PLATE 47, FIGURE 6

This subspecies comes from the Sierra del Cachimbo, which lies between the Sierra del Chorrillo and Sierra de Najaza, in Camagüey Province.

It is easily differentiated from *A. (L.) eurystoma chorrillensis* by having the posterior portion of the outer lip of the outer peristome broadly expanded. It is also much larger.

The type, U.S.N.M. No. 493497, has 5.4 whorls and measures: Length, 13.5 mm.; greater diameter, 12.3 mm.; lesser diameter, 9.6 mm.

## ANNULARIA (LUGARENIA) EURYSTOMA CHORRILLENSIS, new subspecies

## PLATE 47, FIGURE 2

This subspecies comes from the Vereda del Telegrafo, which crosses the Sierra del Chorrillo.

It is easily distinguished from *A. (L.) eurystoma eurystoma* by being smaller and by having the posterior half of the inner lip not broadly expanded. It also has the inner peristome much more exerted, forming a shelf at the posterior angle, at which the outer peristome is slightly auriculate.

The type, U.S.N.M. No. 493499, has 5.4 whorls and measures: Length, 10.8 mm.; greater diameter, 9.7 mm.; lesser diameter, 7.7 mm.

## ANNULARIA (LUGARENIA) BIAYENSIS, new species

## PLATE 47, FIGURE 3

Shell of turbinate outline, thin, pale yellow, with slender interrupted spiral bands of brown, of which 3 are present on the spire and 3 are on the base. There is also a dark spot in the suture of the nuclear tip. Nuclear whorls very strongly inflated, rounded, microscopically granulose. Postnuclear whorls strongly rounded, marked by decidedly retractively curved axial ribs, which are crenulated at the summit. In addition to the crenulations there is a second row of nodules a little anterior to the summit. The axial ribs are slender, narrow, and well elevated, and about one-fifth as wide as the spaces that separate them. Suture channeled. Periphery well rounded. Base moderately long, well rounded, openly umbilicated, marked like the spire on the posterior two-thirds. On the anterior third 4 strong spiral threads are present, of which the fourth marks the edge of the

umbilicus, and is heavier than the rest. On the umbilical wall 10 additional spiral cords are present, which render the axial riblets slightly scalloped. Last whorl solute for about one-tenth of a turn. Aperture broadly ovate; peristome double, the inner moderately expanded and reflected, forming a little shelf at the posterior angle; the outer very broadly expanded, somewhat hooded at the posterior angle and fluted on the broad inner lip. Operculum typically lugarenid.

The type, U.S.N.M. No. 493501, was collected by Rodriguez in the Sierra de San Martin de Biaya, Camagüey Province. It has 5.5 whorls and measures: Length, 12.3 mm.; greater diameter, 10.0 mm.; lesser diameter, 8.1 mm.

ANNULARIA (LUGARENIA) NAJAZAENSIS, new species

Shell broadly elongate-ovate, pale yellow, with or without obsolete interrupted spiral bands of brown. Nuclear whorls very strongly inflated, well rounded, minutely granulose, forming a somewhat pupoid apex. Postnuclear whorls inflated, strongly rounded, appressed at the summit, marked by sublamellar, retractively slanting axial ribs, which are quite variable in strength. The spiral sculpture is very feebly expressed, being indicated only by minute nodulations on the ribs, and these are best developed near the summit of the shell. Suture strongly constricted. Periphery inflated, well rounded. Base moderately long, well rounded, openly umbilicated, marked by the continuation of the axial ribs and spiral threads. Aperture ovate; peristome double, the inner exerted and reflected, forming a slight shelf at the posterior angle; the outer rather broadly expanded and slightly hooded at the posterior angle. Operculum typically lugarenid.

This species also comes from the southern part of Camagüey Province.

We are recognizing two subspecies, which the following key will help to differentiate:

KEY TO THE SUBSPECIES OF ANNULARIA (LUGARENIA) NAJAZAENSIS

Spiral sculpture of umbilical wall strong----- najazaensis  
Spiral sculpture of umbilical wall feeble----- palomarensis

ANNULARIA (LUGARENIA) NAJAZAENSIS NAJAZAENSIS, new subspecies

PLATE 47, FIGURE 7

This subspecies is easily distinguished from *A. (L.) najazaensis palomarensis* by its larger size and stronger sculpture of the umbilical wall. It also has the nodules on the spire less strongly emphasized.

The type, U.S.N.M. No. 493503, was collected by Dr. de la Torre at El Cacaotal, Sierra de Najaza, Camagüey Province. It has 6.2 whorls and measures: Length, 15.1 mm.; greater diameter, 10.3 mm.; lesser diameter, 8.4 mm.

## ANNULARIA (LUGARENIA) NAJAZAENSIS PALOMARENSIS, new subspecies

## PLATE 47, FIGURE 8

This subspecies comes from Palomar de San José, Camagüey Province. It is easily distinguished from *A. (L.) najazaensis najazaensis* by its smaller size, by its little more slender form, and by having the nodulations near the summit of the whorls more pronounced and the spiral sculpture less strongly developed.

The type, U.S.N.M. No. 493505, has 6.1 whorls and measures: Length, 13.1 mm.; greater diameter, 9.5 mm.; lesser diameter, 7.0 mm.

## ANNULARIA (LUGARENIA) LIRATA, new species

Shell of elongate-turbinate outline, pale yellow, with feebly expressed interrupted spiral bands of brown, of which the one a little below the periphery seems most pronounced. There is also a dark spot in the suture of the nucleus. Nuclear whorls 2, well rounded, smooth, forming a somewhat depressed apex. Postnuclear whorls inflated, strongly rounded, marked by retractively curved, sublamellar axial riblets, which are rendered nodulose by spiral threads. The nodulation varies in strength in the different subspecies. Suture very strongly constricted. Periphery inflated, well rounded. Base short, openly umbilicated, marked by the continuation of the axial ribs and by spiral threads which here become a little stronger than they are on the spire. On the umbilical wall the spiral threads increase in number but are reduced in strength. The last whorl is adnate. Aperture broadly ovate; peristome double, the inner reflected and more or less adnate to the outer; the outer rather broadly expanded, somewhat fluted, and marked by concentric lines of growth. Operculum typically lugarenid.

This species comes from the Sierra de Guaicanamar.

We are recognizing two subspecies, which the following key will help to differentiate:

## KEY TO THE SUBSPECIES OF ANNULARIA (LUGARENIA) LIRATA

Nodulation on the last whorl strong.....	<i>lirata</i>
Nodulation on the last whorl feeble.....	<i>parva</i>

## ANNULARIA (LUGARENIA) LIRATA LIRATA, new subspecies

## PLATE 47, FIGURE 1

This subspecies was collected by P. Sifontes at Guaicanamar, Camagüey Province. It can easily be distinguished from *A. (L.) lirata parva* by its larger size and much stronger nodulation.

The type, U.S.N.M. No. 493507, has 6.0 whorls and measures: Length, 13.0 mm.; greater diameter, 9.8 mm.; lesser diameter, 7.8 mm.

## ANNULARIA (LUGARENIA) LIRATA PARVA, new subspecies

## PLATE 47, FIGURE 5

This subspecies comes from La Caridad de Guerrero, Sierra de Guaicánamar.

It is readily distinguished from *A. (L.) lirata lirata* by its smaller size and by its less strongly developed nodulation and spiral sculpture in the umbilicus.

The type, U.S.N.M. No. 493509, has 5.7 whorls and measures: Length, 11.2 mm.; greater diameter, 8.3 mm.; lesser diameter, 6.8 mm.

## ANNULARIA (LUGARENIA) SIFONTESI, new species

## PLATE 47, FIGURE 4

Shell turbinate, pale yellow, with or without a dark band immediately below the summit. Nuclear whorls 2, well rounded, microscopically granulose. Postnuclear whorls inflated, strongly rounded, appressed at the summit, and marked by retractively curved, almost lamellar axial riblets, which are rather distantly spaced. These riblets are rendered feebly nodulose by obsolete spiral threads. Suture strongly constricted. Periphery inflated, strongly rounded. Base moderately long, very broadly, openly umbilicated, marked by the continuation of the axial ribs and near the umbilicus by 3 spiral threads. Within the umbilicus 14 spiral threads are present which render the axial ribs finely nodulose. The last whorl is solute for about one-tenth of a turn. Aperture broadly oval; peristome double, the inner reflected and appressed to the outer; the outer moderately, broadly expanded, forming somewhat of a hood at the posterior angle. Operculum typically lugarenid.

The type, U.S.N.M. No. 493511, was collected by Pablo Sifontes, for whom it is named, in the Sierra del Cachimbo between Sierra de Najaza and El Chorrillo. It has 5.5 whorls and measures: Length, 10.9 mm.; greater diameter, 8.9 mm.; lesser diameter, 7.5 mm.

## Subgenus ANNULAROSA Henderson and Bartsch

1920. *Annularosa* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 72.

Shell turbinate, umbilicated. The early postnuclear whorls with faint axial riblets, which become obsolete on the last turn. Base malleated, the main axis of the malleations being placed in such a regular manner as to suggest spiral threads. A strong spiral keel marks the boundary between the umbilical wall and the base. The umbilical wall is marked by a few spiral threads. Operculum typically annularid.

Type: *Annularia (Annularosa) fragilis* ([Gundlach] Pfeiffer).

## ANNULARIA (ANNULAROSA) FRAGILIS ([Gundlach] Pfeiffer)

Shell broadly conic, pale horn colored. Nuclear whorls almost 2, well rounded, microscopically granulose, scarcely differentiated from the postnuclear turns. Postnuclear whorls strongly rounded and marked by almost obsolete, slightly retractively curved axial riblets. Suture strongly impressed. Periphery well rounded. Base rather broadly, openly umbilicated, marked by the faint continuation of the axial riblets and by malleations, the latter placed in such a regular manner that they suggest spiral threads. The junction of the umbilical with the basal wall is marked by a rather strong spiral cord. The umbilical wall shows faint spiral threads. Last whorl solute for a fraction of a turn. Aperture subcircular; peristome simple. Operculum typically annularid.

The following key and descriptions will differentiate the subspecies:

## KEY TO THE SUBSPECIES OF ANNULARIA (ANNULAROSA) FRAGILIS

Spiral threads on umbilical wall obsolete.....	<i>fragilis</i>
Spiral threads on umbilical wall not obsolete.....	<i>juliani</i>

## ANNULARIA (ANNULAROSA) FRAGILIS FRAGILIS ([Gundlach] Pfeiffer)

## PLATE 48, FIGURES 1-3

1859. *Choanopoma fragile* [Gundlach] PFEIFFER, Malakozool. Blatter, vol. 6, p. 70.  
 1862. *Cyclostoma fragile* REEVE, Conchologia iconica, No. 153.  
 1920. *Annularia (Annularosa) fragilis* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 72.

This, the typical subspecies, was collected by Gundlach on Monte Toro, at Cafetal Yemen, northeast of Guantánamo, Oriente Province.

The specimen described and figured, U.S.N.M. No. 355900, a cotype, was received by Dr. de la Torre from Gundlach. It has 5 whorls and measures: Length, 10.6 mm.; greater diameter, 10.5 mm.; lesser diameter, 8.2 mm.

Typical *A. (A.) fragilis fragilis* is readily distinguished from *A. (A.) fragilis juliani* in being larger, and in having the axial riblets merely indicated and more distantly spaced. The malleations of the base referred to in our description of the species are also much more pronounced, and the spiral threads on the umbilical wall are scarcely indicated.

We have also seen specimens collected by Wright at Rio Cuzco, Oriente Province.

## ANNULARIA (ANNULAROSA) FRAGILIS JULIANI, new subspecies

## PLATE 48, FIGURES 4-6

This subspecies was collected by Julian Acuña at Jarahueca, Alto Songo, Oriente Province. It is distinguished from the typical *A.*

(A.) *fragilis fragilis* in being smaller, in having the axial riblets a little more pronounced and the base less strongly malleated, and in having the umbilical wall marked by quite apparent spiral threads.

The type, U.S.N.M. No. 535603, has 4.5 whorls and measures: Length, 8.2 mm.; greater diameter, 10.3 mm.; lesser diameter, 6.5 mm.

Subgenus ANNULARELLA Henderson and Bartsch

1920. *Annularella* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

1920. *Tudorellata* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 75.

Shell helicoid. The axial sculpture consists of strong ribs, between which finer axial threads are present. The spiral sculpture is confined to the umbilicus. Operculum typically annularid.

Type: *Annularia (Annularella) yunquensis* (Pfeiffer).

The great amount of material now available for study makes it necessary to combine the subgenus *Tudorellata* with *Annularella*.

KEY TO THE SPECIES OF THE SUBGENUS ANNULARELLA

Last whorl adnate.

Inner lip broad.

Interstitial axial riblets almost as strong as the heavier ribs.

Shell conic.

Umbilicus broad..... hendersoni

Umbilicus narrow..... römeri

Shell subglobular..... cumulata

Interstitial axial riblets finer than the heavier axial ribs.

Shell broadly openly umbilicated.

Shell red..... victoris

Shell not red.

Shell depressed-helicoid..... yaterasensis

Shell conic..... heynemanni

Shell narrowly openly umbilicated..... arquesi

Inner lip not broad.

Spiral threads in umbilicus many..... pseudalata

Spiral threads in umbilicus few.

Shell broadly openly umbilicated..... holguinensis

Shell narrowly openly umbilicated..... yumuriensis

Last whorl solute.

Inner lip broad.

Fine axial riblets many..... nipensis

Fine axial riblets few.

Spiral threads on umbilical wall few..... tanamensis

Spiral threads on umbilical wall many..... libanoensis

Inner lip not broad.

Spiral threads on umbilical wall absent.

Interstitial axial riblets fine..... natensoni

Interstitial axial riblets strong..... interstitialis

Spiral threads on umbilical wall present.

Interstitial axial threads few and strong----- *toroensis*

Interstitial axial threads many and fine.

Auricle at posterior angle of aperture very strong- *mayensis*

Auricle at posterior angle of aperture not very strong.

Spiral threads on umbilical wall few.

Spiral threads on base present----- *yunquensis*

Spiral threads on base absent----- *wrighti*

Spiral threads on umbilical wall not few-- *mayariensis*

ANNULARIA (ANNULARELLA) HENDERSONI, new species

PLATE 49, FIGURES 1-3

?1878. *Cistula interstitiale* ARANGO, Contribucion a la fauna malacologica Cubana p. 22 in part.

?1880. *Cistula interstitiale* KOBELT, Jahrb. Deutsch. Malak. Ges., vol. 7, p. 266.

?1890. *Cistula interstitiale* CROSSE, Journ. Conchyl., vol. 38, p. 286, in part.

Shell conic, straw colored. Nuclear whorls 2, well rounded, smooth, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by retractively slanting, slender axial riblets, of which 44 occur on the first; on the second, intercalated riblets make their appearance which raise the number to 98; on the last whorl the intercalated riblets become as strong as the primary ones, and here they become conspicuously expanded into slender cusps at the summit. On the last turn, 194 of these are present. Suture strongly channeled. Periphery strongly rounded. Base short, inflated, strongly rounded, broadly, openly umbilicated, marked by the continuation of the axial ribs and by a strong spiral cord at its anterior margin. The umbilical wall is also marked by the continuation of the axial ribs, but here the riblets become much enfeebled. Seven spiral threads are also present on the umbilical wall. Last whorl adnate. Aperture broadly oval; peristome double, the inner slightly exerted, decidedly reflected on the outer lip, where it is appressed to and co-extensive with the outer lip; the outer is rather broadly expanded, forming a conspicuous auricle at the posterior angle, which is adnate to the preceding turn; on the inner lip the two peristomes are quite distinct. Operculum typically annularid.

The type, U.S.N.M. No. 356290, was collected by Henderson and Bartsch on the foot of Monte Libano, near Guantánamo, Oriente Province. It has 4.8 whorls and measures: Length, 9.8 mm.; greater diameter, 10.4 mm.; lesser diameter, 7.7 mm.

## ANNULARIA (ANNULARELLA) RÖMERI (Pfeiffer)

## PLATE 49, FIGURES 4-6

1864. *Cyclostomus römeri* PFEIFFER, Malakozool. Blätter, vol. 11, p. 105.  
 1866. *Cyclostomus römeri* PFEIFFER, Mon. Conch., vol. 2, pp. 277-278, pl. 68, figs. 10-11.  
 1890. *Colobostylus roemeri* CROSSE, Journ. de Conchyl., vol. 38, p. 302, in part.  
 1920. *Tudora (Tudorellata) roemeri* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 75.

Shell very broadly elongate-conic, almost turbinate, straw colored, with a watered-silk effect; the early whorls are usually darker than the rest; the peristome is yellowish white; the interior of the aperture is pale orange. Nuclear whorls 2, well rounded, microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, the first marked by retractively curved axial threads; on the second and the remaining turns these axial threads become accentuated into sublamellar threads, and between them finer, irregularly developed threads are present. The stronger axial ribs are slightly expanded at the summit and are adnate to the preceding turn. It is this arrangement which gives to the shell a regularly conic aspect. Suture not channeled. Periphery obsoletely angulated. Base short, well rounded, openly umbilicated, and marked by the continuation of the axial sculpture. A strong spiral cord marks the junction of the base and the umbilicus, and another a little weaker is immediately anterior to it, while on the umbilical wall fine obsolete spiral threads are present as well as the somewhat enfeebled continuation of the axial sculpture. Aperture oval; peristome obsoletely double, the inner forming somewhat of a ridge at the posterior angle and on the inner lip, and melting into the outer on the outer lip; the outer broadly, flaringly expanded, of about the same width all around and adnate to the preceding turn on the parietal wall. Operculum typically annularid.

U.S.N.M. No. 356282 was collected by Jeanneret at Salto del Indio, between Rio Yumuri and Punta de Maisi, Oriente Province. It has 4 whorls remaining, having lost a fraction of the first turn, and measures: Length, 10.5 mm.; greater diameter, 9.7 mm.; lesser diameter, 7.6 mm.

Gundlach says of the animal (published by Pfeiffer, loc. cit): "Animal pale with white dots gathered in spots on the foot. Head white from the base of the tentacles to the neck. Forehead with a dark transverse streak. Feelers cinnabar red with dark apex."

## ANNULARIA (ANNULARELLA) CUMULATA (Pfeiffer)

## PLATE 49, FIGURES 7-9

1863. *Cistula cumulata* PFEIFFER, Malakozool. Blätter, vol. 10, pp. 194-195.  
 1920. *Tudora (Tudorellata) cumulata* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 76.

Shell turbinate, varying in color from pale yellow to orange, with the peristome a little paler than the rest. Nuclear whorls 2, well rounded, microscopically granulose, with the last portion of the last turn showing the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by retractively slanting, sublamellar axial riblets, of which 50 occur on the first, 70 on the second, and 82 on the last in the specimen figured. These riblets form low, flattened cusps at the summit. On the last whorl 1, 2, or 3 intercalated riblets may be present between the coarser ones, which are less than half the strength of the heavier ribs. Suture strongly channeled. Periphery well rounded. Base short, openly umbilicated, well rounded, marked by the continuation of the axial riblets and by a poorly defined spiral cord a little posterior to the umbilical angle. The axial riblets continue into the umbilicus, where they become somewhat enfeebled and closely crowded. Here too 7 rather strong spiral cords are present, of which the one forming the outer margin of the umbilicus is the strongest. Aperture broadly oval; peristome double, the outer flaringly expanded, adnate to the preceding turn at the parietal wall; the inner also broadly expanded and appressed to the outer, being differentiated from it at the posterior angle and on the inner lip. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 11051, is one collected by C. Wright at Baracoa, Oriente Province, the type locality. It has 4.2 whorls and measures: Length, 8.2 mm.; greater diameter, 9.3 mm.; lesser diameter, 7.5 mm.

## ANNULARIA (ANNULARELLA) VICTORIS, new species

## PLATE 50, FIGURES 7-9

Shell rather large, broadly turbinate, orange-red except for the peristome, which is paler; the interior of the aperture is brilliant orange immediately within the peristome, gradually becoming paler inward, the tip being the most brilliant. Nuclear whorls 2, well rounded, microscopically granulose, conforming with the outline of the spire. Postnuclear whorls moderately strongly rounded, marked by decidedly lamellose axial ribs, between which finer spiral threads varying from 3 to 8 in number are present. These finer threads are also slightly variable in size. On the first whorl the finer ribs are not apparent, 41 of the heavier being present. The second whorl has 50

and the last 43 of the strong ribs. The strong ribs terminate in fairly strong cusps at the summit, while the intercalated ribs form feeble nodules. Suture fairly strongly channeled. Periphery of the last whorl well rounded. Base short, well rounded, marked by the continuation of the axial ribs and by 4 slender spiral threads near the umbilicus, which are weaker than the heavier thread marking the outer limit of the umbilicus. The umbilicus is open and its wall is marked by 11 rather strong spiral cords, which render the axial riblets nodulose. The last whorl is adnate. Aperture pear-shaped, narrowest at the posterior angle. Peristome double, the outer and inner expanded all around and adnate to each other, separated only at the posterior angle, where the inner forms a sharp shelf above which the outer projects as a hood. Operculum typically annularid, but with the lamella flattened to parallel the chondroid plate on the last whorl. It has, however, the separating channel between the whorls that is characteristic of the group.

The type, U.S.N.M. No. 535654, was collected by Victor Rodriguez at Zona de Caleta, Maisi, Oriente Province. It has 4.9 whorls and measures: Length, 11.8 mm.; greater diameter, 13.3 mm.; lesser diameter, 9.8 mm. We take pleasure in naming this species for Dr. Rodriguez.

ANNULARIA (ANNULARELLA) YATERASENSIS (Pfeiffer)

PLATE 50, FIGURES 4-6

1865. *Choanopoma yaterasense* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 2, pp. 107-108.
1867. *Cyclostoma yaterasense* ARANGO, Repert fisico natural Isla de Cubana, vol. 2, p. 77.
1920. *Tudora (Tudorellata) yateracensis* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 75.

Shell depressed-helicoid, almost helicoid, flesh colored; the interior of the aperture with a yellowish tinge. Nuclear whorls 2, well rounded, smooth, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by strong sublamellar, retractively slanting axial ribs, between which finer threads are present. The stronger ribs are expanded into slight auricles at the summit. Of the stronger of these ribs 48 occur upon the second, and 42 upon the last. Of the finer threads 2 to 5 occur between the stronger. In addition to the axial riblets, the whorls show mere indications of spiral threads, which render the axial riblets slightly wavy but which do not form cusps or tubercles. Suture strongly channeled. Periphery well rounded. Base short, well rounded, openly umbilicated, marked by the continuation of the axial ribs. On the umbilical wall 7 spiral threads are present; these are very feeble except for the outermost one, which is quite cordlike. Aperture subcircular; peristome double,

the outer slightly expanded, broadest on the inner lip, forming a conspicuous auricle at the posterior angle; the inner reflected and adnate to the outer at the middle of the outer wall, falling a little short of being coextensive with the outer on the basal wall, and only about half as wide on the inner lip and forming an inconspicuous curved shelf at the posterior angle. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 356340, a cotype, is one of 6 collected by Gundlach at Yateras, northeast of Guantánamo, Oriente Province, the type locality. It has 4.0 whorls and measures: Length, 8.0 mm.; greater diameter, 9.2 mm.; lesser diameter, 7.0 mm.

This species varies considerably in size, a large specimen having 4.5 whorls measures: Length, 10.2 mm.; greater diameter, 12.7 mm.; lesser diameter, 9.5 mm.

ANNULARIA (ANNULARELLA) HEYNEMANNI (Pfeiffer)

PLATE 50, FIGURES 1-3

1864. *Cyclostomus heynemanni* PFEIFFER, Malakozool. Blätter, vol. 11, p. 105.  
 1867. *Cyclostoma heynemanni* ARANGO, Repert físico natural Isla de Cubana, vol. 2, p. 75.  
 1890. *Colobostylus heynemanni* CROSSE, Journ. Conchyl., vol. 38, p. 302 in part.  
 1920. *Tudora (Tudorellata) heynemani* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 75.

Shell conic, pale straw colored; peristome white; interior of aperture yellowish white. Nuclear whorls almost 2, well rounded, microscopically granulose, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls very strongly inflated, the first one marked by 72 rather distantly spaced, decidedly retractively slanting axial riblets; on the second whorl intercalated finer threads make their appearance between the stronger riblets. This type of sculpture attains its maximum development on the last turn; the second has 120 of the stronger riblets, and the last 92. On this the finer riblets between the stronger threads vary from 2 to 9 in number; the stronger riblets are slightly expanded into auricles at the summit. Suture narrowly and weakly channeled. Periphery of the last whorl well rounded. Base short, openly umbilicated, well rounded, marked by the continuation of the axial sculpture and by a rather strong spiral cord posterior to the junction of the basal wall with the umbilicus; the latter place is marked by a strong spiral cord; within the umbilicus 7 additional, rather strong, spiral threads and the closely approximated, somewhat enfeebled continuation of the axial riblets are present. Aperture broadly oval; peristome double, the inner and outer both expanded and reflected and almost coextensive. The operculum is annularid but it has the lamella quite flattened, with a space separating the succeeding turns.

The specimen described and figured, U.S.N.M. No. 356296, is a cotype received from Dr. de la Torre and collected by Arango at Maisi, Oriente Province. It has 4.4 whorls and measures: Length, 7.8 mm.; greater diameter, 10.6 mm.; lesser diameter, 8.7 mm.

A larger specimen from the same locality, U.S.N.M. No. 356297, has 4.8 whorls and measures: Length, 9.7 mm.; greater diameter, 11.8 mm.; lesser diameter, 8.9 mm.

ANNULARIA (ANNULARELLA) ARQUESI, new species

PLATE 51, FIGURES 4-6

1866. *Cyclostomus römeri* var. PFEIFFER, Malakozool. Blätter, vol. 13, p. 63.  
 1867. *Cyclostoma arquesi* ARANGO, *nomen nudum*, MS., Repert físico natural Isla de Cubana, vol. 2, p. 270.  
 1876. *Cyclostomus römeri* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 3, p. 176, in part.  
 1898. *Colobostylus arquesi* KOBELT and MOLLENDORFF, *nomen nudum*, Nachr. Deutsch. Malak. Gesell., vol. 30, p. 192, in part.

Shell turbinate, pale straw colored, a little deeper within the aperture. Nuclear whorls almost 2, well rounded, microscopically granulose except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, well rounded, the first one marked by 84 slender, threadlike axial ribs. On the remaining turns the axial sculpture becomes separated into two elements; one, strong lamellar axial ribs, which are developed into slender auricles at the summit; the other, fine threads less than one-fourth the size of the coarser, occupying the spaces between the coarser. The latter vary from 3 to 7 in number. Of the stronger ribs, 46 occur on the second turn and 50 on the last. Suture narrowly channeled. Periphery inflated, obscurely angulated. Base short, openly umbilicated, moderately well rounded, marked by the continuation of the axial riblets and by a strong spiral cord, which marks the junction of the umbilicus and the base. There are two slender spiral threads posterior to the stronger cord on the base. The umbilical wall is marked by the continuation of the axial riblets, which here become crowded and somewhat enfeebled, and 4 spiral threads. Aperture broadly oval; peristome double, the inner poorly defined, reflected over the outer and appressed to and coextensive with it on the outer lip; the outer broadly, flaringly expanded, forming a moderately strong auricle at the posterior angle, and adnate to the preceding turn on the parietal wall. Operculum typically annularid.

A cotype received from Dr. de la Torre, collected by Arango at Barigua, north coast of Baracoa, Oriente Province, U.S.N.M. No. 356294, has 5.3 whorls and measures: Length, 13.0 mm.; greater diameter, 12.1 mm.; lesser diameter, 9.7 mm.

This species was listed by Arango as cited above, with the statement that it would be published soon by Pfeiffer. Pfeiffer states under *Cyclostomus römeri* that the specimens sent him by Arango from Barigua are scarcely varietally distinguishable from typical *C. römeri*. We disagree with this statement. We consider it a valid species, which we describe.

## ANNULARIA (ANNULARELLA) PSEUDALATA (Torre) Pilsbry and Henderson

## PLATE 51, FIGURES 1-3

1865. *Cistula alatum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 2, p. 110, in part.  
 1912. *Annularia pseudolatum* (Torre) PILSBRY and HENDERSON, Nautilus, vol. 26, pp. 43-44.  
 1913. *Annularia pseudolatum* TORRE, Nautilus, vol. 27, p. 37, pl. 3, figs. 8, 9.  
 1920. *Annularia (Annularella) pseudalatum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

Shell helicoid, flesh colored, with a yellowish tinge. Nuclear whorls almost 2, well rounded, smooth. Postnuclear whorls increasing very rapidly in size, inflated, strongly rounded, marked on the first turn by 22 slender, retractively curved, axial riblets; on the remaining turns the axial ribs become differentiated into two types, namely, strong sublamellar elements between which finer threads varying from 2 to 5 in number are present; of the stronger riblets, 72 are present on the second, with 99 upon the last turn. Suture strongly constricted. Periphery inflated, well rounded. Base short, inflated, strongly rounded, very openly umbilicated, the umbilicus being almost funnellike, marked by the continuation of the axial riblets, which extend into the umbilicus, and 3 spiral threads near the umbilicus, of which the one marking the junction of the umbilicus and the base is the strongest. On the umbilical wall 14 additional spiral threads, which are of almost the same strength, are present. Aperture broadly ovate; peristome double, the inner coextensive with the outer except at the auricle, where the two become differentiated; the outer moderately broadly expanded; the auricle at the posterior angle is adnate to the preceding turn. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 11052, was collected by C. Wright between Demajagua and Guantánamo, Oriente Province. It has 4.6 whorls and measures: Length, 11.2 mm.; greater diameter, 14.9 mm.; lesser diameter, 11.4 mm.

## ANNULARIA (ANNULARELLA) HOLGUINENSIS, new species

## PLATE 52, FIGURES 1-3

1865. *Choanopoma alatum* PFEIFFER, Monographia pneumonopomorum viventium, suppl. 2, p. 110 in part.  
 1878. *Choanopoma alatum* ARANGO, Contribucion a la fauna malacologica Cubana, pp. 13-14 in part.  
 1890. *Choanopoma alatum* CROSSE, Journ. Conchyl., vol. 38, p. 273 in part.

Shell depressed-helicoid, thin, straw yellow, a little paler on the peristome. Nuclear whorls strongly rounded, smooth except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls strongly inflated, rather depressed, marked by retractively slanting, sublamellar axial riblets, of which 98 occur on the last two whorls. These riblets are slightly expanded into cusps at the summit. Between these distantly spaced sublamellar riblets are finer axial threads, which vary in number from 1 to 7; the spaces between them also vary correspondingly in width. Suture narrowly strongly channeled. Periphery well rounded. Base short, strongly rounded, openly umbilicated, marked by the continuation of the axial riblets and by 2 slender spiral threads adjacent to the umbilicus. The axial riblets continue into the umbilicus and here become a little enfeebled and closely spaced, maintaining their arrangement of strong and feeble elements. In addition to the axial riblets there are 7 spiral threads on the umbilical wall, which are of almost equal strength and spacing. Aperture almost circular; peristome double, the inner slightly expanded, reflected over and adnate to the outer, scarcely distinct on the basal and outer lip, but well marked at the posterior angle and on the inner lip; the outer broadly expanded, forming a conspicuous auricle at the posterior angle, which is adnate to the preceding turn. Operculum typically annularid.

The type, U.S.N.M. No. 356303, was collected by Mr. Henderson near Holguin, Oriente Province. It has 3.5 whorls and measures: Length, 8.0 mm.; greater diameter, 10.9 mm.; lesser diameter, 9.0 mm.

We believe that it is the same shell which the authors, whom we quote in our synonymy, refer to as having been collected between Holguin and Barajagua.

ANNULARIA (ANNULARELLA) YUMURIENSIS, new species

PLATE 52, FIGURES 4-6

Shell small, of turbinate outline, flesh colored. Nuclear whorls 2, well rounded, microscopically granulose. Postnuclear whorls somewhat inflated, strongly rounded, and marked on the first whorl by rather strong axial riblets and thereafter by axial ribs of two series, namely, strong sublamellar elements, between which fine, threadlike riblets are present. Of the strong axial ribs 59 are present on the first turn, 55 on the second, and 59 on the last. The intercalated riblets vary in number from 3 to 7. The strong axial ribs are not developed into cusps at the summit, but appear to maintain equal strength throughout. Suture slightly channeled. Periphery well rounded. Base short, inflated, strongly rounded, marked by the continuation of the axial ribs only. Base narrowly, openly umbilicated, marked by a strong cord at the outer termination of the umbili-

cus, and by 5 weak cords on the umbilical wall. These do not render the axial riblets nodulose. Last whorl adnate. Aperture broadly ovate; peristome double, the inner and outer narrowly expanded and reflected and coextensive, separated only at the posterior angle, where there is a slight depression between the hood forming the outer peristome and the inner. Operculum typically annularid.

The type, U.S.N.M. No. 535646, was collected at Boca de Yumuri, Oriente Province, by Arango. It has 4.8 whorls and measures: Length, 9.0 mm.; greater diameter, 6.5 mm.; lesser diameter, 5.8 mm.

## ANNULARIA (ANNULARELLA) NIPENSIS, new species

## PLATE 52, FIGURES 7-9

Shell strongly turbinate, pale yellow. Nuclear whorls almost 2, strongly rounded, smooth, except for the last portion of the last turn, which shows the beginning of the axial riblets. Postnuclear whorls very strongly elevated, strongly rounded, and marked by sublamellar axial riblets, of which 72 occur on the first, 56 on the second, and 64 on the last. The sublamellar riblets are slightly expanded at the summit; the spaces between them on the last two whorls are marked by rather strong axial threads, which vary from 2 to 6 in number. The spaces separating these sublamellar axial riblets vary correspondingly in width. Suture scarcely channeled. Base short, inflated, well rounded, openly umbilicated, marked by the continuation of the axial ribs. The umbilical wall is marked by the closely crowded continuation of the axial riblets and by 9 spiral threads, of which the outermost is a little stronger than the rest. Last whorl solute for about one-fourth of a turn. Aperture broadly oval; peristome double, the outer and inner coextensive on the outer and basal lip; the outer is a little more expanded on the inner and parietal wall, forming an inconspicuous auricle at the posterior angle; at the posterior angle the inner peristome projects as a low shelf. Operculum typically annularid.

The type, U.S.N.M. No. 356324, was collected by Mr. Henderson at Farallones de Nipe (Sabanilla), Oriente Province. It has 4.5 whorls and measures: Length, 12.3 mm.; greater diameter, 11.4 mm.; lesser diameter, 8.2 mm.

## ANNULARIA (ANNULARELLA) TANAMENSIS, new species

## PLATE 53, FIGURES 1-3

?1878. *Cistula interstitiale* ARANGO, Contribucion a la fauna malacologica Cubana, p. 22, in part.

?1890. *Cistula interstitiale* CROSSE, Journ. Conchyl., vol. 38, p. 286, in part.

Shell turbinate, thin, last whorl semitranslucent; the early whorls rose red, the last pale straw colored, a little more yellowish within the aperture. Nuclear whorls almost 2, smooth, well rounded, except

for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls strongly rounded, the first one marked by 42 rather distantly spaced axial threads, while on the second there are 64. On this turn intercalated ribs between the stronger are making their appearance. These become much more strongly developed on the last turn, where 112 are present. Suture deeply channeled. Periphery strongly rounded. Base well rounded, openly umbilicated, marked by a strong spiral cord at the junction of the base and umbilicus. The umbilical wall is marked by the continuation of the axial riblets, which here become considerably enfeebled, and 5 feeble spiral threads. Last whorl solute for one-fourth of a turn. Aperture broadly oval; peristome double, the outer broadly expanded, forming a conspicuous auricle at the posterior angle; the inner moderately exerted, strongly reflected all around except at the posterior angle and almost appressed to the outer peristome. Operculum typically annularid.

The type, U.S.N.M. No. 356284, collected by Arango, comes from the ancient Ingenio El Cocco, Sagua de Tánamo, Oriente Province. It has 4.9 whorls and measures: Length, 9.4 mm.; greater diameter, 10.3 mm.; lesser diameter, 7.4 mm. A topotype, U.S.N.M. No. 356285, has 4.3 whorls and measures: Length, 8.8 mm.; greater diameter, 10.4 mm.; lesser diameter, 9.6 mm.

This species can easily be distinguished from the others by the conspicuous reddish coloring of the tip.

ANNULARIA (ANNULARELLA) LIBANOENSIS, new species

PLATE 53, FIGURES 7-9

Shell rather large, broadly turbinate, flesh colored. Nuclear whorls a little more than 2, strongly rounded, forming a well elevated apex, which conforms with the outline of the rest of the spire, and which has the whorls microscopically granulose. Postnuclear whorls well rounded, marked by retractively curved axial riblets, in which the stronger elements are scarcely differentiated from the intercalated riblets. Of these riblets 41 occur on the first turn, 69 on the second, and 174 on the third and two-tenths whorls completing the spire. These riblets terminate at the summit in slender cusps. Suture narrowly but rather deeply channeled. Periphery slightly angled. Base short, well rounded, and marked by the continuation of the axial riblets and by a weak spiral thread posterior to the strong cord, limiting the umbilicus. The base is openly umbilicated, and shows many spiral threads, as well as the closely crowded axial riblets, on the umbilical wall. The last whorl is solute for about one-tenth of a turn. Aperture almost circular; peristome double, the inner peristome quite strongly exerted and reflected to fuse with the outer on the outer lip; outer peristome moderately, broadly expanded on the outer lip, more

so on the inner lip, and decidedly so at the posterior angle, where it forms a hood, the posterior angle of which touches the preceding whorl. The inner lip at the posterior angle forms a decided shelf, leaving a deep triangular pit at the posterior angle. Operculum typically annularid.

The type, U.S.N.M. No. 535648, comes from Alto del Cedrito, Monte Libano, Oriente Province. It has 5.3 whorls and measures: Length, 12.9 mm.; greater diameter, 12.5 mm.; lesser diameter, 9.5 mm.

ANNULARIA (ANNULARELLA) NATENSONI, new species

PLATE 53, FIGURES 4-6

Shell small, turbinate, pale yellow. Nuclear whorls 2, well rounded, smooth, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by slender axial threads on the first half whorl, after which the axial sculpture becomes differentiated into two types, namely, distantly, rather irregularly spaced, sublamarar ribs, between which occur finer axial threads. Thirty-four of the strong ribs occur on the second whorl and 31 are on the last eight-tenths of the last turn. The finer threads between the lamellar ribs vary in number from 3 to 10. Suture strongly constricted. Periphery of the last whorl inflated, well rounded. Base short, inflated, well rounded, openly umbilicated, marked by the continuation of the axial ribs, which extend prominently into the umbilicus. A feeble spiral thread marks the outer limit of the umbilicus. The umbilical wall itself is free of spiral sculpture. The last whorl is solute for about one-eighth of a turn. Aperture subcircular; peristome double, the inner reflected over the outer on the outer basal and inner lip, forming a shelf at the posterior angle of the aperture; the outer moderately expanded and almost the same width except at the posterior angle, where it forms an auricle. Operculum typically annularid.

The type, U.S.N.M. No. 535650, was collected by Natenson at Silla de Baez west of Baracoa, Oriente Province. It has 4.9 whorls and measures: Length, 7.5 mm.; greater diameter, 7.4 mm.; lesser diameter, 6.2 mm.

ANNULARIA (ANNULARELLA) INTERSTITIALIS ([Gundlach] Pfeiffer)

PLATE 54, FIGURES 4-6

1859. *Cyclostoma (Cistula) interstitiale* [Gundlach] PFEIFFER, Malakozool. Blätter, vol. 6, p. 74.  
 1861. *Cistula interstitiale* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.  
 1920. *Tudora (Tudorellata) interstitialis* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 75.

Shell turbinate, thin, semitranslucent, yellowish white, a little darker on the early turns than the last. Nuclear whorls 2, well

rounded, smooth, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by strong, sublamellar axial ribs which are expanded into slight auricles at the summit. The spaces between these sublamellar ribs are marked by additional axial riblets, which are almost as strong as the stronger elements. Of these 1 to 3 may occur between the stronger. Suture deeply channeled. Periphery inflated, strongly rounded. Base short, strongly rounded, marked by the continuation of the axial sculpture. There is a strong spiral cord at the junction of the base and the umbilicus. Here the axial riblets crossing it form feeble elongated nodules. On the umbilical wall the axial sculpture becomes slightly enfeebled. Last whorl solute for a tenth of a turn. Aperture broadly oval; peristome double, the inner a little heavier, slightly exerted and slightly reflected; the outer thin, transparent, slightly expanded. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 356277, is one of 3 received from Gundlach. It has 4.9 whorls and measures: Length, 9.8 mm.; greater diameter, 10.7 mm.; lesser diameter, 8.4 mm.

This species was collected by Gundlach at Cafetales de Yateras, Oriente Province. He says of the animal (*Malakozool. Blätter*, vol. 6, p. 74, 1859): "It is whitish with whitish dots upon the head and at the base of the feelers. The head is somewhat reddish within. The feelers have a dark tip. The body is marked by various blackish spots which are visible through the shell."

ANNULARIA (ANNULARELLA) TOROENSIS, new species

PLATE 54, FIGURES 1-3

Shell turbinate, straw colored, a little more deeply yellow within the aperture. Nuclear whorls 2, well rounded, smooth, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, the first marked by 48, rather distantly spaced, axial riblets, while on the next two whorls intercalated slender threads make their appearance, which raise the number of riblets on the second whorl to 104, and on the last to 156. Suture strongly channeled. Periphery well rounded. Base short, very broadly, openly umbilicated, marked by the continuation of the axial riblets, and by a strong spiral cord at its anterior margin. The umbilical wall is marked by the continuation of the axial ribs, which here become much enfeebled, and by 8 spiral threads. Last whorl solute for about one-eighth of a turn. Aperture broadly oval; peristome double, the outer narrowly expanded and reflected; the inner moderately, strongly exerted, and but slightly reflected. Operculum typically annularid.

The type, U.S.N.M. No. 356288, was collected by Dr. Ramsden at Embrita, Monte Toro, Oriente Province. It has 4.8 whorls and measures: Length, 10.0 mm.; greater diameter, 10.8 mm.; lesser diameter, 8.2 mm.

## ANNULARIA (ANNULARELLA) MAYENSIS Torre and Ramsden

## PLATE 55, FIGURES 7-9

1914. *Annularia mayensis* TORRE and RAMSDEN, Nautilus, vol. 28, p. 50.

1920. *Tudora (Tudorellata) mayensis* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 75.

Shell helicoid, straw colored. Nuclear whorls almost 2, well rounded, smooth, except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by rather strong, retractively curved, axial, sublamellar riblets, of which 90 occur on the second and 102 on the last whorl. These riblets become slightly expanded at the summit. On the last whorl finer threads occur between the sublamellar threads, which vary from 2 to 5 in number. The spaces separating the coarser threads also vary correspondingly in width. Suture narrowly channeled. Periphery well rounded. Base short, well rounded, marked by the continuation of the axial riblets. Umbilicus broadly open, the umbilical wall marked by the continuation of the closely crowded axial riblets and by 13 spiral threads, which render the axial riblets slightly nodulose at their junction; the outermost spiral thread is considerably stronger than the rest. Last whorl solute for about one-tenth of a turn. Aperture broadly oval; peristome double, the inner almost coextensive with the outer except at the posterior angle, where it forms a conspicuously projecting shelf; the outer narrowly expanded but forming a conspicuous auricle at the posterior angle. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 356320, is one of 2 topotypes collected by Dr. Ramsden. It comes from "La Isabelita," La Maya, Oriente Province. It has a little over 3 whorls and measures: Length, 10.0 mm.; greater diameter, 12.8 mm.; lesser diameter, 9.8 mm.

## ANNULARIA (ANNULARELLA) YUNQUENSIS (Pfeiffer)

## PLATE 55, FIGURES 1-3

1860. *Cyclostoma yunquense* PFEIFFER, Malakozool. Blätter, vol. 7, p. 26.

1861. *Choanopoma yunquense* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.

1920. *Annularia (Annularella) yunquensis* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 73.

Shell turbinate, thin, translucent, yellowish flesh colored. Nuclear whorls almost 2, well rounded, smooth. Postnuclear whorls increas-

ing very rapidly in size, inflated, strongly rounded, marked by retractively slanting axial riblets, of which 72 occur on the first turn. On the succeeding turns the axial riblets become specialized into two series, one strong and sublamellar and the other weak and threadlike. Of the strong riblets, 62 occur on the second turn and 64 are on the last, while the spaces between these riblets are marked by 2 to 7 of the finer threads. Suture slightly constricted. Periphery strongly rounded. Base short, inflated, strongly rounded, with a very broad, almost funnellike umbilicus, marked by the continuation of the axial riblets, which extend into the umbilicus, and by 3 spiral threads, of which the last one marks the junction of the umbilicus and the base, and it is much stronger than the other two; within the umbilicus 4 feeble additional spiral threads are present. Last whorl solute for one-fourth of a turn. Aperture almost subcircular; peristome double, the inner exerted and reflected; the outer narrowly expanded, slightly fluted at the junction of the basal and inner lips, of the same width all around except at the posterior angle, where it forms a rather broad auricle. Operculum typically annularid.

The specimen described and figured, U.S.N.M. No. 11017, is one of 5 collected by C. Wright at Yunque de Baracoa, Oriente Province. It has 4.9 whorls and measures: Length, 9.1 mm.; greater diameter, 8.8 mm.; lesser diameter, 6.9 mm.

ANNULARIA (ANNULARELLA) WRIGHTI, new species

PLATE 55, FIGURES 4-6

Shell small, turbinate, pale straw colored. Nuclear whorls 2, well rounded, smooth except for the last portion of the last turn which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, rather high, marked by strong, retractively slanting, sublamellar axial ribs, of which 54 occur on the second and 64 on the last. These axial riblets are expanded into moderately broad cusps at the summit, which do not become appressed to the preceding turns. Between the sublamellose axial riblets are finer axial threads which vary from 2 to 4 in number. Suture narrowly channeled. Periphery well rounded. Base short, inflated, strongly rounded, narrowly, openly umbilicated, marked by the continuation of the closely crowded axial riblets and by 7 rather strong spiral threads on the umbilical wall of which the outer is the heavier. Last whorl solute for about one-fourth of a turn. Aperture broadly oval; peristome double, the outer coextensive on the outer lip, projecting slightly on the inner lip and at the posterior angle as a narrowly developed auricle; on the inner lip and at the posterior angle the inner peristome is slightly exerted. Operculum typically annularid.

The type, U.S.N.M. No. 356328, was collected by C. Wright east of Ermitage, between Santiago and Guantánamo, Oriente Province. It has 4.5 whorls and measures: Length, 10.0 mm.; greater diameter, 9.5 mm.; lesser diameter, 6.9 mm.

ANNULARIA (ANNULARELLA) MAYARIENSIS, new species

This species is differentiated from the rest of the Annularellas by having the last whorl solute, the inner lip of the outer peristome narrow, the umbilical wall with many spiral threads, and with the interstitial axial threads numerous and fine, and a weak auricle at the posterior angle of the aperture.

The three subspecies here recognized come from the limestone blocks inland from Nipe Bay, Oriente Province:

KEY TO THE SUBSPECIES OF ANNULARIA (ANNULARELLA) MAYARIENSIS

Shell pale orange.....	welchi
Shell yellowish white.	
Shell broadly turbinate.....	mayariensis
Shell narrowly turbinate.....	canapuensis

ANNULARIA (ANNULARELLA) MAYARIENSIS WELCHI, new subspecies

PLATE 56, FIGURES 4-6

Shell broadly turbinate, pale orange. Nuclear whorls 2, inflated, well rounded, smooth, except for the last part of the last turn, which shows the beginning of the postnuclear sculpture. The first of the postnuclear whorls is marked by 52 slender, retractively curved, axial riblets. On the last part of the first postnuclear turn the fine interstitial axial threads make their appearance. These increase steadily in size and on the last turn they are also of sublamellar nature and are scarcely differentiated from the larger lamellae. There are 214 riblets on the last turn. Suture fairly strongly channeled. Periphery inflated, strongly rounded. Base short, strongly rounded, marked by the continuation of the axial ribs, which are crowded over the umbilical wall. The umbilical wall also bears 9 spiral threads, of which the outer one is the strongest. The last whorl is solute for about one-fifth of a turn. Aperture subcircular; peristome double, the outer and inner apparently coextensive except at the posterior angle, where the inner forms a slight shelf, and the outer projects as a narrow auricle. Operculum typically annularid.

The type, U.S.N.M. No. 535632, comes from a hill north of Miranda in the Mercedes Valley, Oriente Province. It has 5 whorls and measures: Length, 12.7 mm.; greater diameter, 14.0 mm.; lesser diameter, 9.3 mm.

## ANNULARIA (ANNULARELLA) MAYARIENSIS MAYARIENSIS, new subspecies

## PLATE 56, FIGURES 1-3

1865. *Cistula interstitialis*  $\beta$  PFEIFFER, Monographia pneumonopomorum viventium, suppl. 2, p. 141.  
 1878. *Cistula interstitialis* ARANGO, Contribucion a la fauna malacologica Cubana, p. 22, in part.  
 1890. *Cistula interstitialis* CROSSE, Journ. Conchyl., vol. 38, p. 286, in part.

Shell broadly turbinate, almost helicoid, pale straw colored. Nuclear whorls almost 2, well rounded, smooth except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls inflated, strongly rounded, marked by retractively slanting, sublamellar axial riblets, of which 66 occur on the first turn, where they are all of about the same strength and spacing; on the second there are 72 of the stronger riblets, and between these the finer threads are well developed; on the last whorl 70 of the stronger riblets are present, with the finer threads attaining almost one-third the strength of the sublamellar riblets; these vary in number from 2 to 5, and the spaces separating the coarser riblets vary correspondingly. The coarser riblets are slightly expanded at the summit. Suture moderately channeled. Base short, strongly rounded, openly umbilicated, marked by the continuation of the axial riblets. The umbilical wall is marked by the closely crowded axial riblets and by 10 spiral threads, of which the outer one is about twice as strong as the rest. The junction of the stronger axial riblets and the spiral threads forms feeble nodules on the umbilical wall. Last whorl solute for about one-fifth of a turn. Aperture broadly oval; peristome double, the inner slightly expanded and coextensive on the basal and outer lip, a little narrower on the inner lip, projecting as a conspicuous shelf at the posterior angle; the outer slightly expanded, forming a conspicuous auricle at the posterior angle. Operculum typically annularid.

The type, U.S.N.M. No. 356321, was collected by C. Wright at Cayo del Rey, Mayarí, Oriente Province. It has 4.5 whorls and measures: Length, 11.5 mm.; greater diameter, 12.8 mm.; lesser diameter, 10.3 mm.

## ANNULARIA (ANNULARELLA) MAYARIENSIS CANAPUENSIS, new subspecies

## PLATE 57, FIGURES 7-9

Shell narrowly turbinate, yellowish white. Nuclear whorls almost 2, well rounded, smooth except for the last portion of the last turn, which shows the beginning of the postnuclear sculpture. Postnuclear whorls rather high between the sutures, inflated, strongly rounded, marked by decidedly retractively slanting, sublamellar axial riblets, of which 66 occur on the first, 52 on the second, and 79 on the last

whorl. These sublamellar riblets are strongly expanded at the summit, the expanded portion being adnate to the preceding turn as slender auricles. Between these sublamellar riblets quite strong axial threads are present, which vary from 2 to 4 in number. Suture well constricted. Base short, inflated, strongly rounded, broadly, openly umbilicated, and marked by the continuation of the axial riblets. The umbilical wall is marked by the closely approximated axial riblets and by 10 feeble spiral threads, which are rather irregularly spaced, and of which the outer is the strongest. Last whorl solute for one-fourth of a turn. Aperture broadly oval; peristome double, the inner and outer coextensive on the outer and basal lip, slightly separated on the inner lip, and more so on the parietal wall; the outer forms a weak auricle at the posterior angle of the aperture. Operculum typically annularid.

The type, U.S.N.M. No. 356326, was collected by Mr. Henderson at Farallones de Canapú, near Cayo del Rey, Oriente Province. It has 5.0 whorls and measures: Length, 10.8 mm.; greater diameter, 10.3 mm.; lesser diameter, 8.0 mm.

Subgenus *CHONDROPOMATUS* Henderson and Bartsch

1920. *Chondropomatus* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 59.

Shell of turbinate form, marked by strong axial ribs, between which finer threads parallel to the ribs are present. The axial sculpture extends into the open umbilicus, the wall of which is marked by strong spiral cords. Operculum with the merest indication of the beginning of a lamella.

Type: *Annularia* (*Chondropomatus*) *lata* ([Gundlach] Pfeiffer).

Henderson and Bartsch created the above subgenus for *Cyclostoma latum* (Gundlach) Pfeiffer and placed it in the genus *Chondropoma* of the subfamily Chondropominae. Much additional material now causes a realignment of this group. All the characters of the shell, with the exception of the operculum, are those of the subgenus *Annularella*, of the genus *Annularia*, in which genus it is now placed, since it is believed that the reduction of the lamella to the vanishing point or even its absence had best be considered a specialization along the line of reduction, rather than an expression of a phylogenetic relationship. This realignment is also confirmed by the zoogeographic position of the group.

KEY TO THE SPECIES OF THE SUBGENUS *CHONDROPOMATUS*

Peristome white.....	<i>lata</i>
Peristome yellow.....	<i>mimetica</i>

ANNULARIA (*CHONDROPOMATUS*) *LATA* ([Gundlach] Pfeiffer)

## PLATE 57, FIGURES 4-6

1858. *Cyclostoma latum* [GUNDLACH] PFEIFFER, Malakozool. Blätter, vol. 5, p. 190.  
 1861. *Chondropoma latum* BLAND, Ann. Lyceum Nat. Hist. New York, vol. 7, p. 27.  
 1920. *Chondropoma (Chondropomatus) latum* HENDERSON and BARTSCH, Proc. U. S. Nat. Mus., vol. 58, p. 59.

Shell broadly helicoid, with well elevated spire, flesh colored, the nuclear turns and the first postnuclear turns pale brown. Nuclear whorls 1.9, strongly rounded, inflated, very finely granulose. Post-nuclear whorls strongly rounded, rather high, with a deep channel at the summit, which is bordered anteriorly by a pronounced carina, which is very feeble on the first postnuclear turn, but which increases in strength from there on. The postnuclear whorls are marked by strong, sublamellar, retractively slanting axial ribs, which are of decidedly uniform strength and spacing. The spaces between these sublamellar ribs are marked by axial threads, which coincide with the heavier sculpture in disposition. These threads vary from one to five in number. The strong sublamellar axial ribs render the shoulder near the summit weakly crenulated; they do not terminate at the shoulder posteriorly, but extend into the channel at the summit. Suture rendered very pronounced by a channel. Periphery of the last whorl rounded. Base somewhat inflated, well rounded, very deeply, openly umbilicated, the umbilicus occupying about one-fifth of the diameter of the base. The base is marked by the continuations of the axial sculpture described for the spire, while the umbilical wall is marked by 6 strong spiral cords, the first of which is the strongest, and which marks the outer termination of the expanding umbilicus, while the rest are successively a little weaker and closer spaced. Posterior to the strong cord referred to as limiting the umbilicus is another cord, which is considerably weaker. The junctions of these spiral cords and the axial riblets form slender, elongated nodules, having their long axis parallel with the spiral cords. Aperture broadly pyriform; peristome double, the inner and outer coextensive, except at the posterior angle, where the outer forms a conspicuous auricle, while the inner forms a shelf. Sometimes there is a second shelf between these two. Operculum thin, corneous, consisting of 4.5 turns with an excentric nucleus; the outer edge of the last volution is thin and slightly upturned on the columellar border; the entire surface, except the last two turns, has the outer surface covered with a coating of small calcareous granules.

This species comes from Santiago. The specimen figured is U.S.N.M. No. 354945. A summary of the measurements of a series of specimens before us yields the following data:

	Length	Greater diameter	Lesser diameter
Greatest.....	<i>Mm.</i> 7.9	<i>Mm.</i> 8.7	<i>Mm.</i> 7.0
Least.....	5.3	6.1	5.2
Average.....	6.7	7.2	6.0

Gundlach says of the animal: "Found on the cliffs of the coast of Cuba at the Forts of Morro, Aguadores and Sardinero (about Santiago). The animal is whitish, almost colorless, with whitish dots, particularly on the head and the base of the tentacles. The tip of the snout and the tentacles ochre red, the tip of the tentacles brown; the body of the animal appears greenish with dark spots through the shell. The animal suspends itself from a mucous thread."

## ANNULARIA (CHONDROPOMATUS) MIMETICA, new species

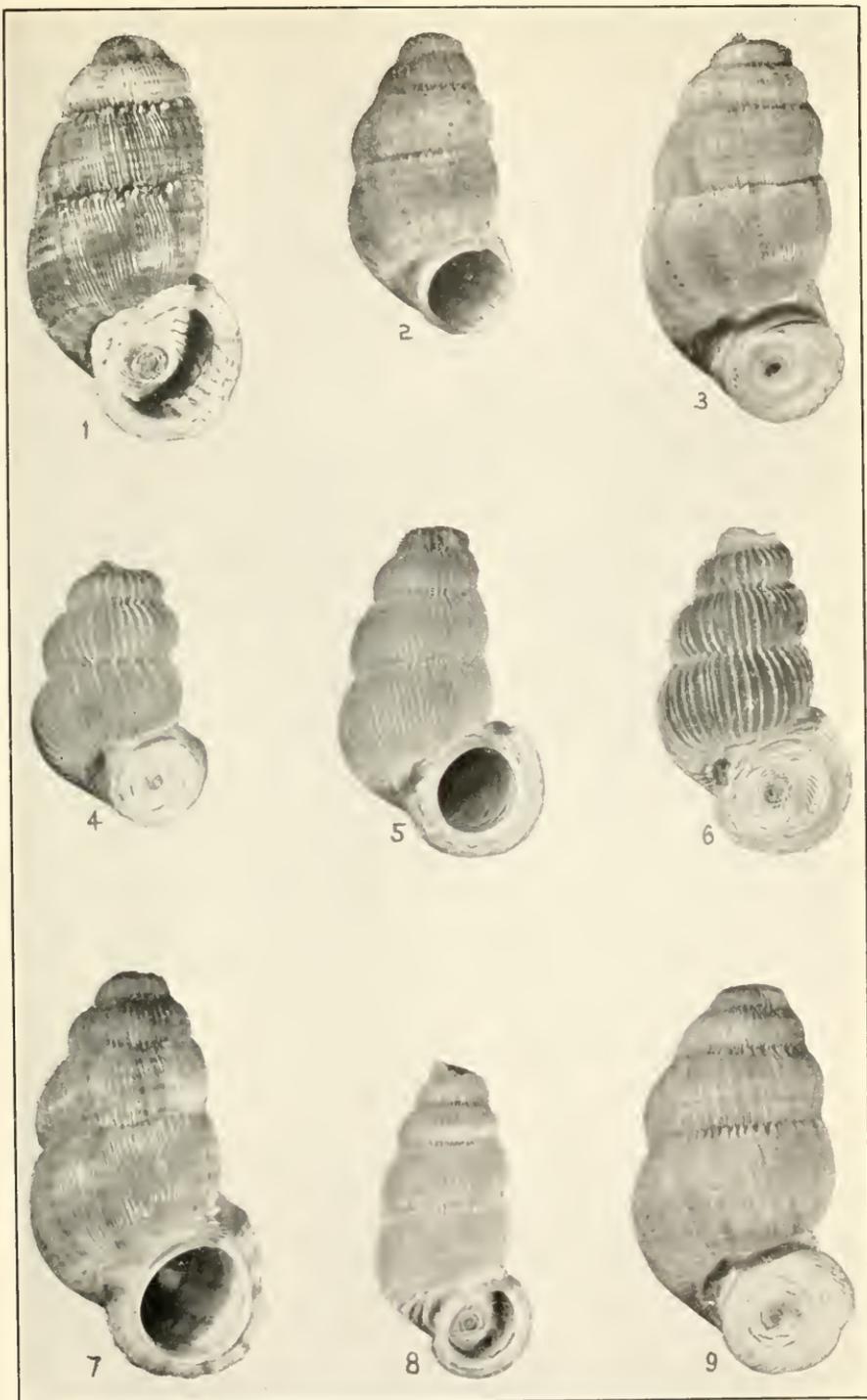
## PLATE 57, FIGURES 1-3

Shell subglobular, flesh colored, with an orange tinge and stronger orange shade on the peristome. Nuclear whorls 2, strongly rounded, microscopically granulose. Postnuclear whorls inflated, strongly rounded, marked by retractively curved axial ribs, between which finer axial threads are present. On the first two-thirds of the turn the finer threads are not apparent. The first whorl has 53 ribs, while the last has 67. These ribs terminate at the summit in slender, white tubercles. Of the finer threads from 1 to 4 may be present between the stronger. Suture conspicuously channeled. Periphery strongly rounded. Base inflated, strongly rounded, and marked by the continuation of the axial sculpture. Umbilicus narrow, marked by the continuation of the axial ribs and 8 feeble spiral threads. The one, however, limiting the outer termination of the umbilicus is much stronger than the rest, and it renders the axial riblets here nodulose. Aperture broadly pearshaped; peristome double, the inner and outer coextensive and moderately broadly reflected, separated only on the posterior half of the inner lip by an impressed line, and at the posterior angle, where the inner forms a shelf, while the outer is projected into the conspicuous auricle. Operculum as described for the subgenus.

This species was collected in the region of Maisi, Oriente Province, by Dr. Rodriguez.

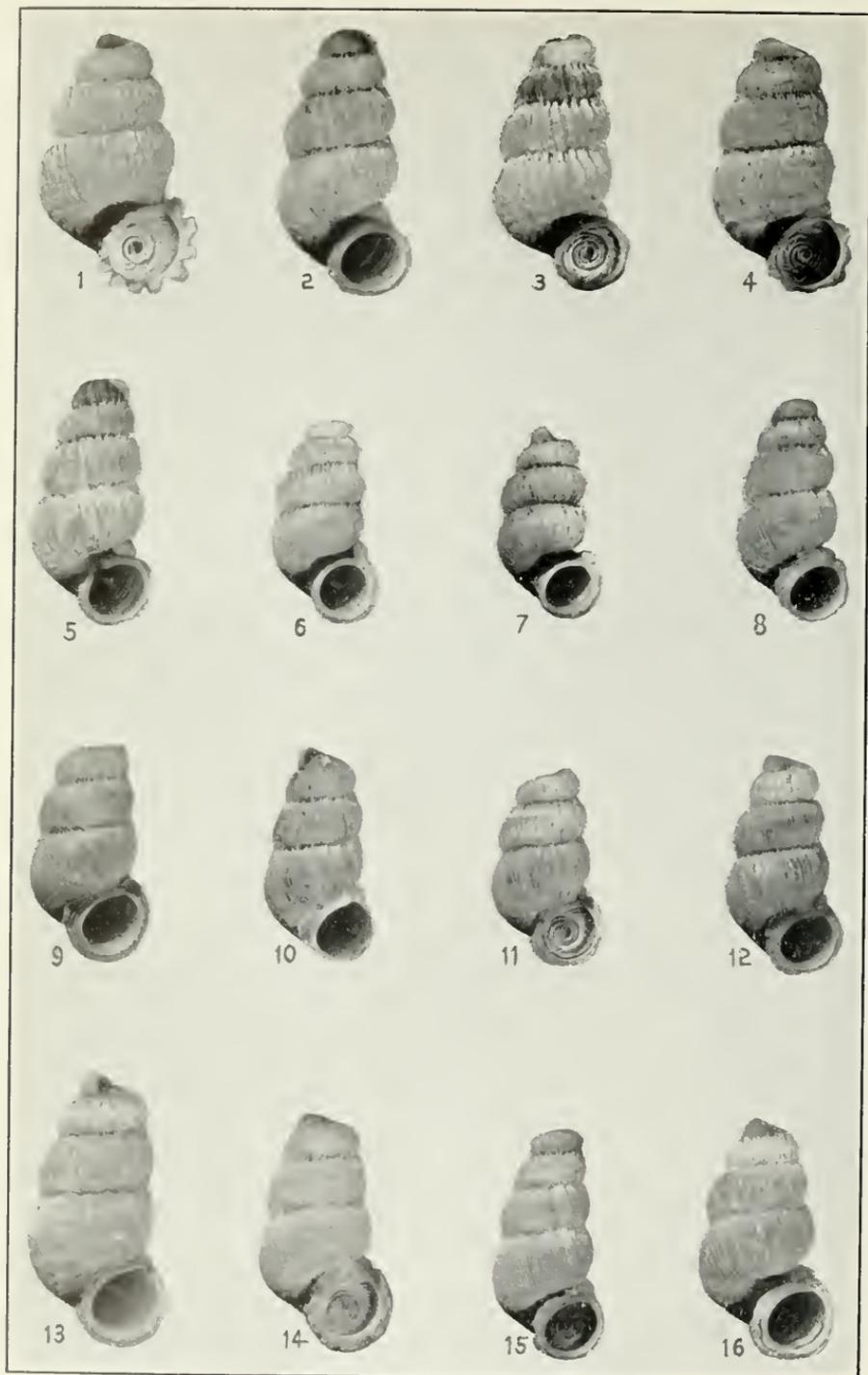
The type, U.S.N.M. No. 425626, comes from Farrallón de San Lucas. It has 4.8 whorls and measures: Length, 10.2 mm.; greater diameter, 9.6 mm.; lesser diameter, 7.8 mm.





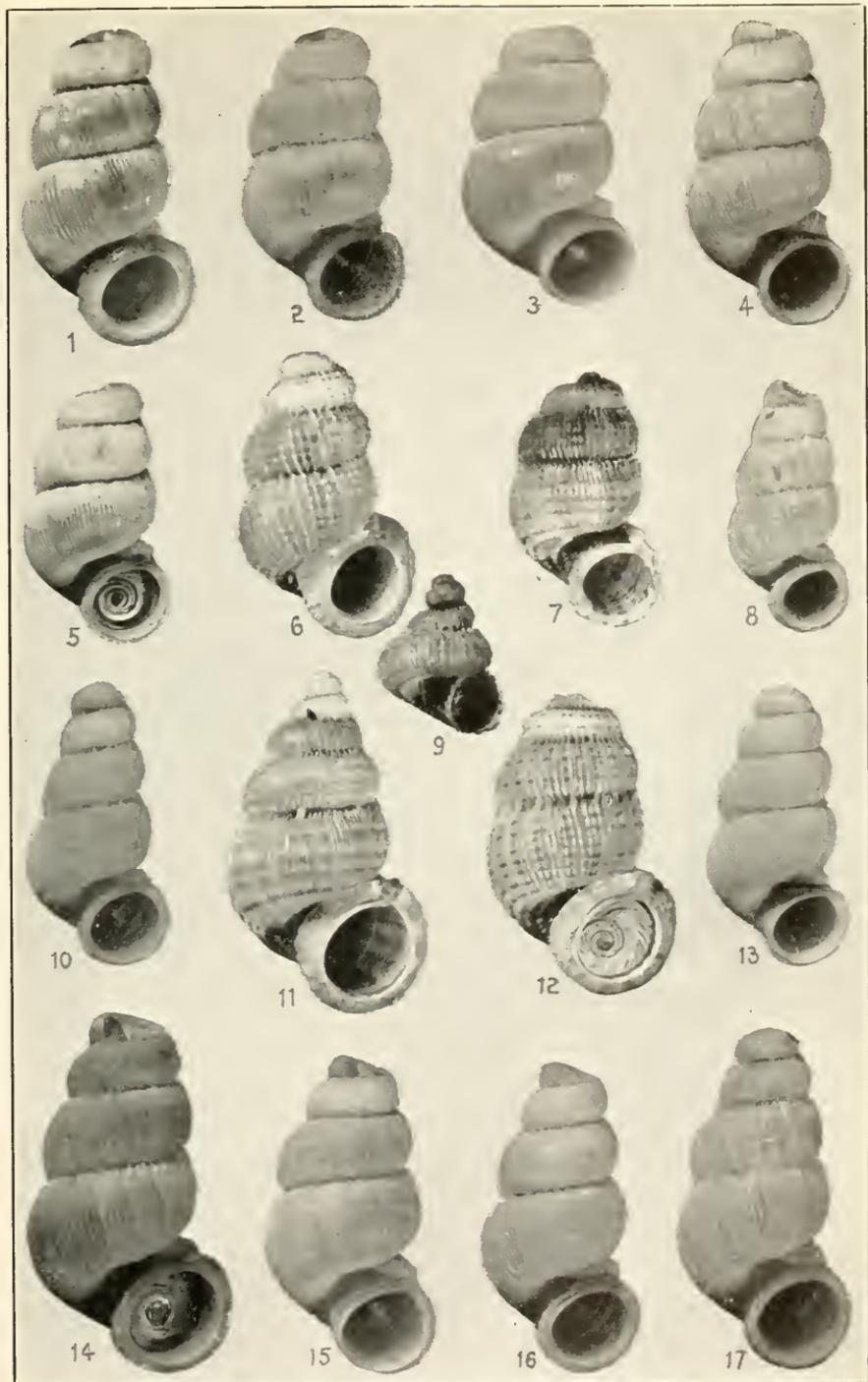
## SPECIES AND SUBSPECIES OF OPISTHOCOELIUM (X 4).

- 1, *O. (Opisthocoele) excurrens*; 2, *O. (Opisthocoelex) paradoxum paradoxum*; 3, *O. (O.) p. magnum*; 4, *O. (O.) simulans*; 5, *O. (Opisthocoeleium) lamellicostatum lamellicostatum*; 6, *O. (O.) mabuyense*; 7, *O. (Opisthocoele) oculum*; 8, *O. (Opisthocoeleium) opisthocoele*; 9, *O. (Opisthocoelex) paradoxum gibbosum*.



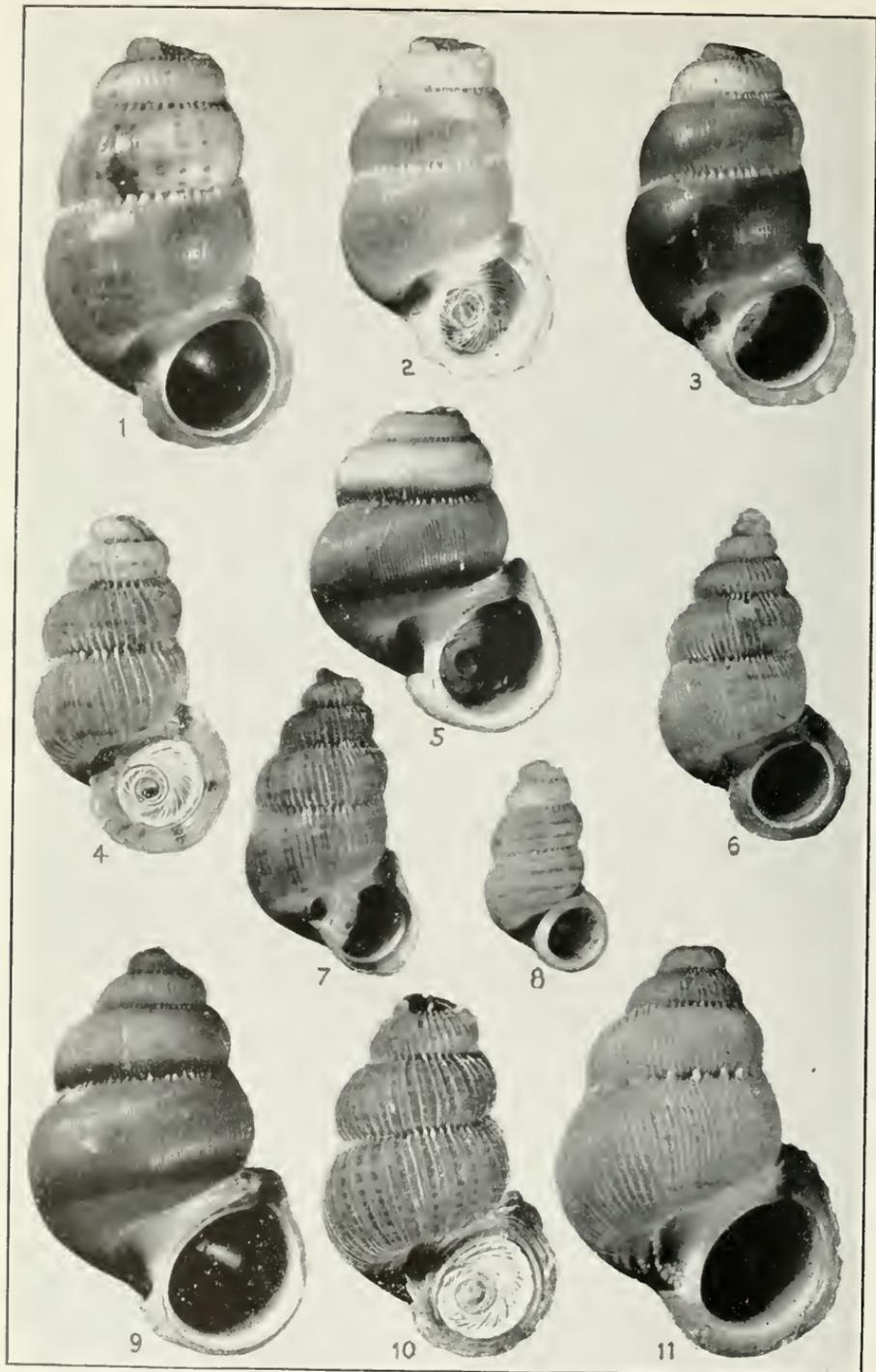
## SPECIES AND SUBSPECIES OF TORRELLA AND RHYTIDOPOMA (X 4).

- 1, *Torrella (Torrella) torreiana*; 2, *T. (T.) immersa immersa*; 3, *T. (T.) i. camaronensis*; 4, *T. (T.) deficiens*; 5, *T. (T.) immersa grillensis*; 6, *T. (Torrellisca) simpsoni simpsoni*; 7, *T. (T.) s. terneroensis*; 8, *T. (T.) trinidadensis*; 9, *Rhytidopoma nodulatum anafense*; 10, *R. honestum itinerans*; 11, *R. h. nodiferum*; 12, *R. nodulatum nodulatum*; 13, *R. honestum honestum*; 14, *R. coronatum*; 15, *R. nodulatum palenquense*; 16, *R. occidentale*.



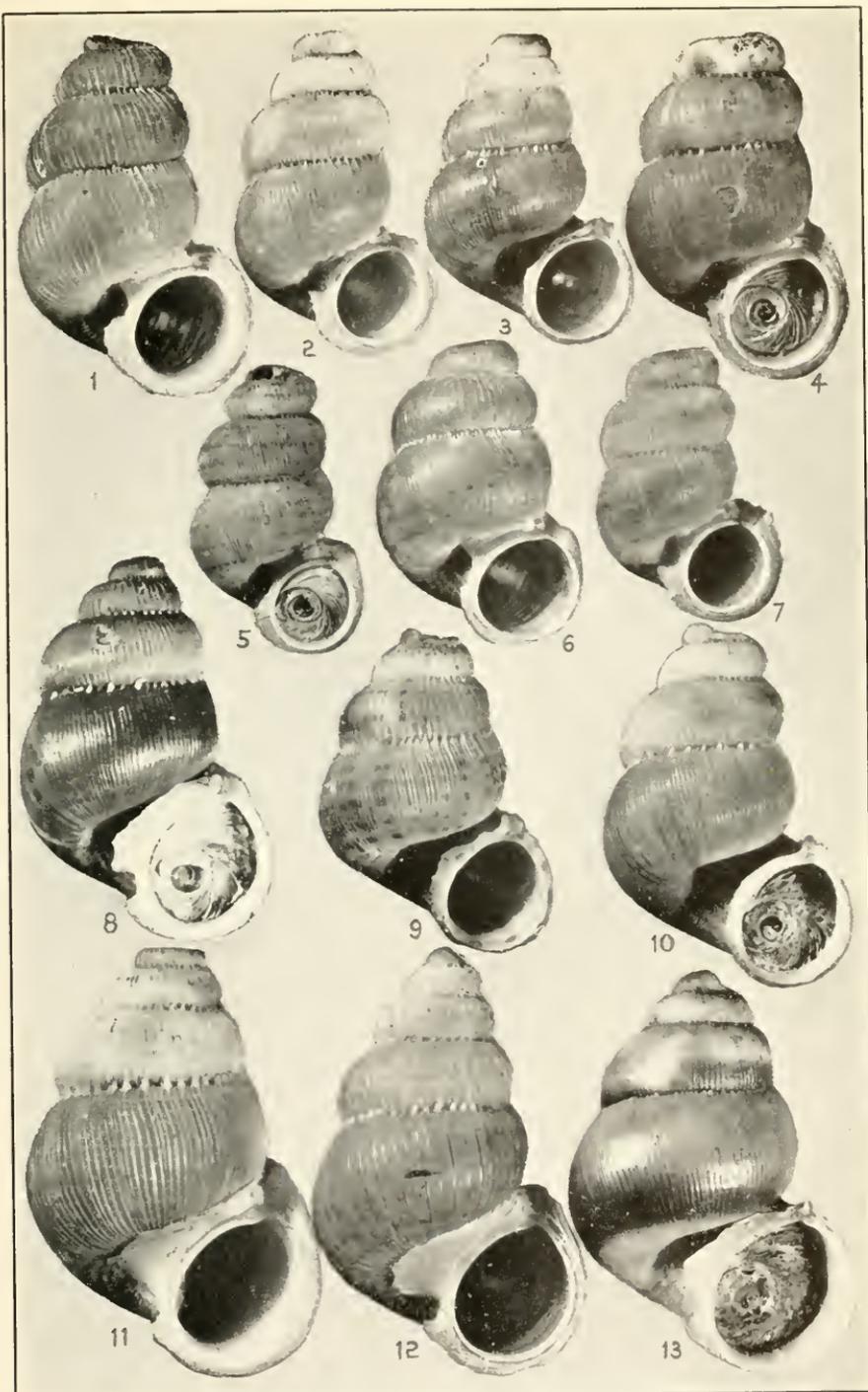
## SPECIES AND SUBSPECIES OF RHYTIDOPOMA AND OPISTHOSIPHON (X 4).

- 1, *Rhytidopoma wrightianum wrightianum*; 2, *R. clathratum candelaense*; 3, *R. hespericum*; 4, *R. wrightianum cabrasense*; 5, *R. w. ottonis*; 6, *Opisthosiphon (Solutapex) echinatum*; 7, *O. (S.) saizii*; 8, *R. rugulosum*; 9, *O. (S.) caroli* (nucleus); 10, *R. pinense colombense*; 11, *O. (S.) quesadae*; 12, *O. (S.) caroli*; 13, *R. clathratum jumaguense*; 14, *R. pinense rosarioense*; 15, *R. clathratum clathratum*; 16, *R. pinense erzastulum*; 17, *R. p. pinense*.



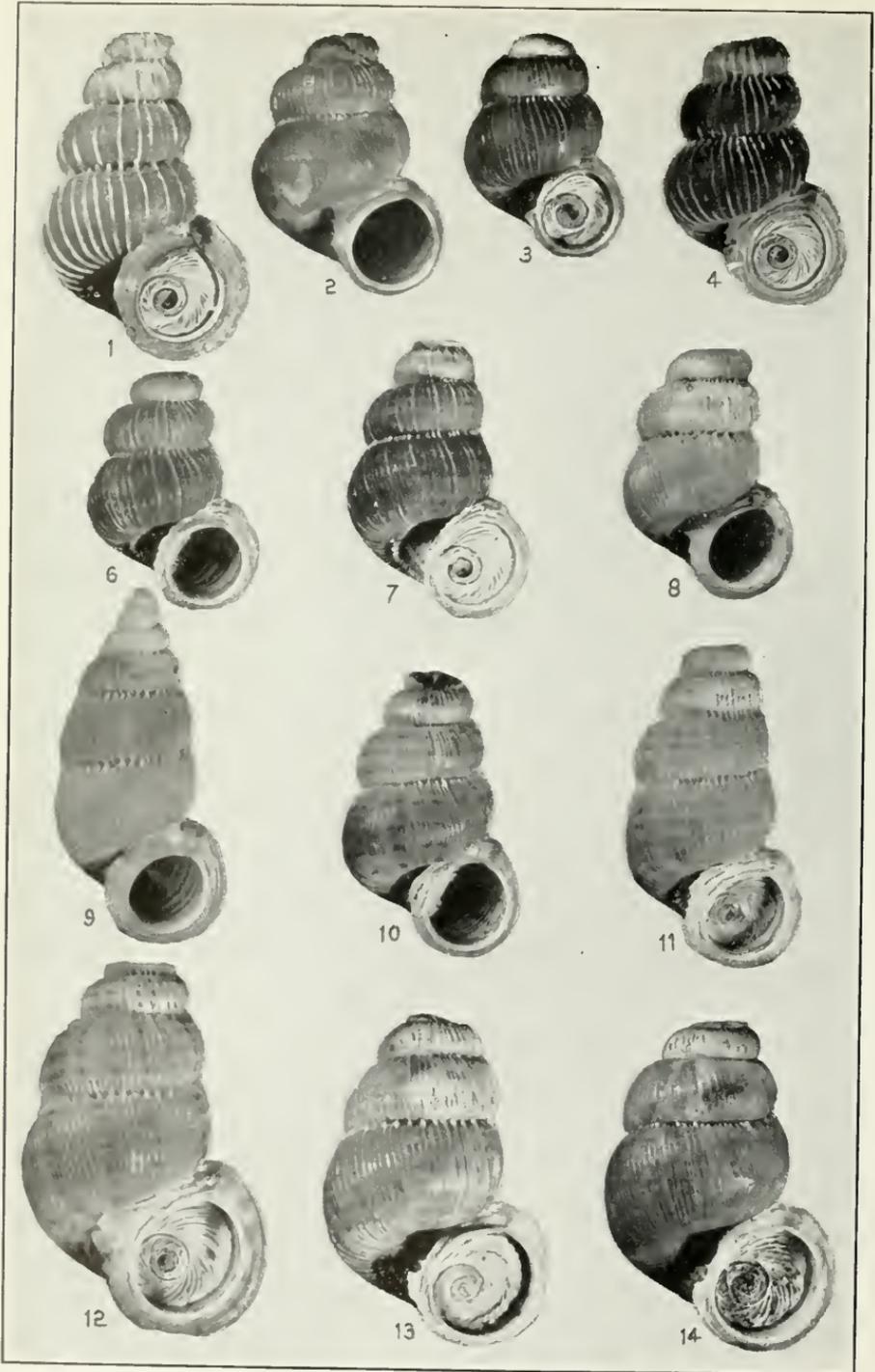
## SPECIES AND SUBSPECIES OF OPISTHOSIPHON (X 4).

- 1, *Opisthosiphon* (*Bermudezsiphona*) *palmeri camajanense*; 2, *O. (B.) prominulum*; 3, *O. (B.) palmeri palmeri*; 4, *O. (B.) lamellosum lamellosum*; 5, *O. (B.) banoense banoense*; 6, *O. (B.) lamellosum lowei*; 7, *O. (B.) cucullatum*; 8, *O. (Mirisiphon) sculptum*; 9, *O. (B.) banoense trincherasense*; 10, *O. (B.) plateroense*; 11, *O. (B.) greenfieldi*.



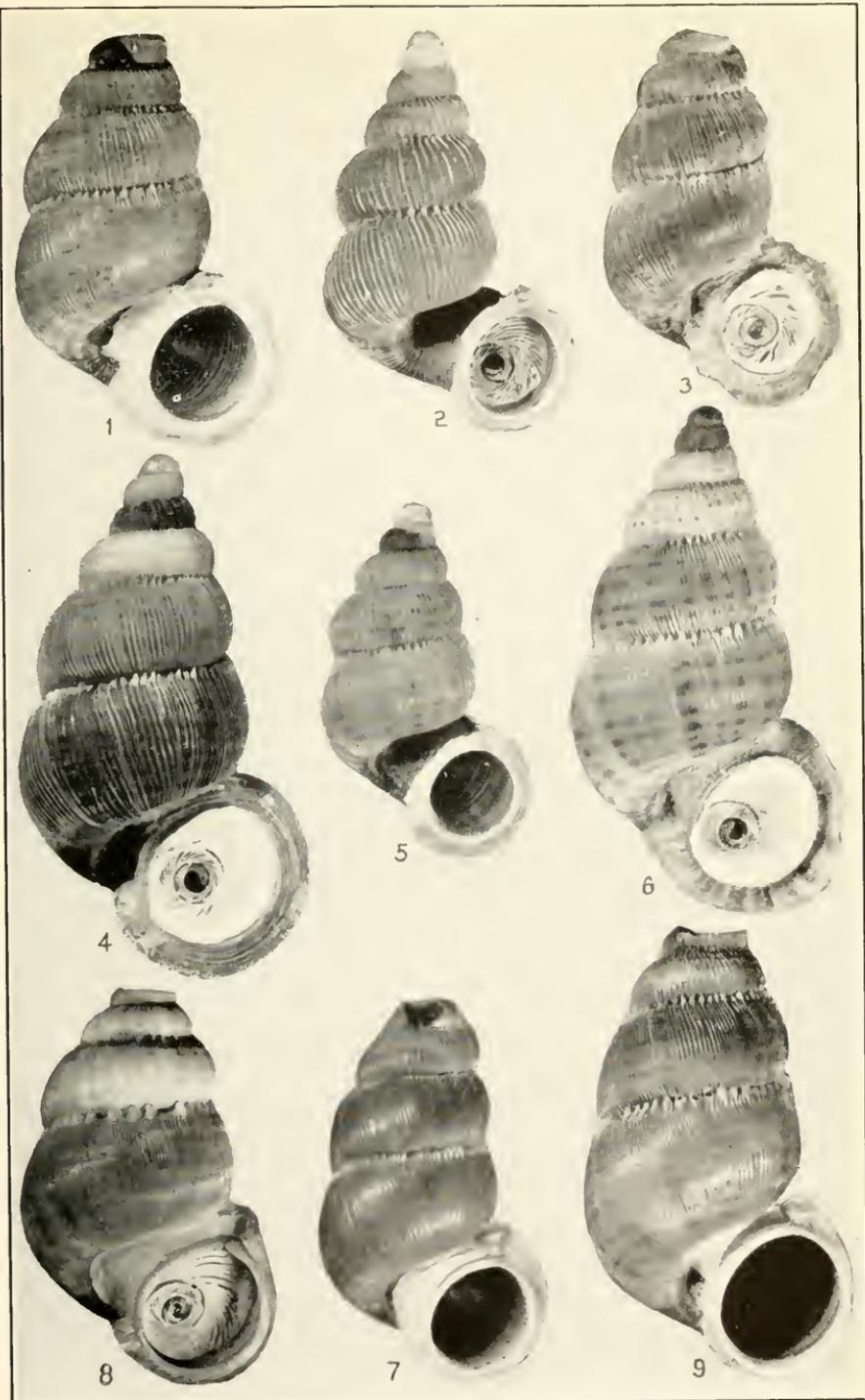
## SPECIES AND SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) (X 4).

- 1, *obtectum obtectum*; 2, *obtectum guayosense*; 3, *evanidum degeneratum*; 4, *obtectum seibaboense*; 5, *insulanum insulanum*; 6, *obtectum tenuicostum*; 7, *insulanum scopulorum*; 8, *subobturatum subobturatum*; 9, *salustii*; 10, *evanidum evanidum*; 11, *obturatum obturatum*; 12, *obturatum sulcosum*; 13, *subobturatum tinajaense*.



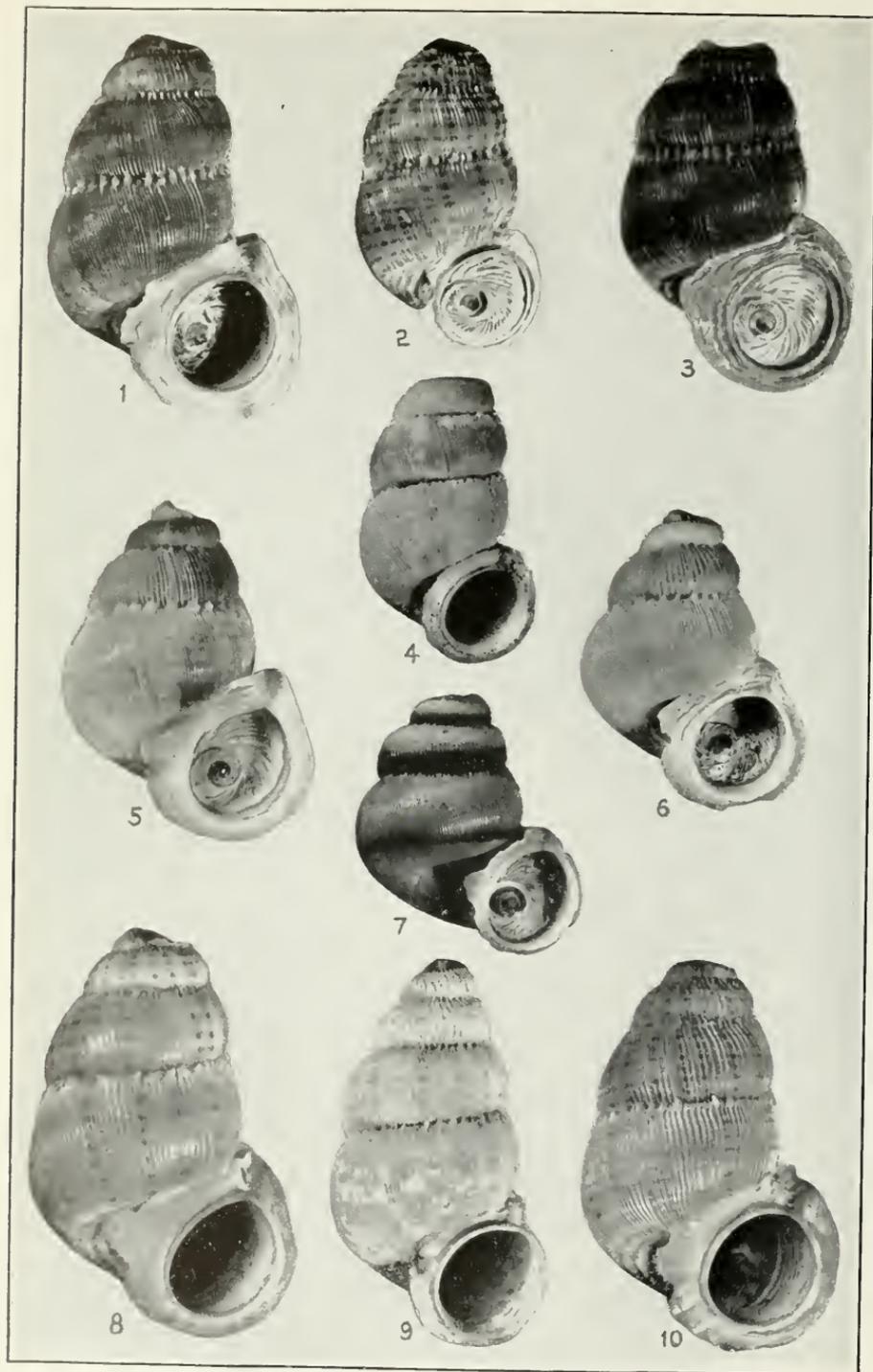
SPECIES AND SUBSPECIES OF OPISTHOSIPHON (BERMUDEZSIPHONA) (X 4).

- 1, *andrewsi*; 2, *subobtectum subobtectum*; 3, *subobtectum puntillense*; 4, *torrei*; 6, *bermudezi*; 7, *detectum lucasense*; 8, *detectum murinum*; 9, *aguilerianum aguilerianum*; 10, *detectum detectum*; 11, *aguilerianum holguinense*; 12, *caguanense*; 13, *subobtectum guajabanense*; 14, *subobtectum quintanense*.



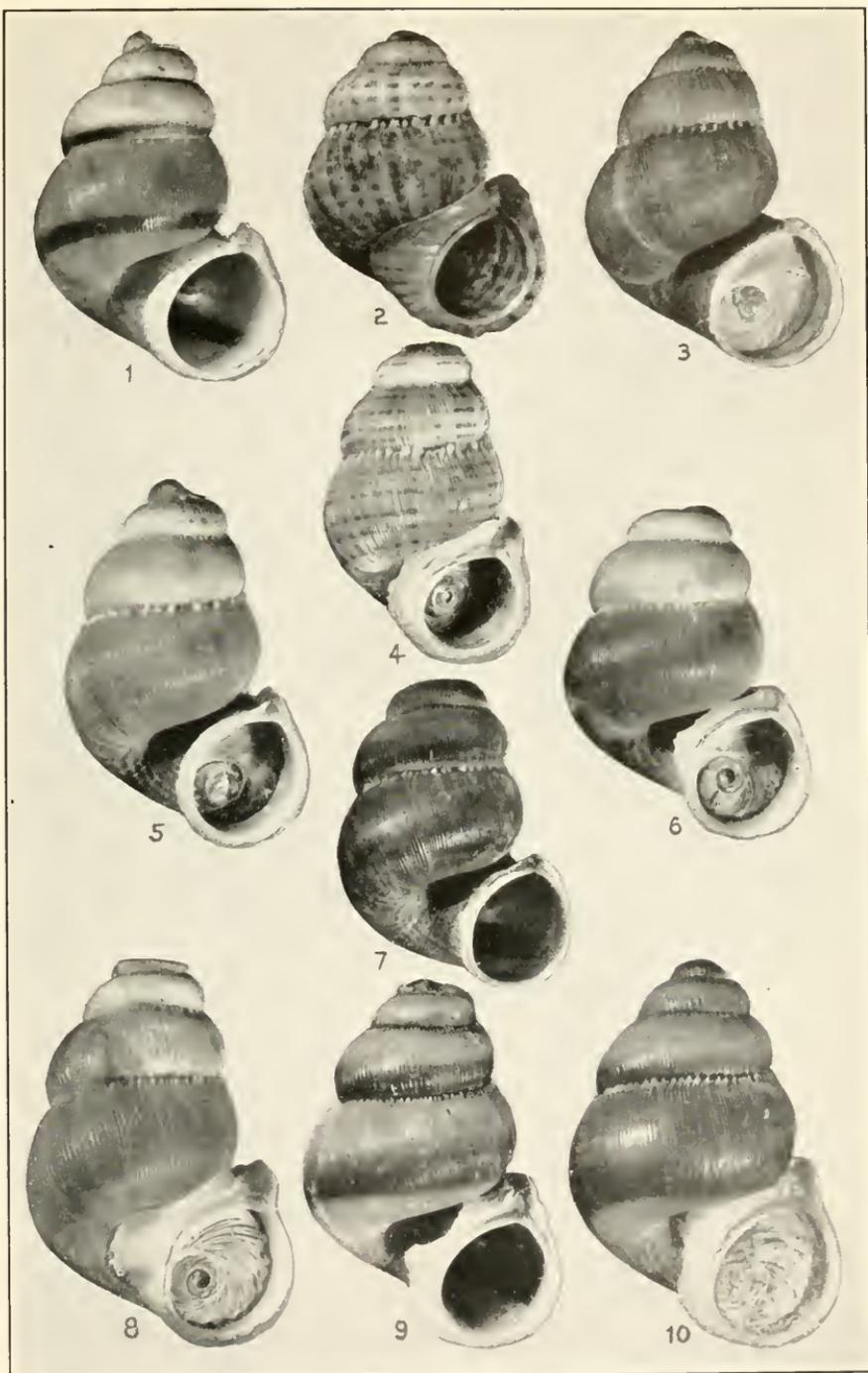
## SPECIES AND SUBSPECIES OF OPISTHOSIPHON (X 4).

- 1, *O. (Opisthosiphona) plicatum*; 2, *O. (O.) moreletianum moreletianum*; 3, *O. (O.) pupoides bibijaguaense*; 4, *O. (O.) p. pupoides*; 5, *O. (O.) moreletianum columbense*; 6, *O. (O.) pupoides velazquezii*; 7, *O. (O.) turiguanense*; 8, *O. (Cubatasiphona) poeyi*; 9, *O. (C.) protractum*.



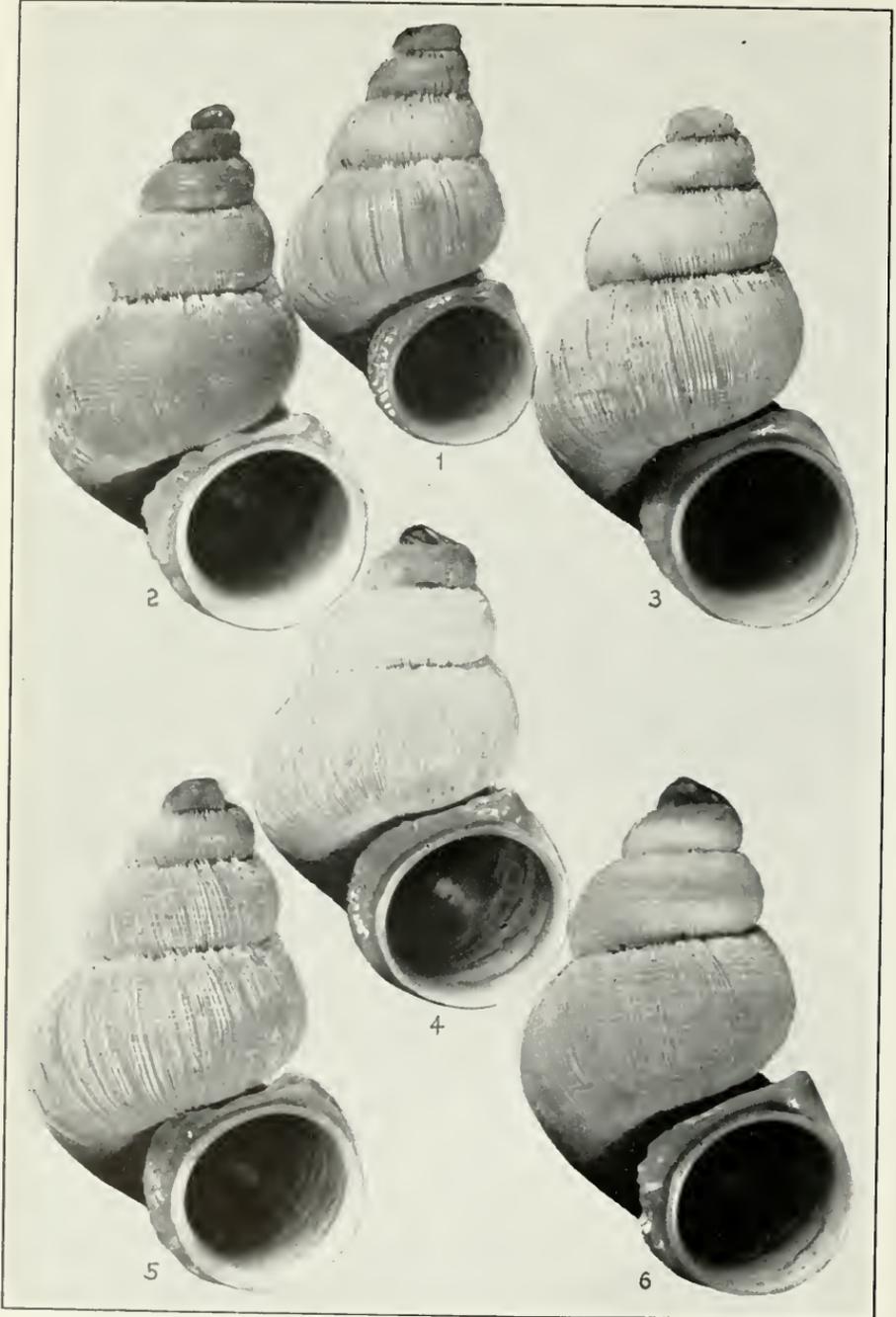
## SPECIES OF OPISTHOSIPHON (CUBITASIPHONA) (X 4).

1, *judasense*; 2, *guanajaense*; 3, *cunaguae*; 4, *manatiense*; 5, *sanchezi*; 6, *sosai*; 7, *litorale*; 8, *bioscaei*; 9, *claudens*  
10, *quinti*.

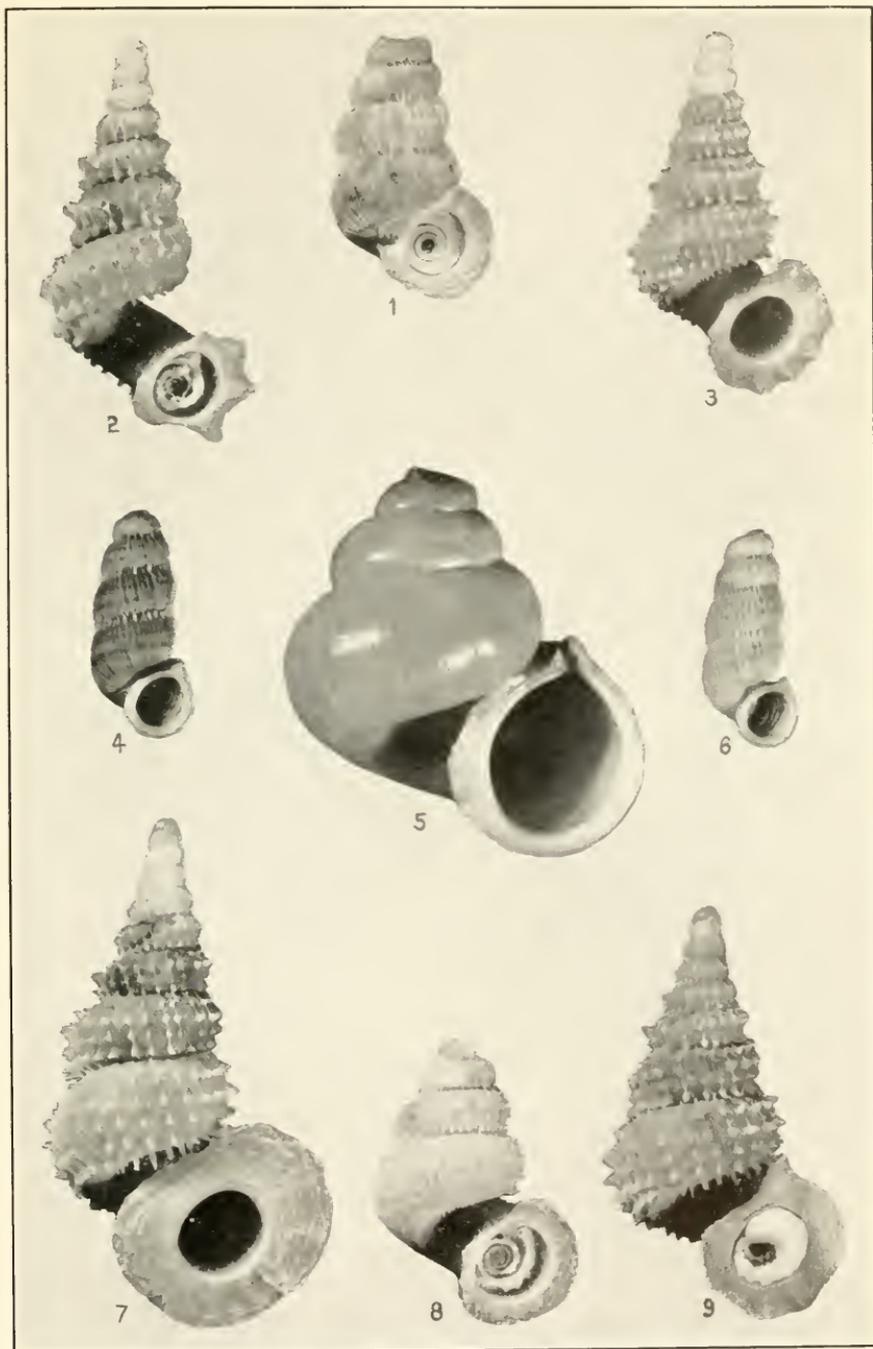


## SPECIES AND SUBSPECIES OF OPISTHOSIPHON (CUBITASIPHONA) (X 4).

- 1, *apertum*; 2, *tersum*; 3, *paredonense escalerense*; 4, *tersum*; 5, *paredonense paredonense*; 6, *berryi transitorium*;  
7, *deviatum*; 8, *berryi viguetense*; 9, *berryi berryi* (type of *semiapertum*); 10, *berryi berryi*.

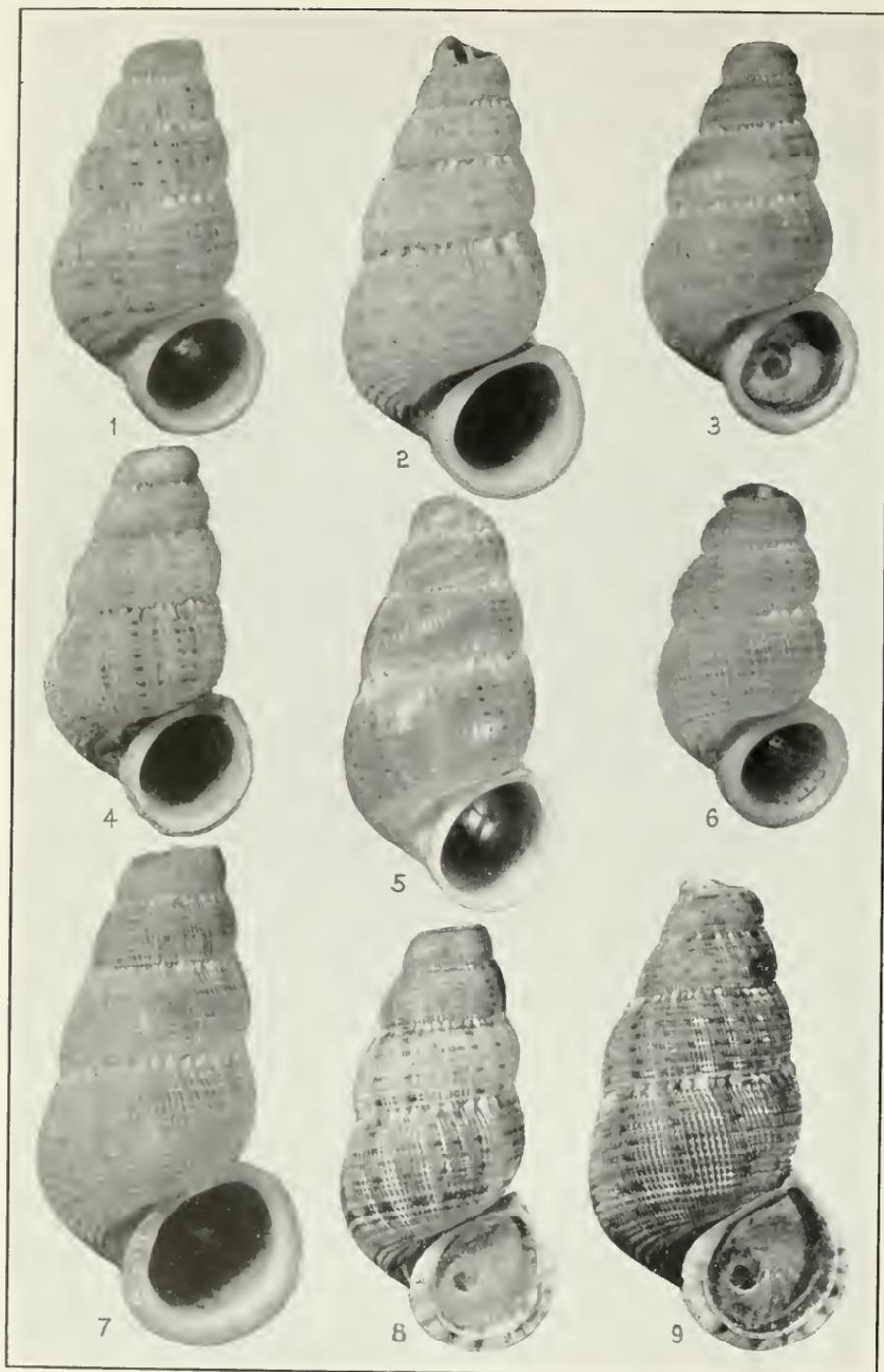


SUBSPECIES OF RHYTIDOTHYRA BILABIATA (X 4).  
1, *nana*; 2, *rosea*; 3, *straminea*; 4, *aurantiaca*; 5, *rosacea*; 6, *bilabiata*.



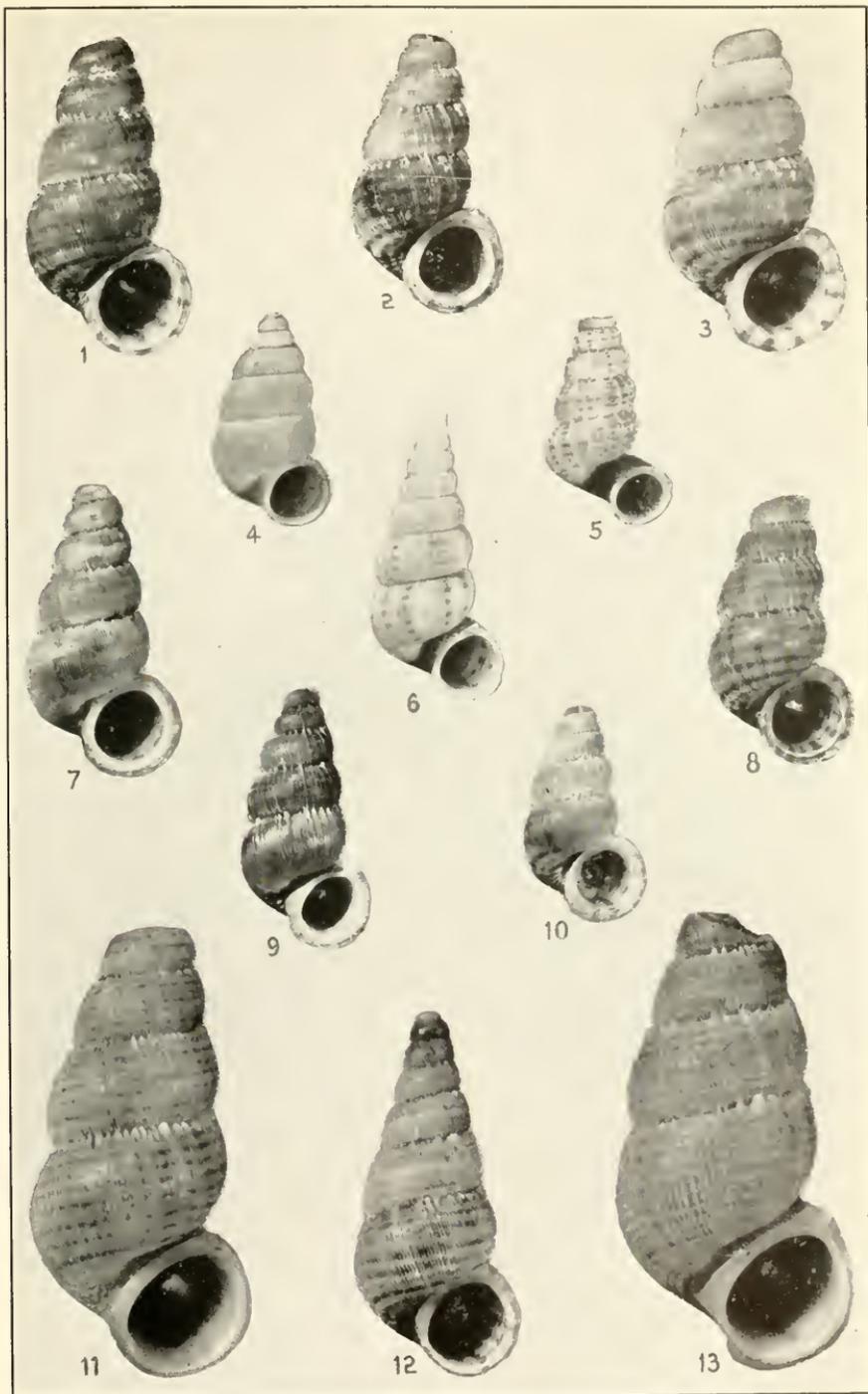
SPECIES AND SUBSPECIES OF XENOPOMOIDES, XENOPOMA, OPISTHOSIPHON, AND DALLSIPHONA (X 4).

- 1, *Xenopomoides delicatulum*; 2, *Xenopoma hystrix*; 3, *Xenopoma hendersoni*; 4, *Opisthosiphon* (*Cylindrosiphona*) *bacillum bacillum*; 5, *O. (C.) b. garciai*; 6, *Dallsiphona dalli*; 7, *Xenopoma aguayoi*; 8, *X. humboldtianum*; 9, *X. spinosissimum*.



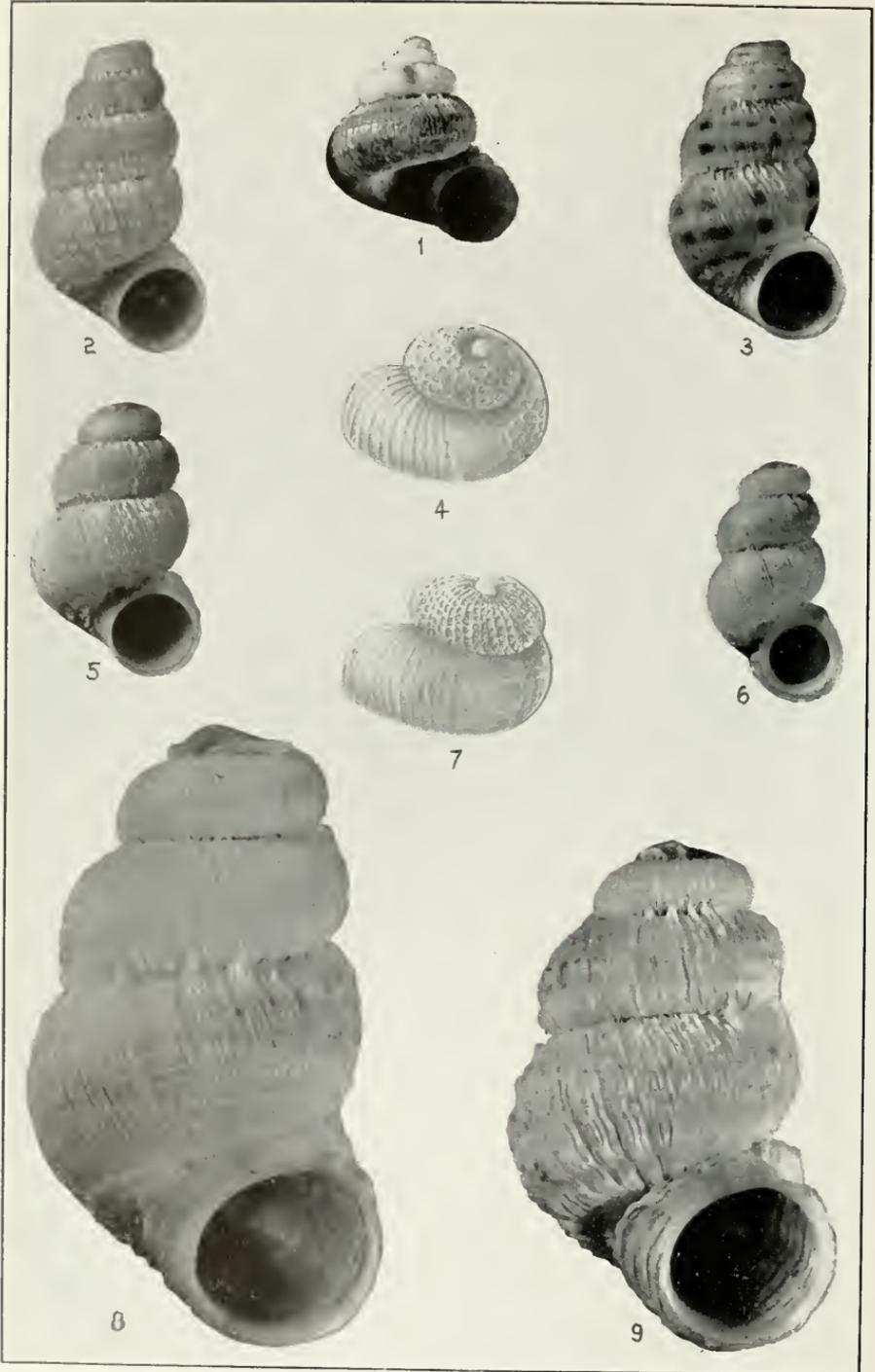
## SPECIES AND SUBSPECIES OF PARACHONDRIA (X 4).

- 1, *Parachondria (Parachondrops) erecta mayensis*; 2, *P. (P.) e. erecta*; 3, *P. (P.) e. turquinensis*; 4, *P. (P.) e. ramonensis*; 5, *P. (P.) wrighti*; 6, *P. (Parachondria) abnata*; 7, *P. (P.) texta texta*; 8, *P. (P.) i. booneae*; 9, *P. (P.) i. portillensis*.



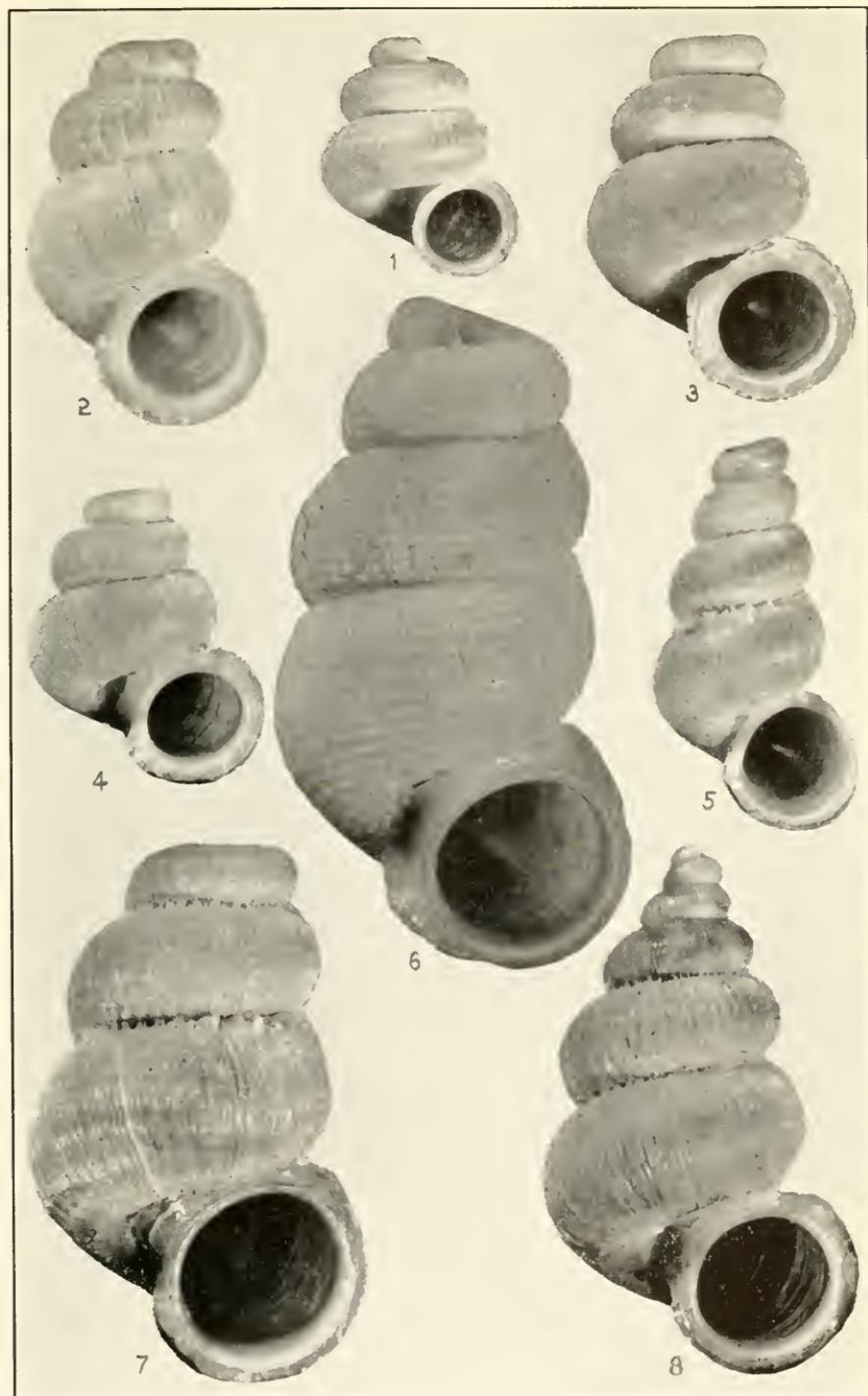
## SPECIES AND SUBSPECIES OF PARACHONDRIA AND ADAMSIELLA (X 4).

- 1, *Parachondria (Parachondrops) chordata chordata*; 2, *P. (P.) c. songoensis*; 3, *P. (P.) c. tananensis*; 4, *Adamsiella (Cubadamsiella) gratiosa*; 5, *A. (C.) leoni*; 6, *A. (C.) procax*; 7, *Parachondria (Parachondrops) nigricula*; 8, *P. (P.) chordata mayariensis*; 9, *P. (P.) daudinoti*; 10, *P. (P.) chordata baracoensis*; 11, *P. (P.) abtiana*; 12, *P. (P.) chordata guantanamoensis*; 13, *P. (P.) lurida*.



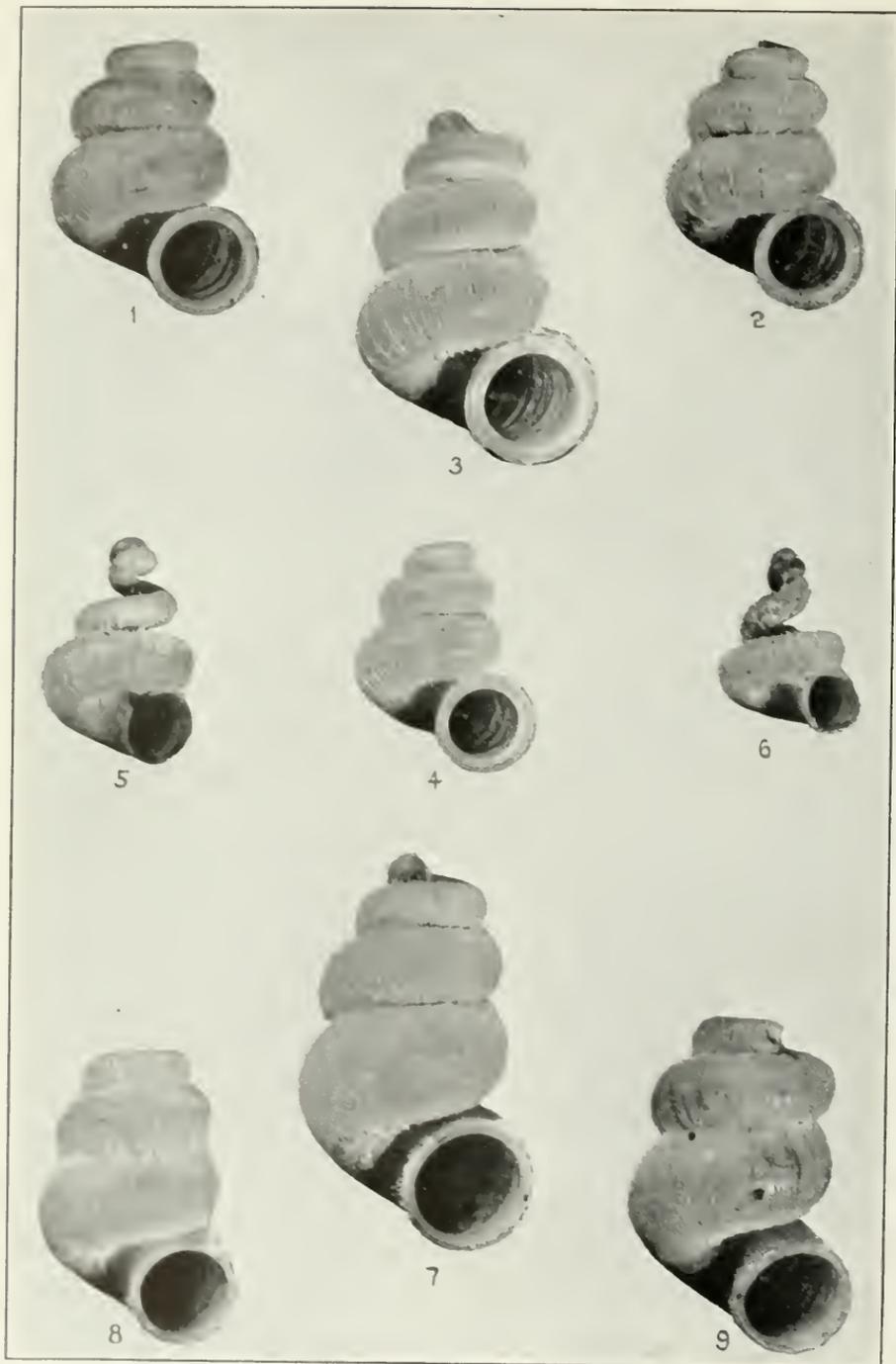
SPECIES AND SUBSPECIES OF LIMADORA, LIMADOREX, AND TUDORA.

1, *Limadora tollini*; 2, *L. garciana sillaensis*; 3, *L. scabrata*; 4, *L. tollini* (nucleus much enlarged); 5, *L. garciana garciana*; 6, *Limadorex limonensis*; 7, *L. limonensis* (nuclear whorls much enlarged); 8, *Tudora (Eutudorops) torquata*; 9, *T. (E.) torquata* (pa atype). Figs. 1-6,  $\times 4$ ; figs. 8, 9,  $\times 8$ .



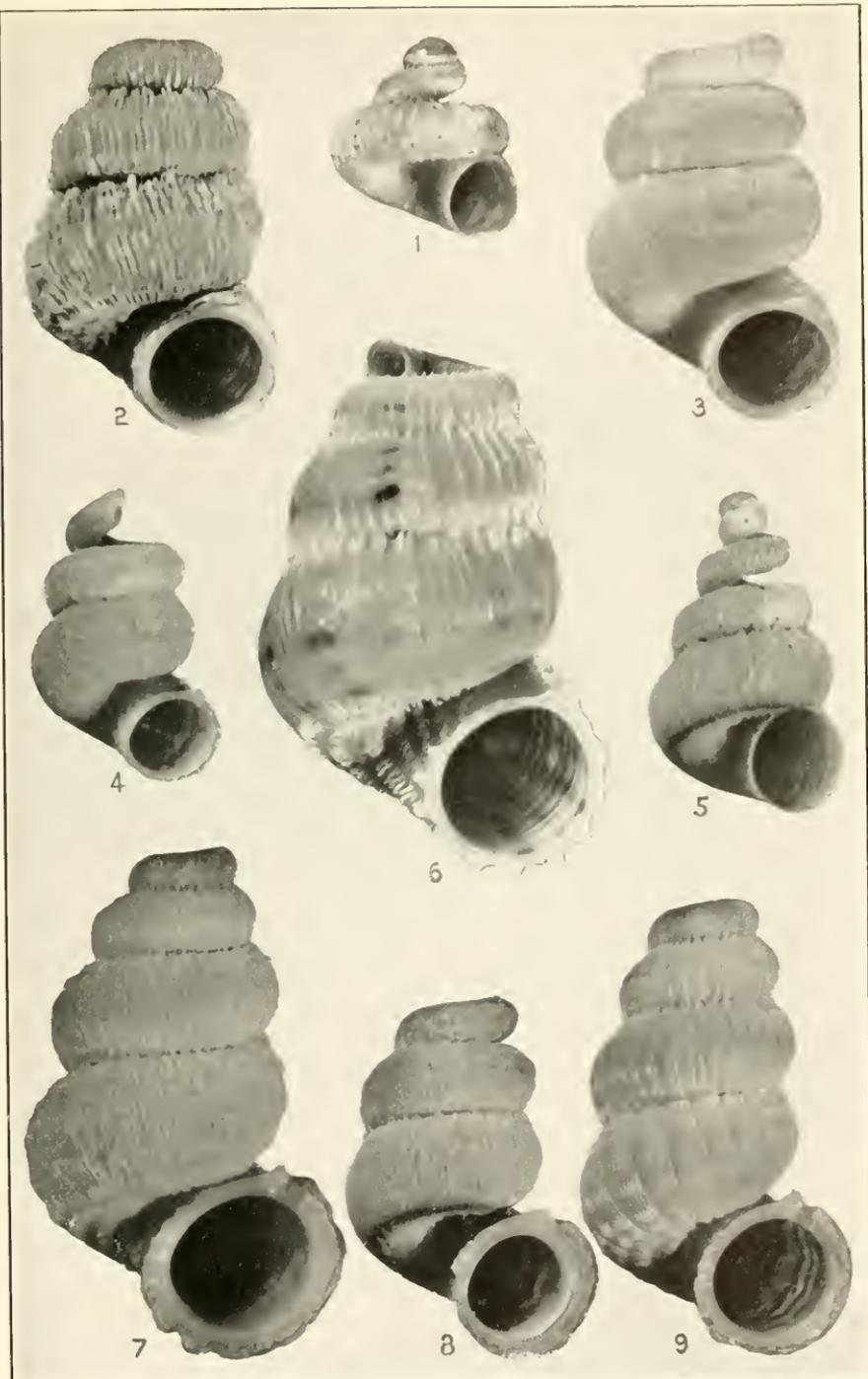
SPECIES AND SUBSPECIES OF TUDORA (EUTUDOREX) (X 8).

1, *complanata*; 2, *rotundata*; 3, *rocui*; 4, *undosa undosa*; 5, *pitoeulenta*; 6, *welchi*; 7, *undosa barroii*; 8, *undosa laureani*.



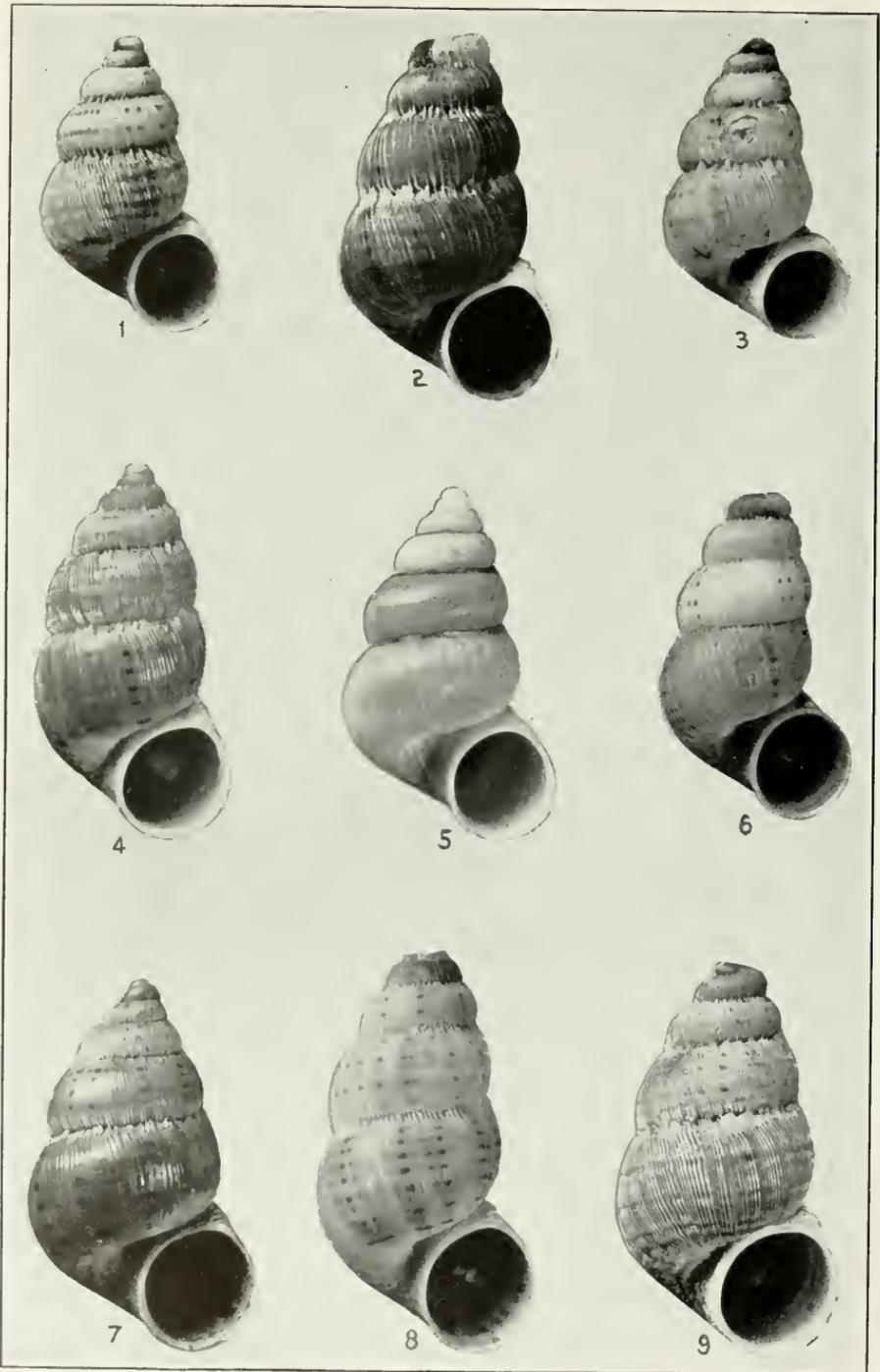
## SPECIES AND SUBSPECIES OF TUDORA (N. S.).

1. *Tudora (Eutadorea) tricoloris antoniensis*; 2. *T. (E.) t. palmirensis*; 3. *T. (E.) t. trocheli*; 4. *T. (E.) t. atucaren-*  
*sis*; 5. *T. Ramadensis* *nodulata* *n. dubitata* (nucleus); 6. *T. (R.) n. mirifica* (nucleus); 7. *T. (R.) n. mirandensis*;  
 8. *T. (R.) n. nodulata*; 9. *T. (R.) n. mirifica*.



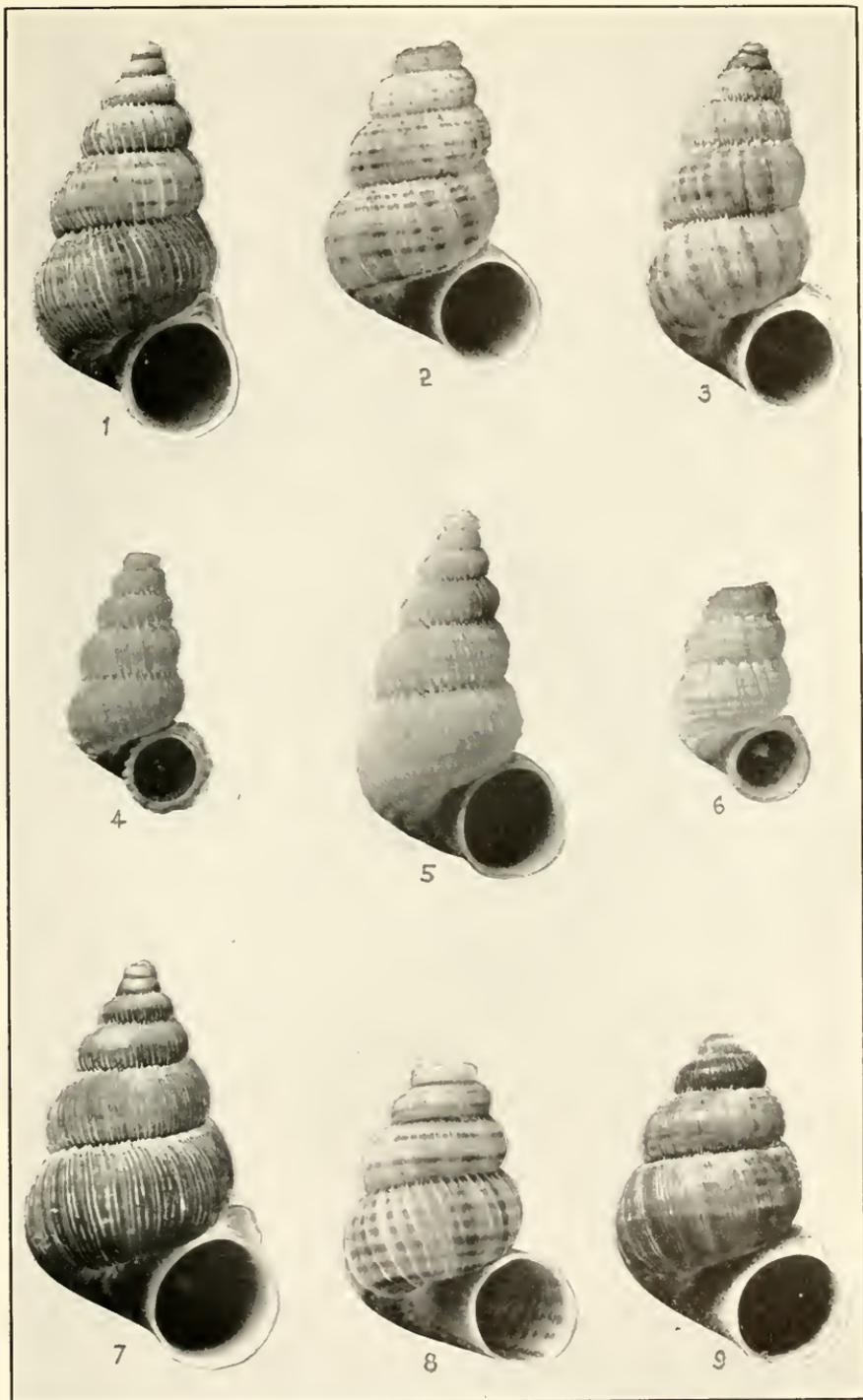
## SPECIES AND SUBSPECIES OF TUDORA (RAMSDENIA) (X 8).

- 1, *per.pectiva* (nucleus); 2, *bufo*; 3, *nobilitata mayariensis*; 4, *nobilitata yatera-ensis*; 5, *notata* (nucleus); 6, *per.pectiva*; 7, *natensoni canetensis*; 8, *notata*; 9, *natensoni natensoni*.



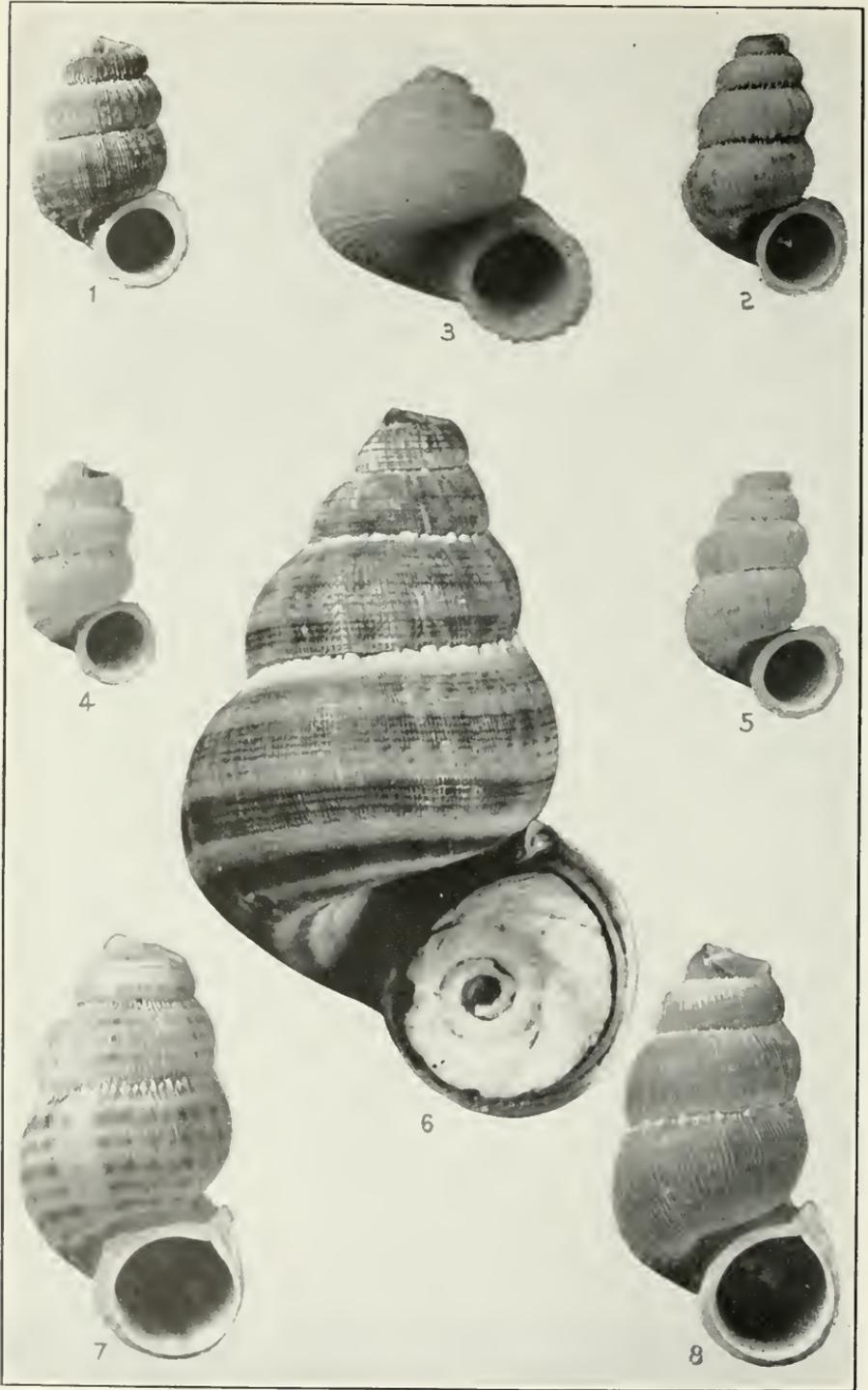
SPECIES AND SUBSPECIES OF TUDORA (AGUAYOTUDORA) (X 8).

1, *recta martiensis*; 2, *recta barreti*; 3, *recta recta*; 4, *cristata cristata*; 5, *suavis*; 6, *cristata chorrillensis*; 7, *crassiuscula*;  
8, *bermudezi bermudezi*; 9, *bermudezi sibanicuensis*.



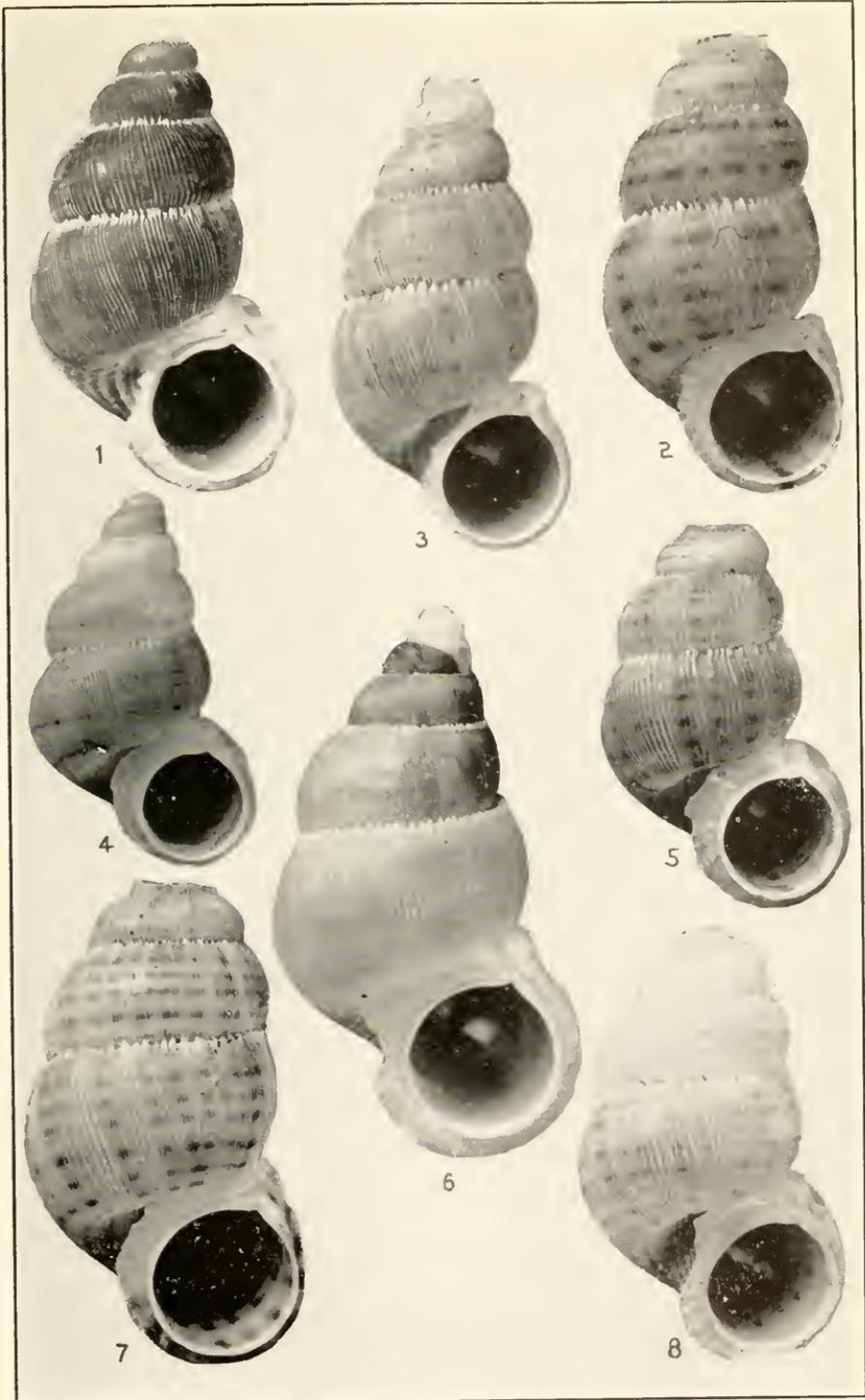
## SPECIES AND SUBSPECIES OF TUDORA (X 4).

- 1, *Tudora (Aguyotudora) aguayoi guaicanamarensis*; 2, *T. (A.) tuberculata*; 3, *T. (A.) aguayoi najazaensis*; 4, *T. (Wrightudora) arcticoronata*; 5, *T. (A.) asperata*; 6, *T. (H.) enode*; 7, *T. (A.) aguayoi aguayoi*; 8, *T. (A.) varicosa*; 9, *T. (A.) obesa*.



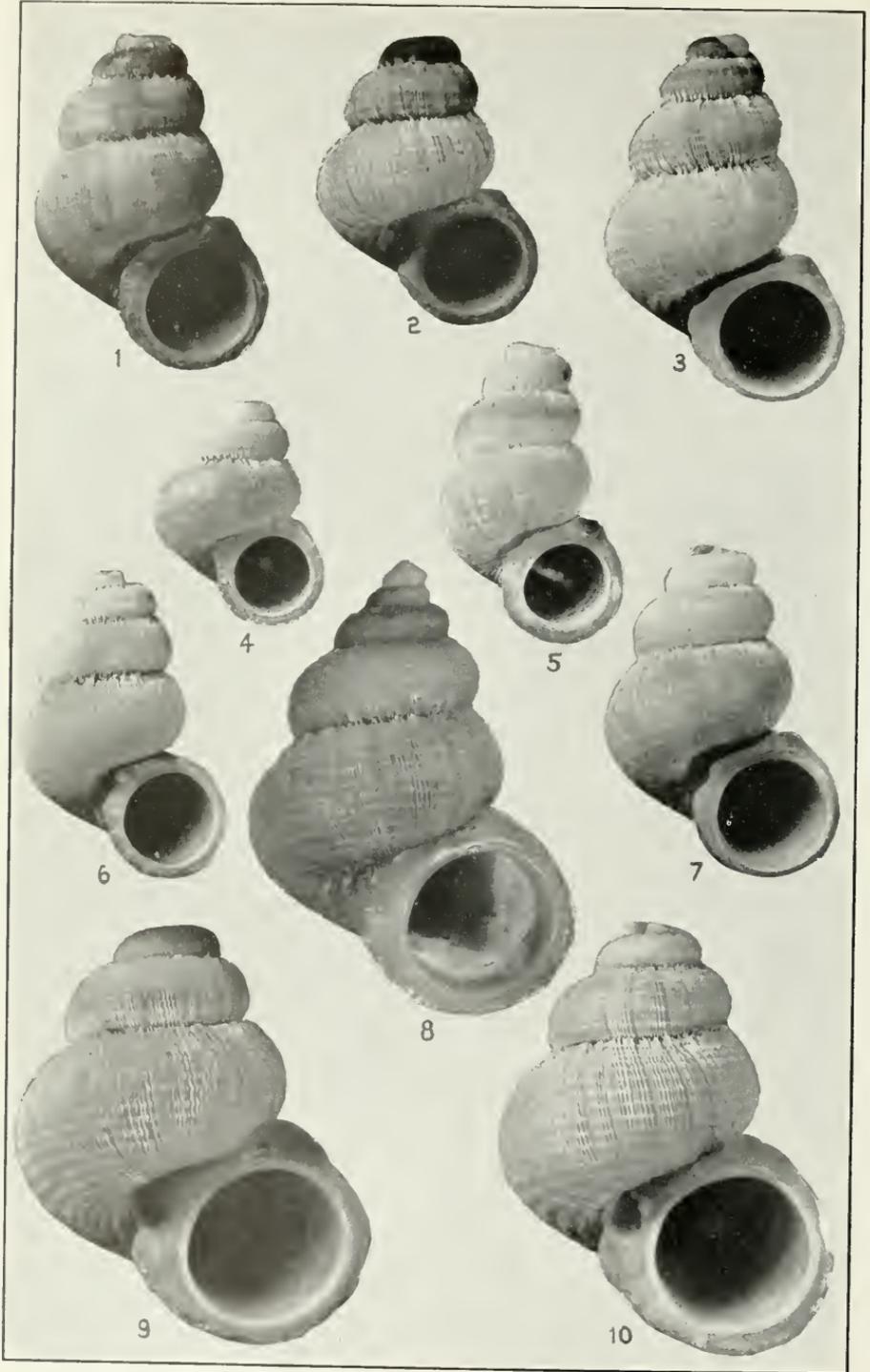
SPECIES AND SUBSPECIES OF TUDORA AND ANNULARIA (X 4).

- 1, *Tudora* (*Wrightudora*) *gundlachi*; 2, *T.* (*W.*) *garridoiana garridoiana*; 3, *T.* (*Gundlachtudora*) *decolorata*; 4, *T.* (*W.*) *semicoronata*; 5, *T.* (*W.*) *garridoiana baracoensis*; 6, *T.* (*Tudorina*) *rangelina*; 7, *Annularia* (*Annularodes*) *uncinata*; 8, *A.* (*A.*) *canoensis*.



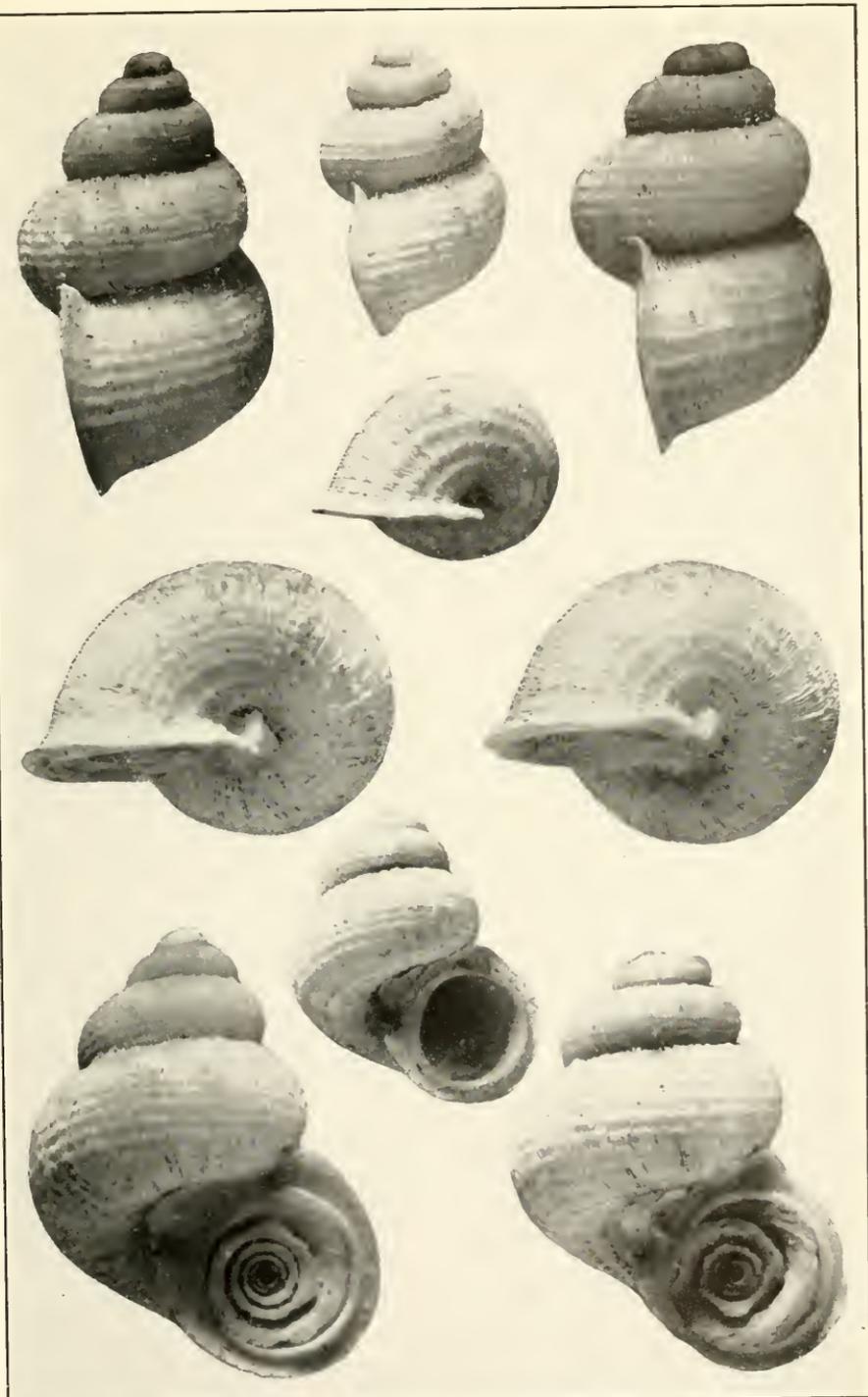
## SPECIES AND SUBSPECIES OF ANNULARIA (X 4).

- 1, *A. (Annularodisca) pilibryi*; 2, *A. (Annularodei) terneroensis terneroensis*; 3, *A. (A.) indiaea*; 4, *A. (A.) cantarillensis*; 5, *A. (A.) terneroensis indioensis*; 6, *A. (A.) obsoleta*; 7, *A. (A.) perezi perezi*; 8, *A. (A.) p. guttarti*.



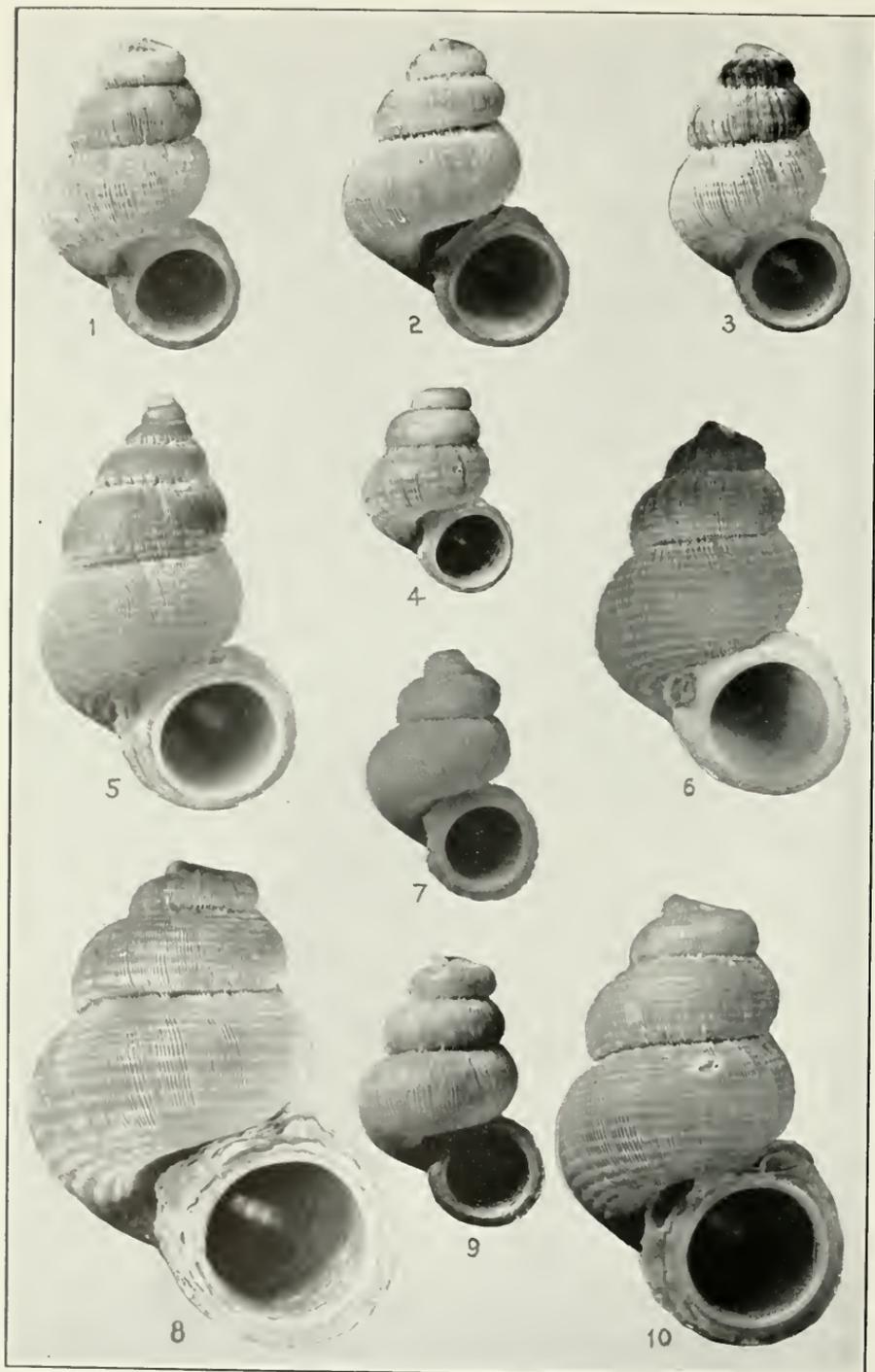
## SPECIES AND SUBSPECIES OF ANNULARIA (ANNULAROPS) (X 4).

1, *sauvallei chorreensis*; 2, *semicana nana*; 3, *sauvallei natensoni*; 4, *perplexa*; 5, *vannostrandii*; 6, *sauvallei cortinai*;  
7, *sauvallei sauvallei*; 8, *plicata*; 9, *semicana organicola*; 10, *semicana semicana*.



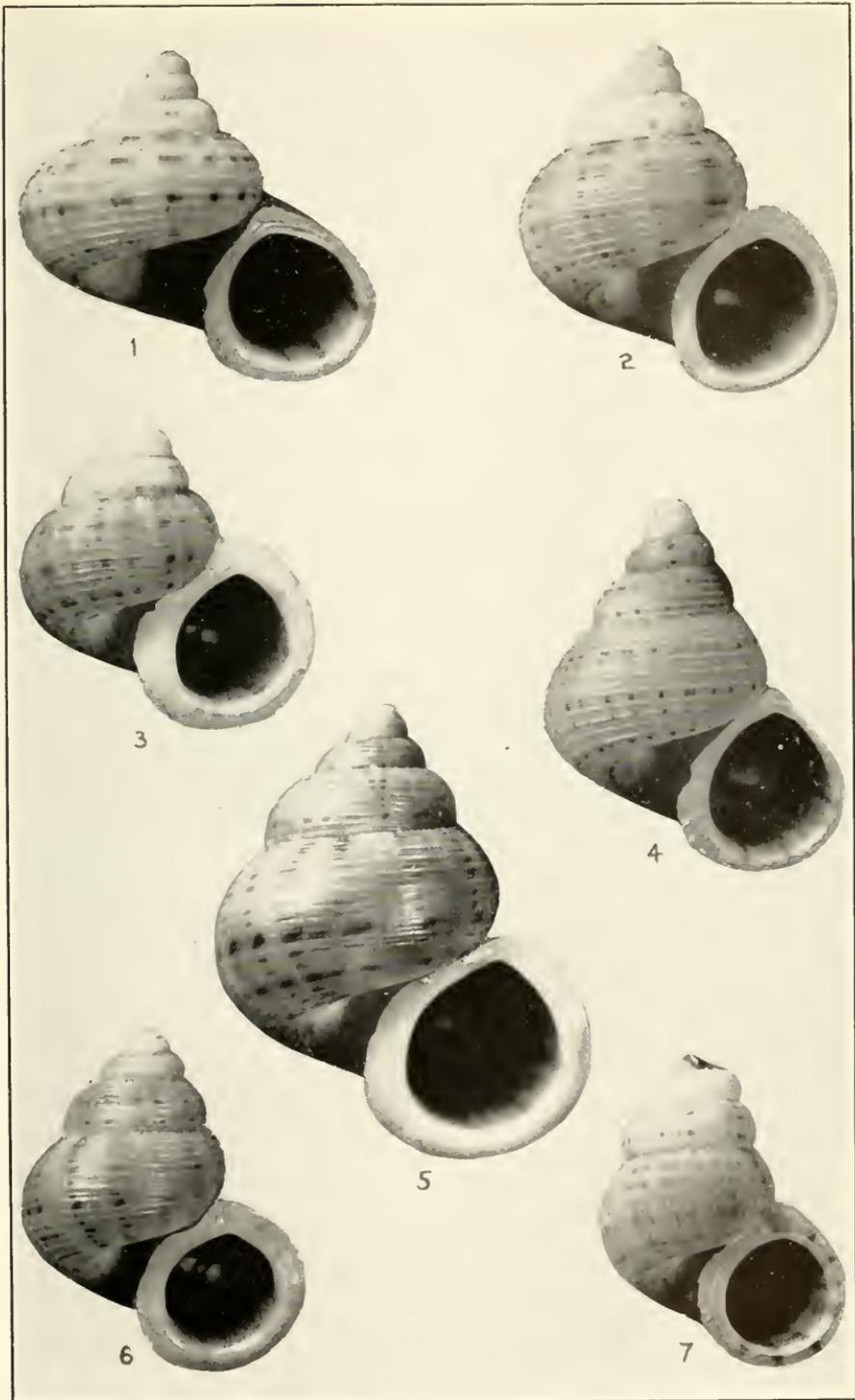
ANNULARIA (ANNULAROPS) SEMICANA SEMICANA (X 4).

The three cotypes in the British Museum.



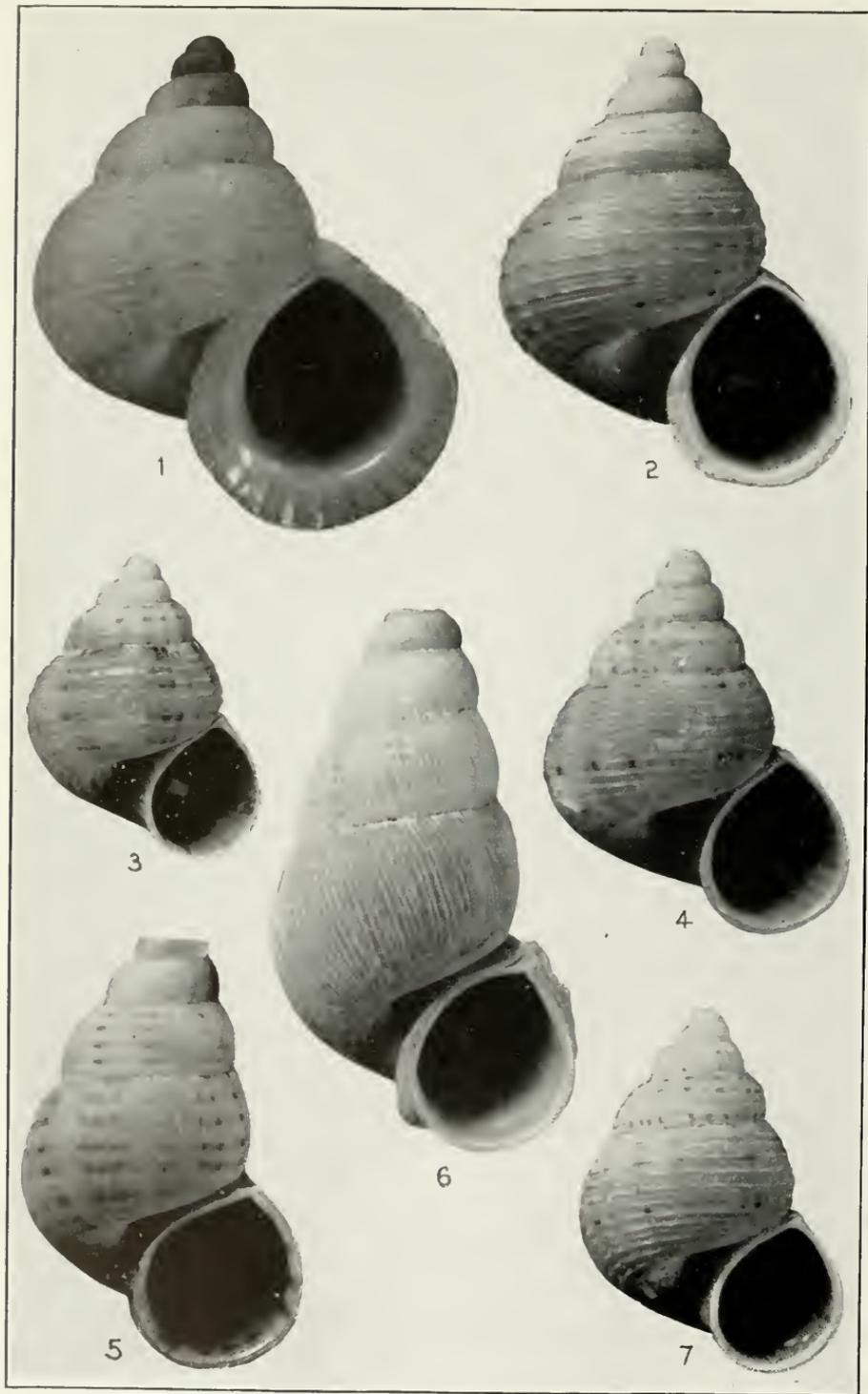
## SPECIES AND SUBSPECIES OF ANNULARIA (ANNULAROPS) (X 4).

- 1, *coronadoi purca*; 2, *blaini cumbrensis*; 3, *coronadoi acerata*; 4, *coronadoi coronadoi*; 5, *attenuata attenuata*; 6, *attenuata morsei*; 7, *tryoni vinalensis*; 8, *blaini blaini*; 9, *tryoni tryoni*; 10, *attenuata minaensis*.



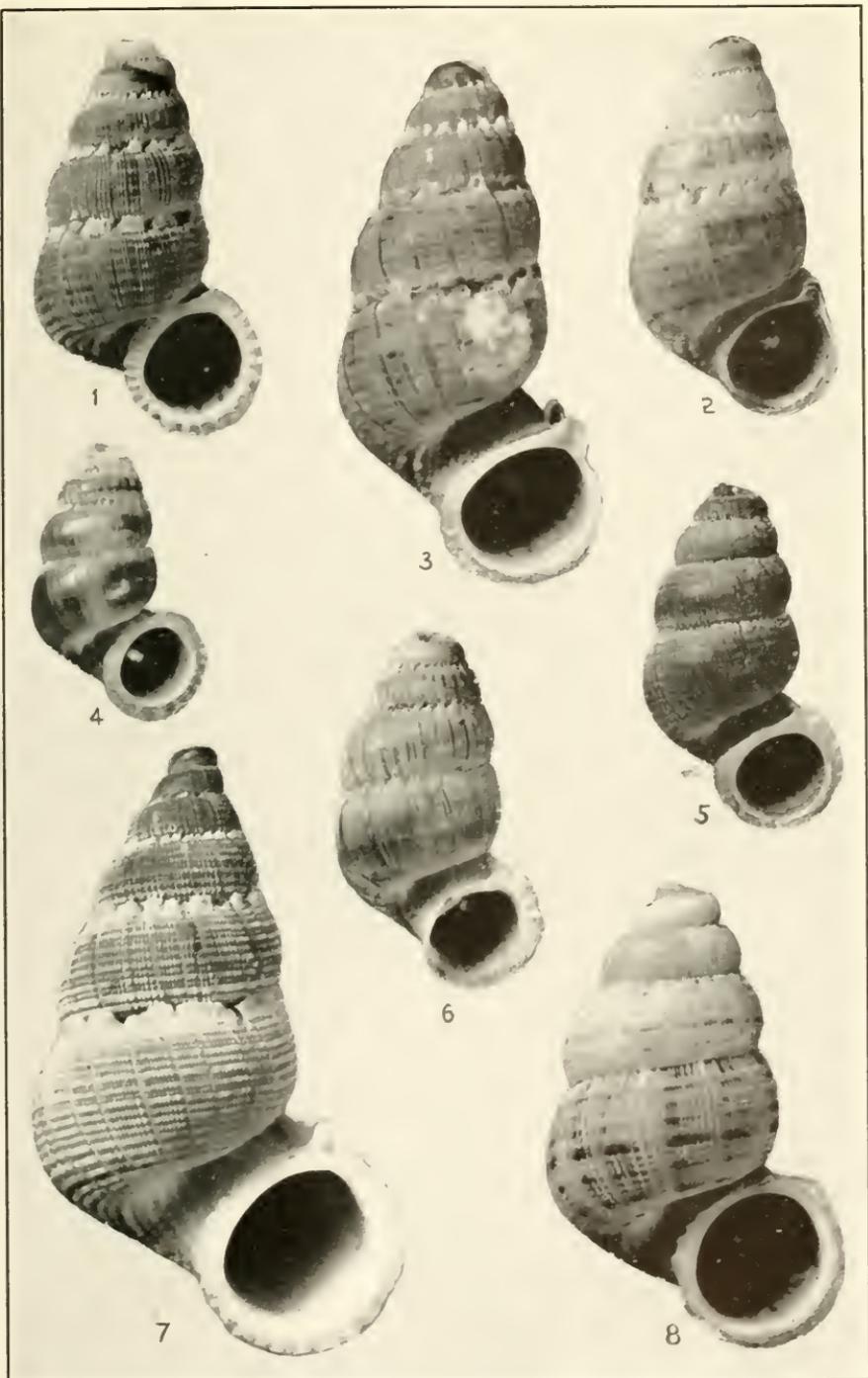
SPECIES AND SUBSPECIES OF ANNULARIA (X 4).

- 1, *A. (Eutudora) cabrerai*; 2, *A. (E.) transitoria di tineta*; 3, *A. (E.) latistoma*; 4, *A. (E.) transitoria transitoria*; 5, *A. (E.) limbifera ternata*; 6, *A. (E.) limbifera limbifera*; 7, *A. (Annularodella) morenoi*.



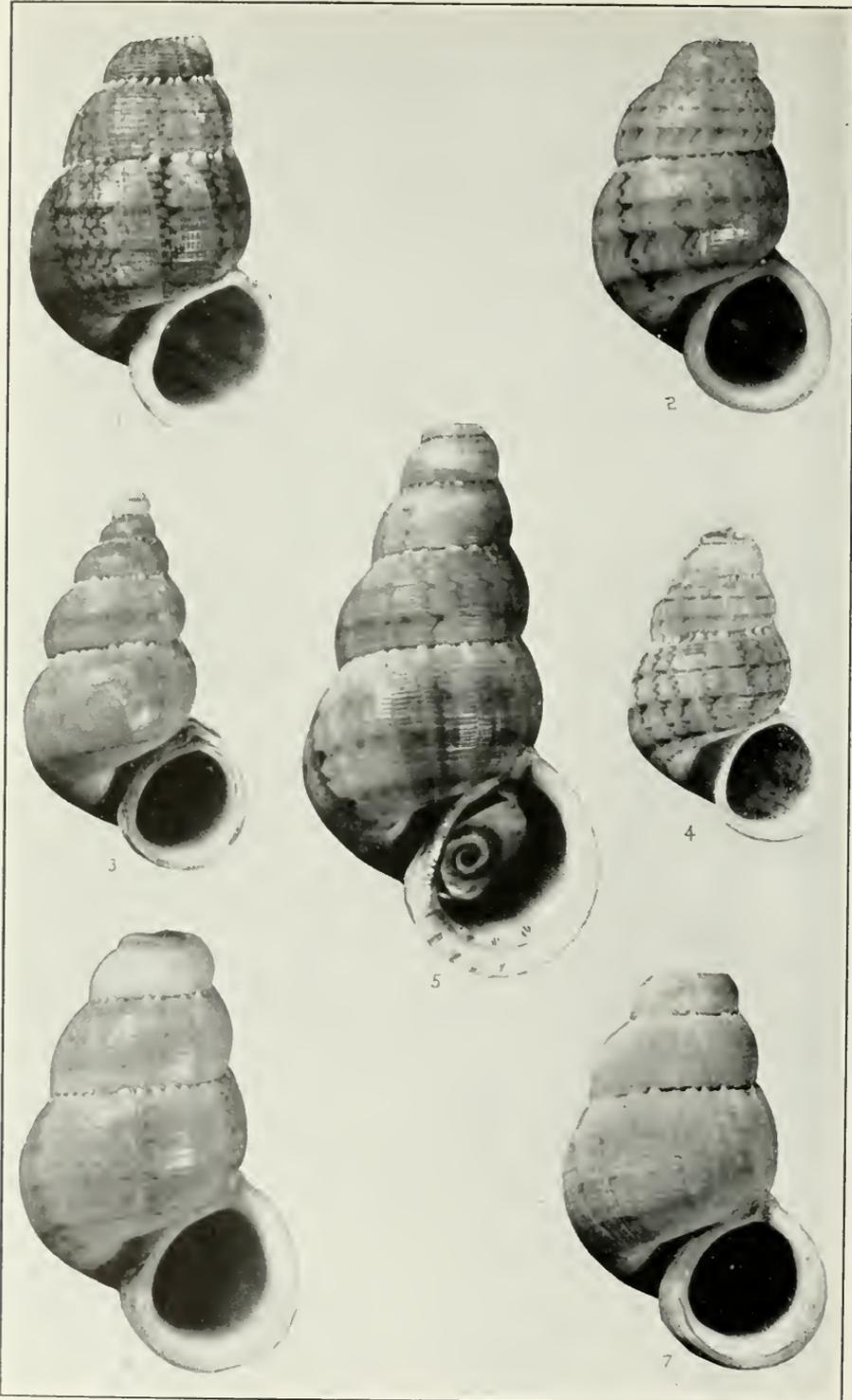
## SPECIES AND SUBSPECIES OF ANNULARIA (X 4).

- 1, *A. (Eutudoriscia) jimeno*; 2, *A. (E.) camoensis*; 3, *A. (E.) catenata blanesi*; 4, *A. (E.) agassizi*; 5, *A. (Fossularia) inquisita*; 6, *A. (F.) boqueronensis*; 7, *A. (Eutudoriscia) catenata catenata*.

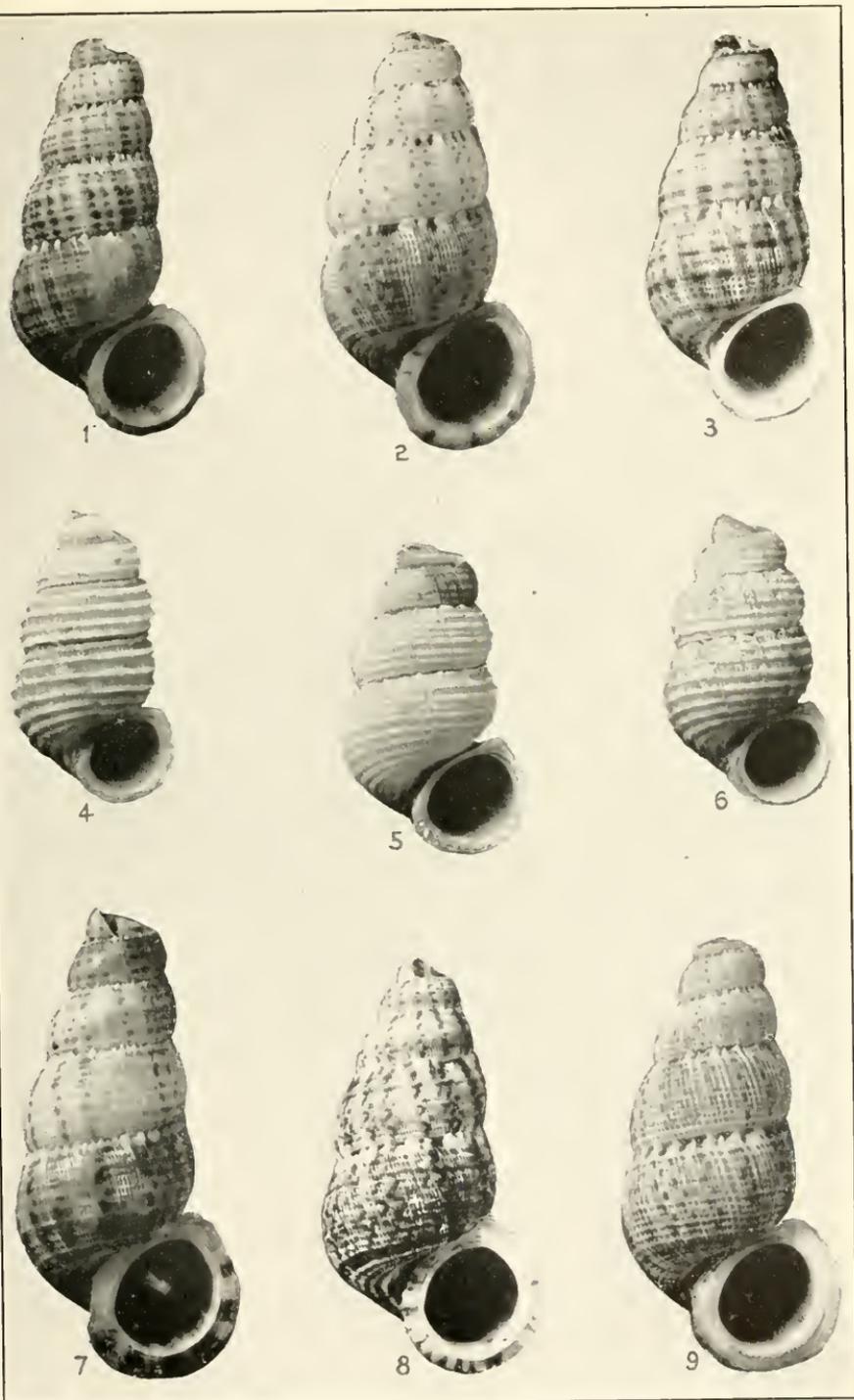


SPECIES AND SUBSPECIES OF ANNULARIA (DIPLOPOMA) (✓ 4).

- 1, *torrei*; 2, *architectonica sanamen'i*; 3, *architectonica architectonica*; 4, *oboleta*; 5, *ongweni*; 6, *puhri*; 7, *ramidensi*; 8, *architectonica libanensis*.

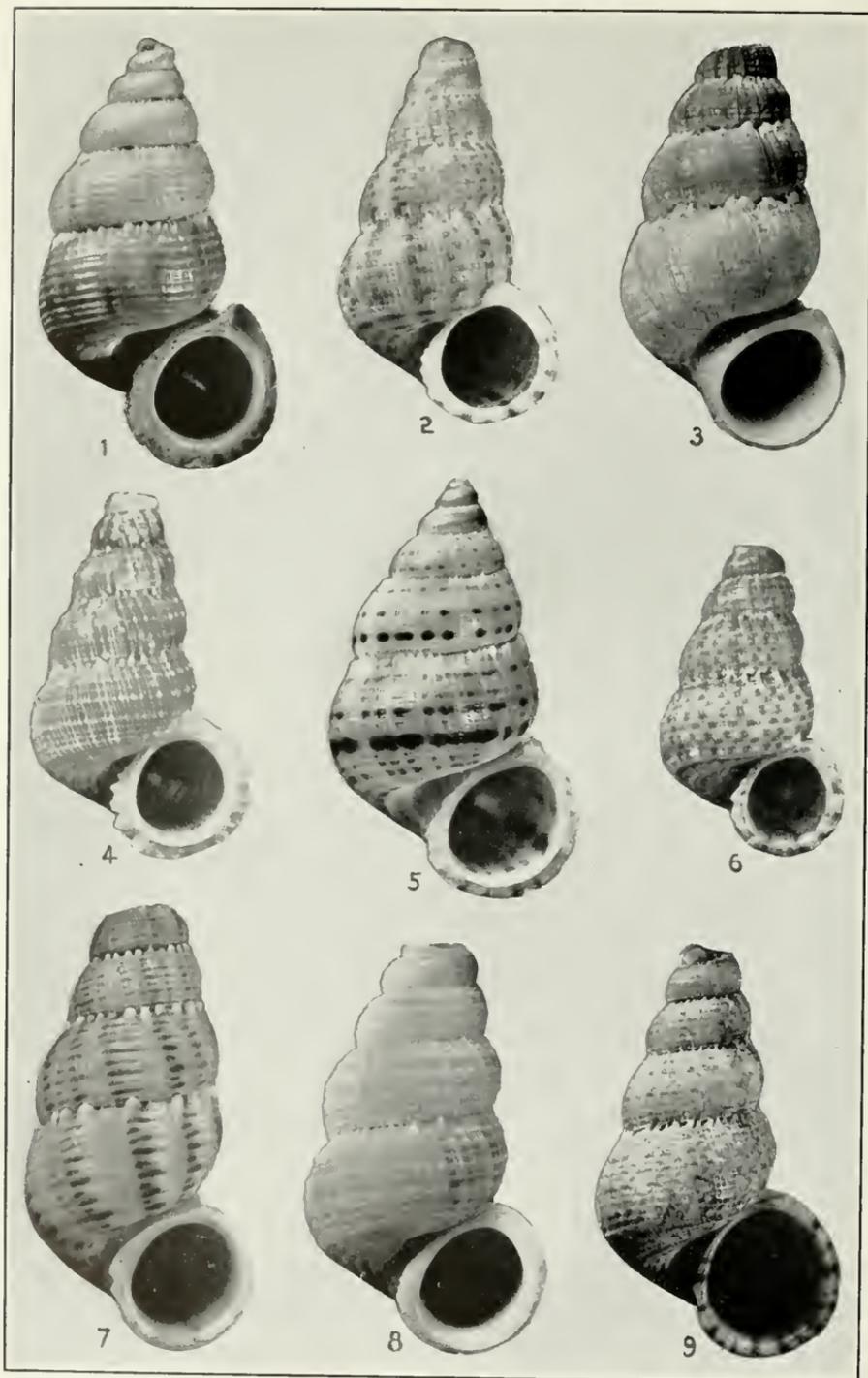


SUBSPECIES OF ANNULARIA (ANNULARITA) MAJUSCULA (X 2).  
 1. *macta*; 2. *crassilabris*; 3. *narcisi*; 4. *catalinensis*; 5. *excelsa*; 6. *majuscula*; 7. *cumbrensis*.



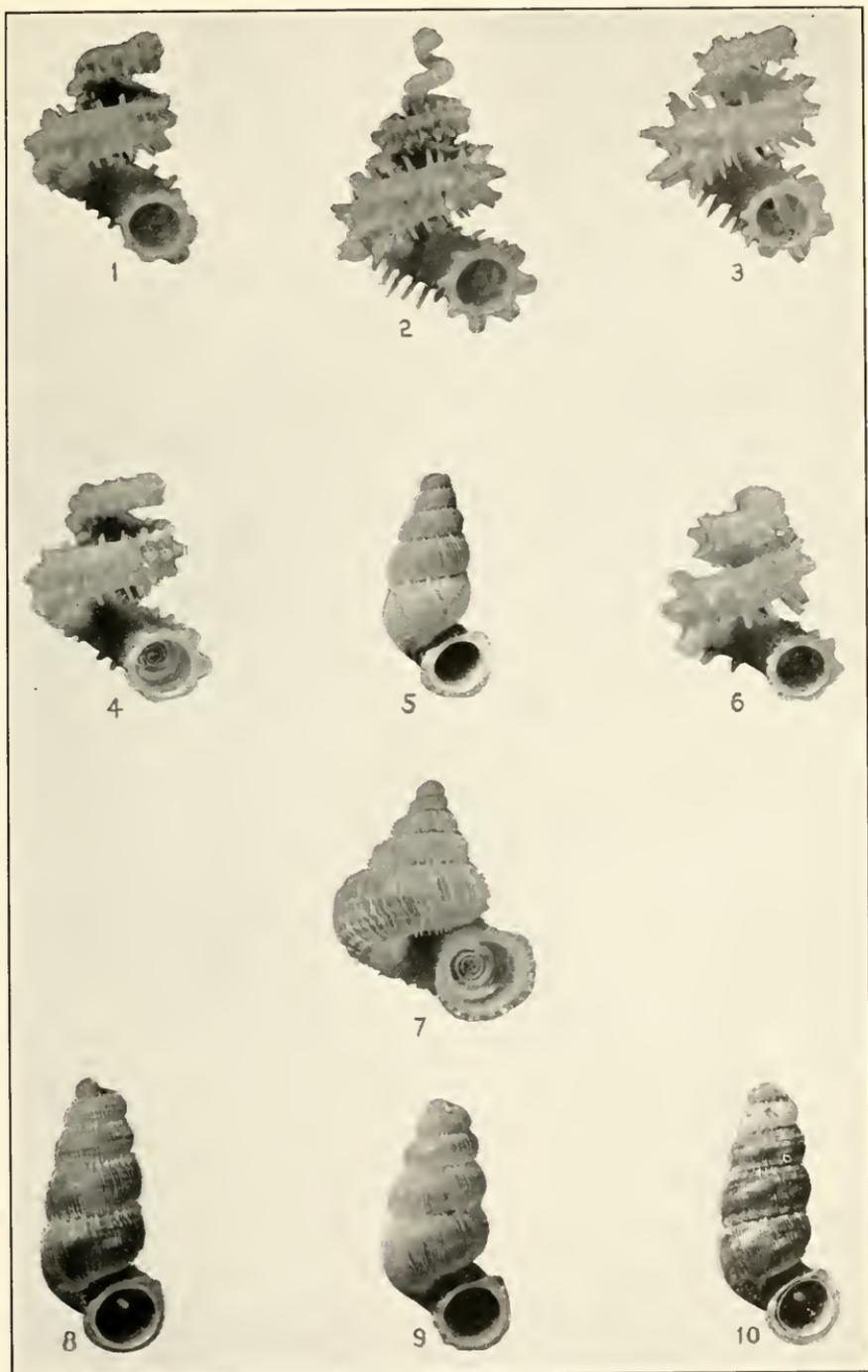
## SPECIES AND SUBSPECIES OF ANNULARIA (X 4).

1. *A. (Trochelovindex) candeana candeana*; 2. *A. (T.) jiguanaensis jiguanaensis*; 3. *A. (T.) candeana fallax*; 4. *A. (Juannularia) arguta arguta*; 5. *A. (J.) perplicata*; 6. *A. (J.) arguta insularis*; 7. *A. (T.) tracta*; 8. *A. (T.) jiguanaensis negrosensis*; 9. *A. (T.) j. bairensis*.



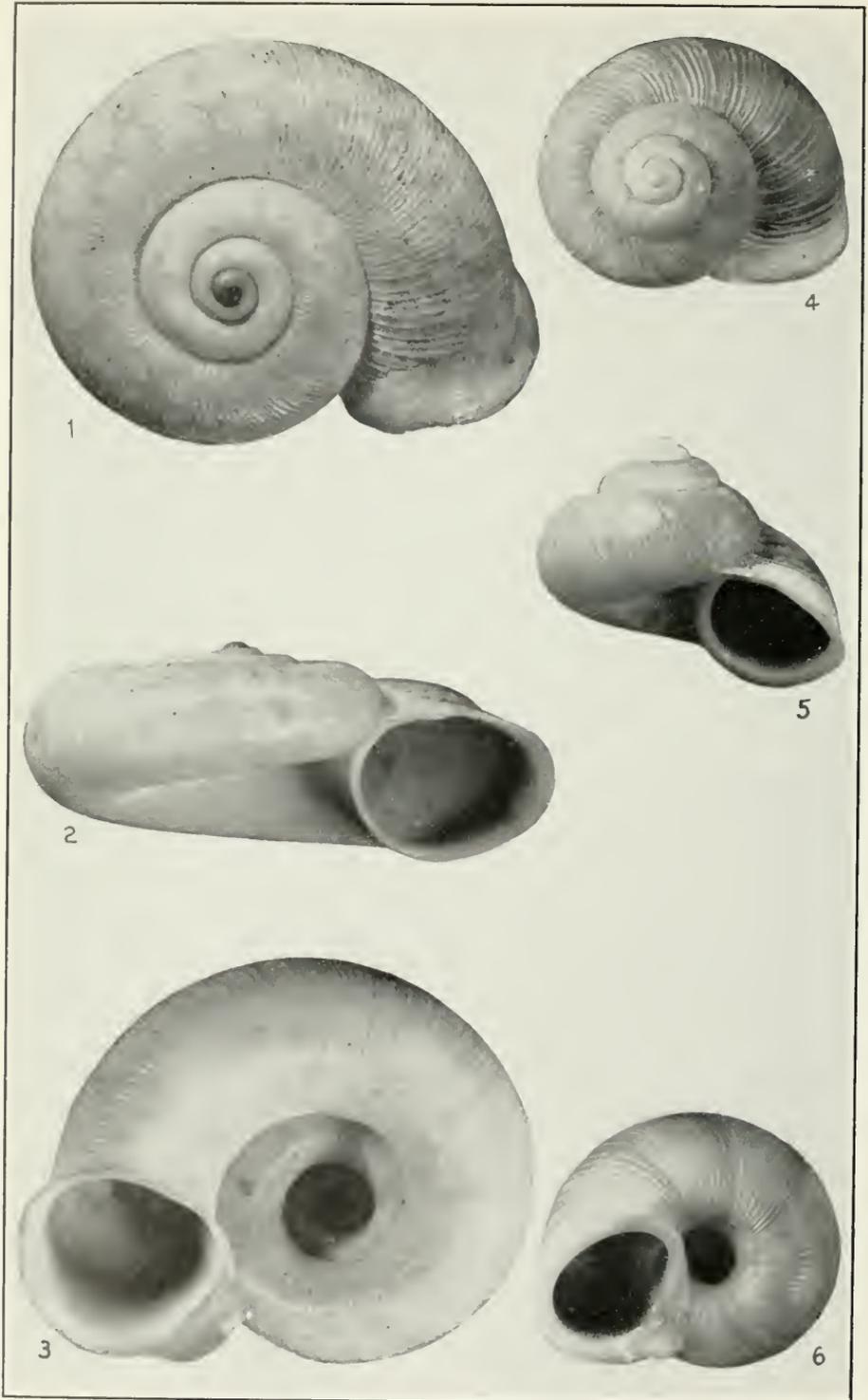
SPECIES AND SUBSPECIES OF ANNULARIA (TROSCHELINDEX) (X 4).

1, *minia*; 2, *arangiana cautoensis*; 3, *rocai*; 4, *arangiana magistra*; 5, *barbouri*; 6, *arangiana arangiana*; 7, *inculta*; 8, *agrestis*; 9, *bebini*.



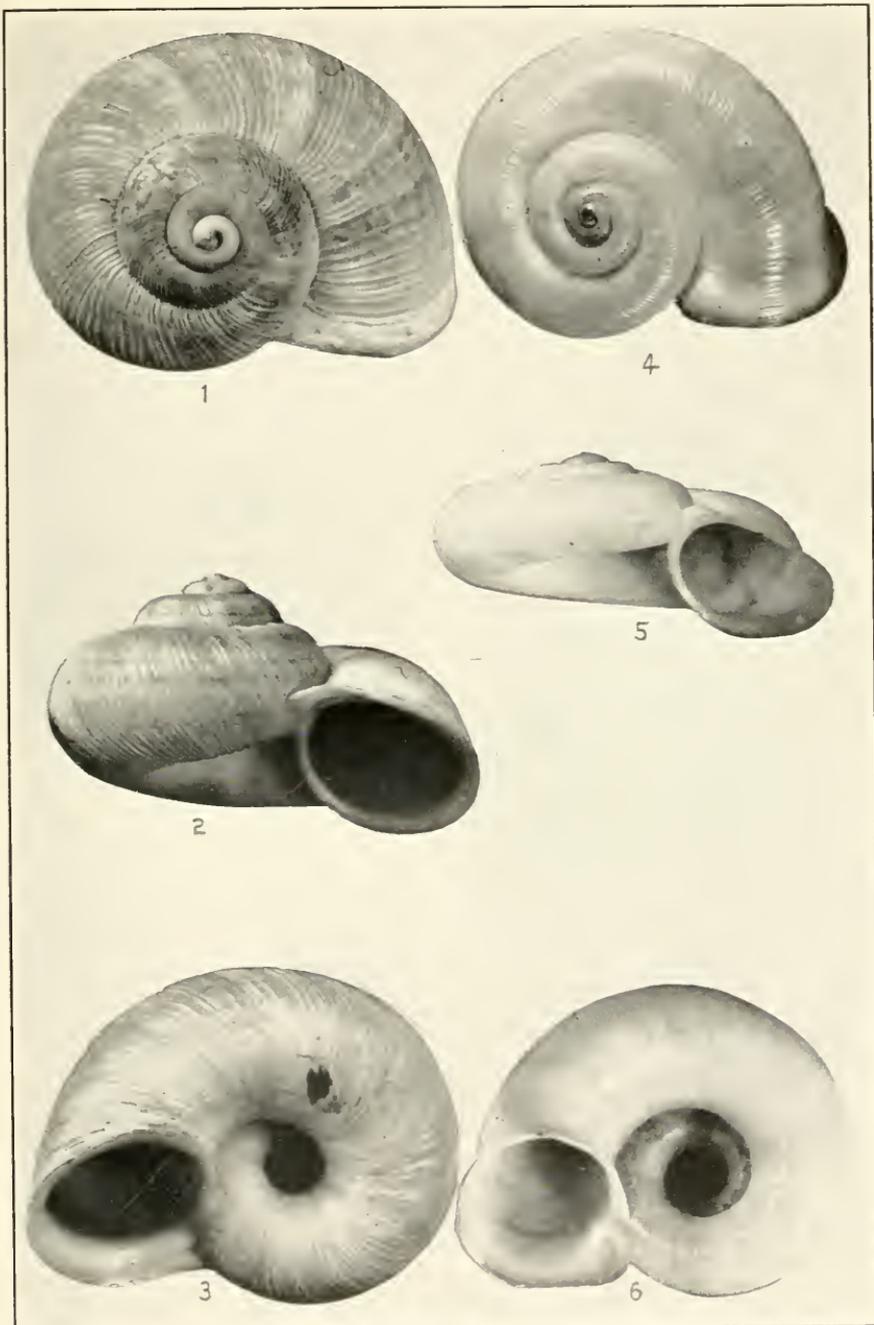
## SPECIES AND SUBSPECIES OF ANNULARIA (X 4).

- 1, 2, *A. (Blaesospira) echinus echinus*; 3, *A. (B.) e. infernalis*; 4, *A. (B.) e. lucifer*; 5, *A. (B.) rocai*; 6, *A. (Subannularia) jeannereti*; 7, *A. (Guajaibona) pretrei*; 8, *A. (S.) storchi nipensis*; 9, *A. (S.) lachneri*; 10, *A. (S.) storchi storchi*.



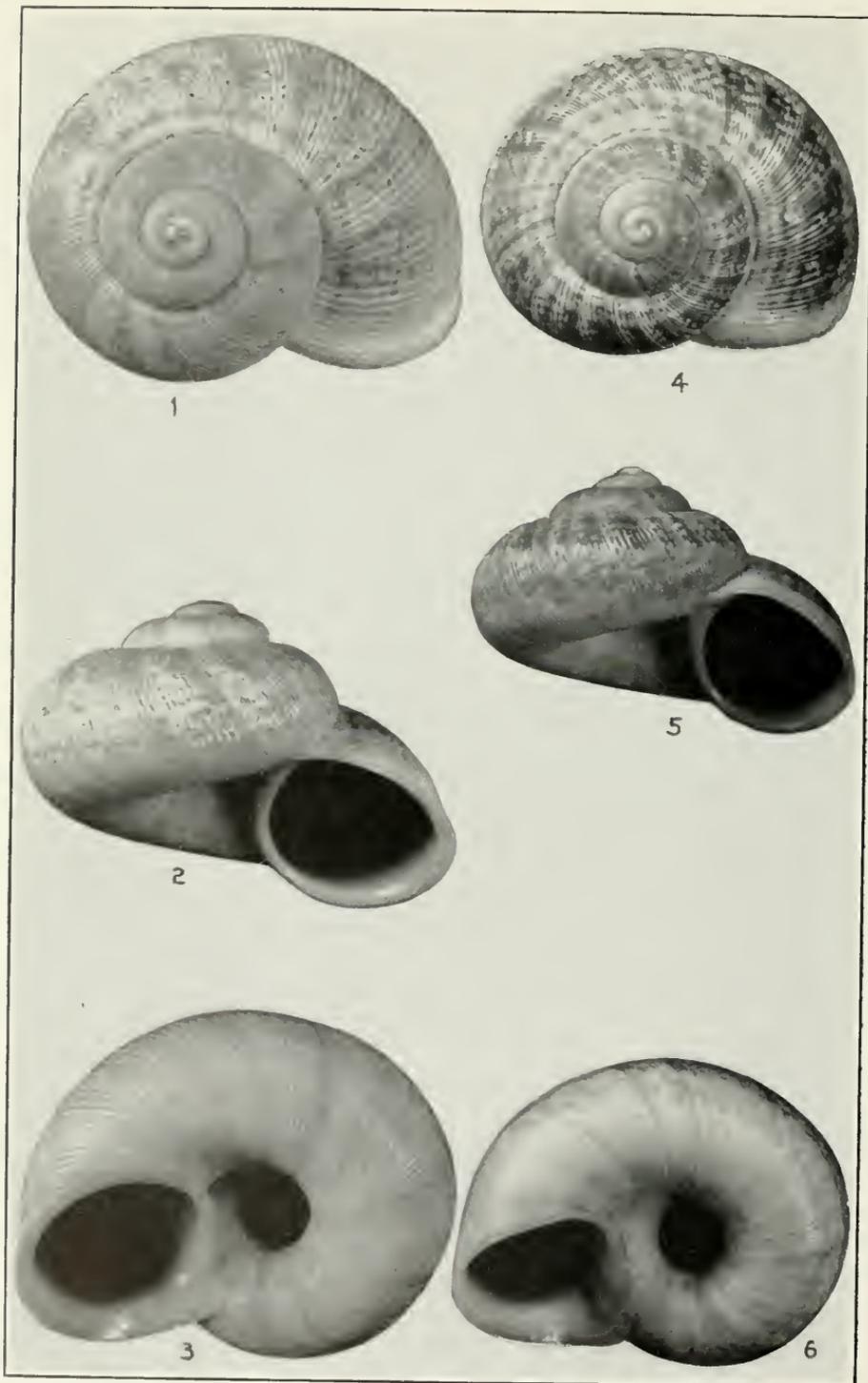
SPECIES OF ANNULARIA (ANNULARISCA) (X 4).

1-3, *prestoni*; 4-6, *tacrensis*.

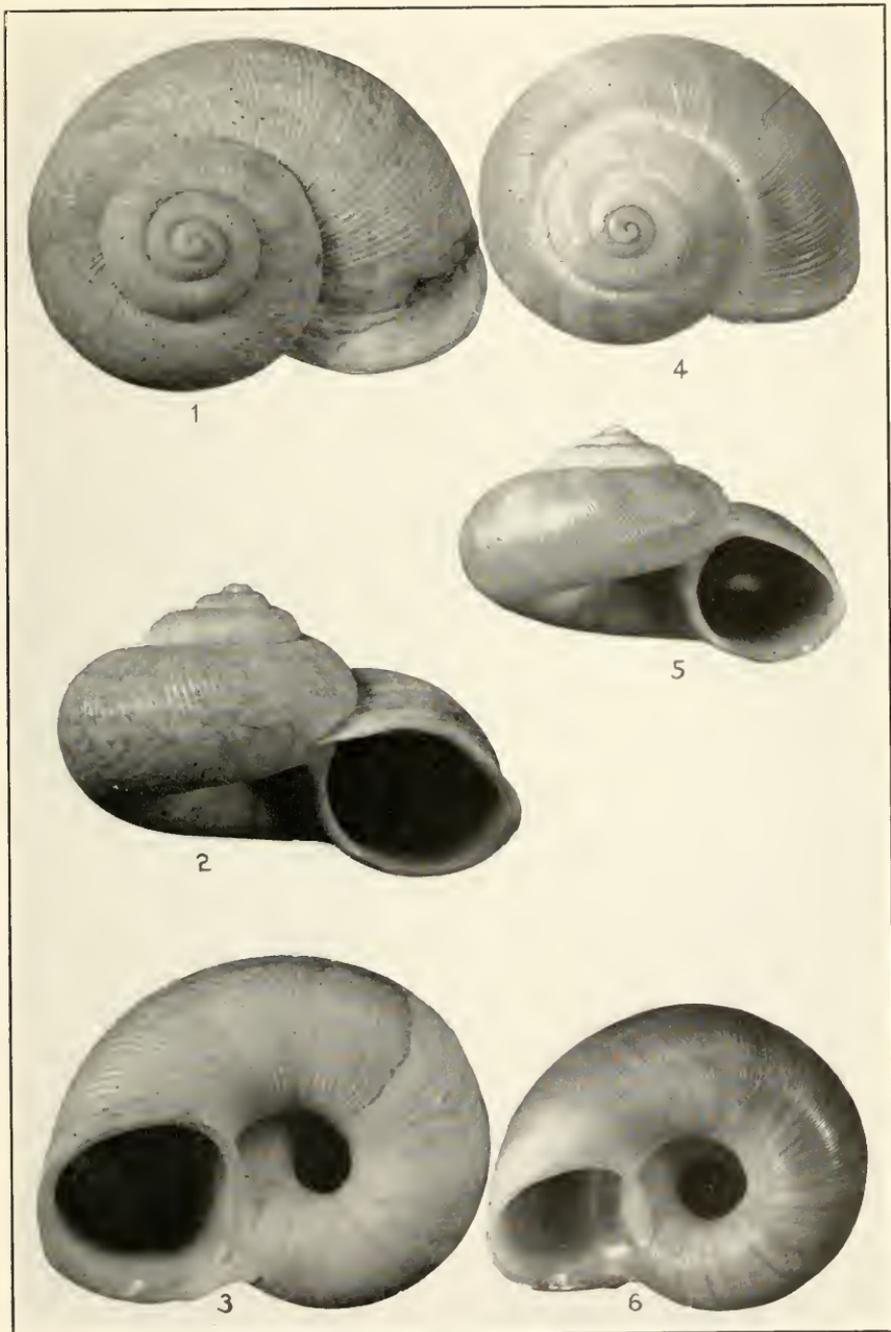


SPECIES OF ANNULARIA (ANNULARISCA) (X 4).

1 3, *aberrans*; 4-6, *eburnea*.

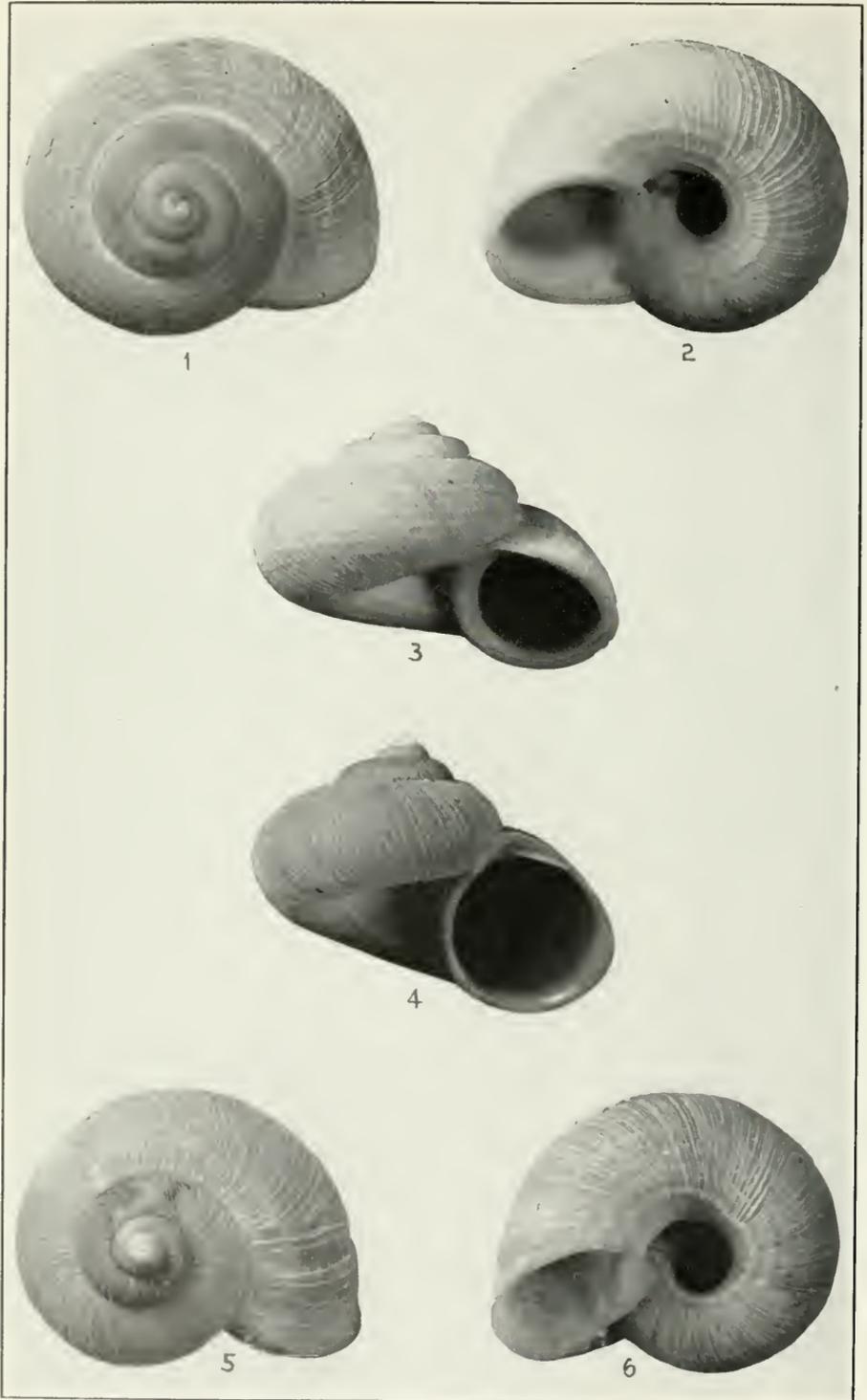


SUBSPECIES OF ANNULARIA (ANNULARISCA) AURICOMA (X 4).  
1-3, *putre*; 4-6, *auricoma*.

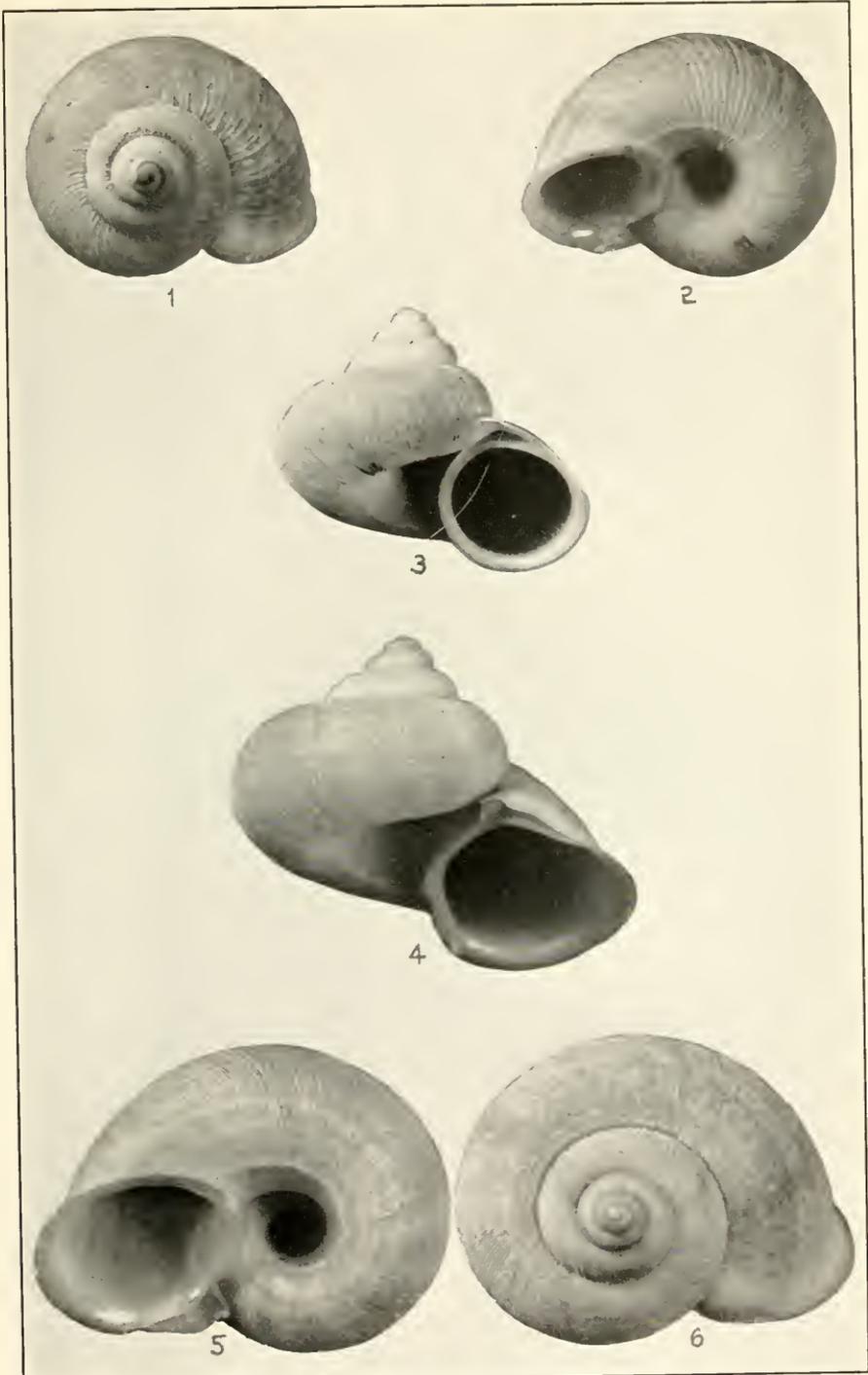


SPECIES OF ANNULARIA (ANNULARISCA) (X 4).

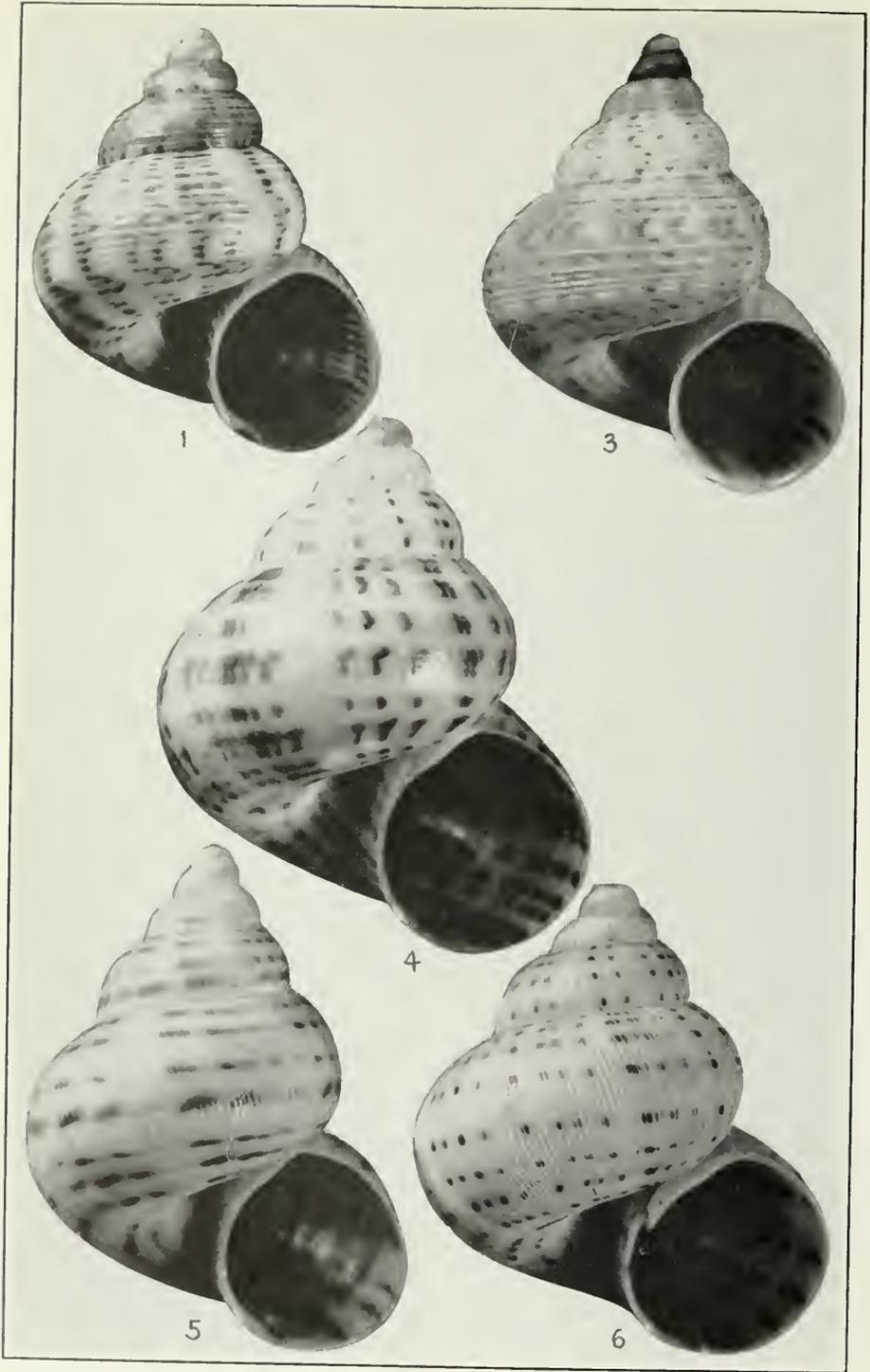
1-3, *alata*; 4-6, *pallens*.



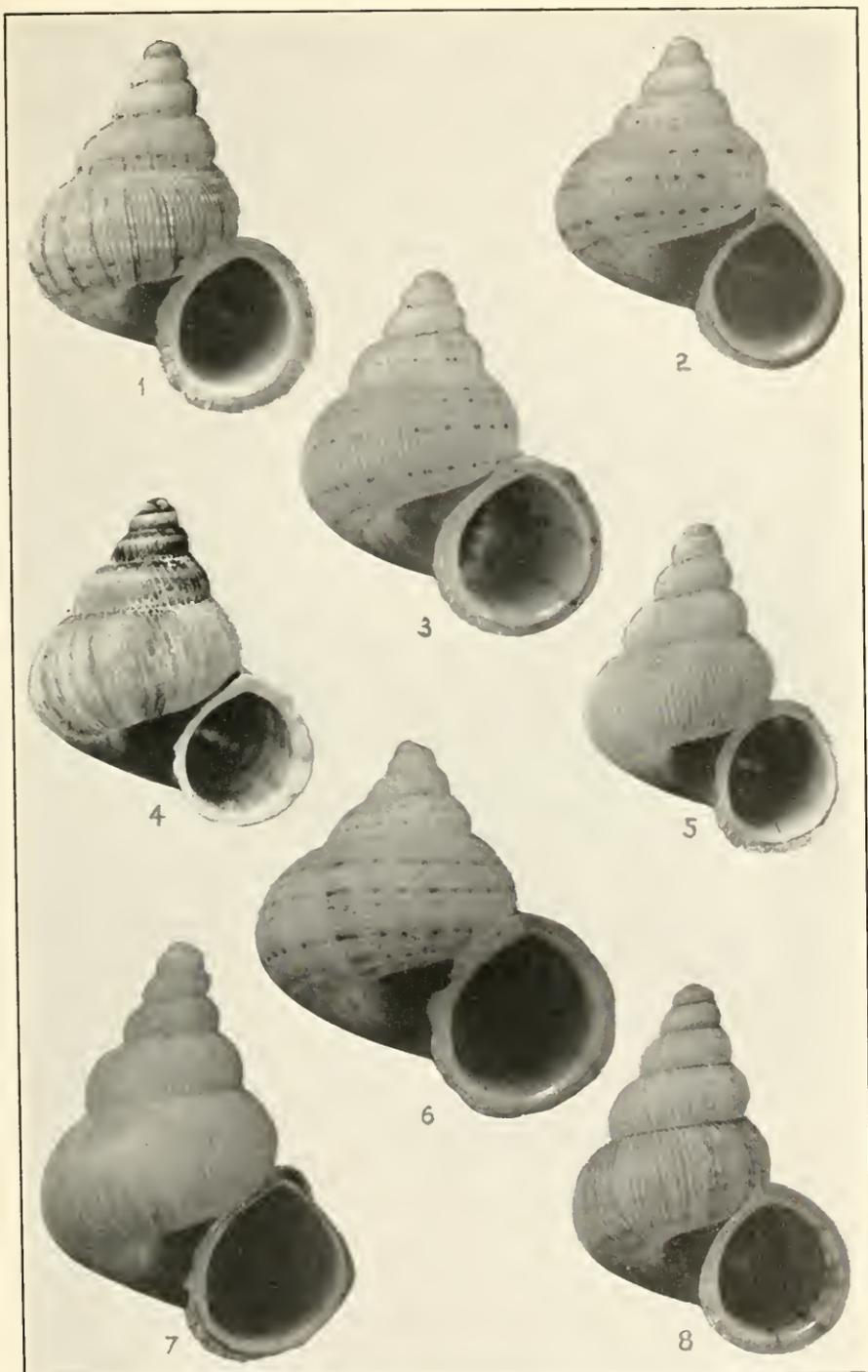
SPECIES OF ANNULARIA (ANNULAREX) (X 4).  
1-3, *intercisa*; 4-6, *mackinlayi*.



SPECIES OF ANNULARIA (ANNULAREX) (X 4).  
1-3, *incerta*; 4-6, *ramsdeni*.

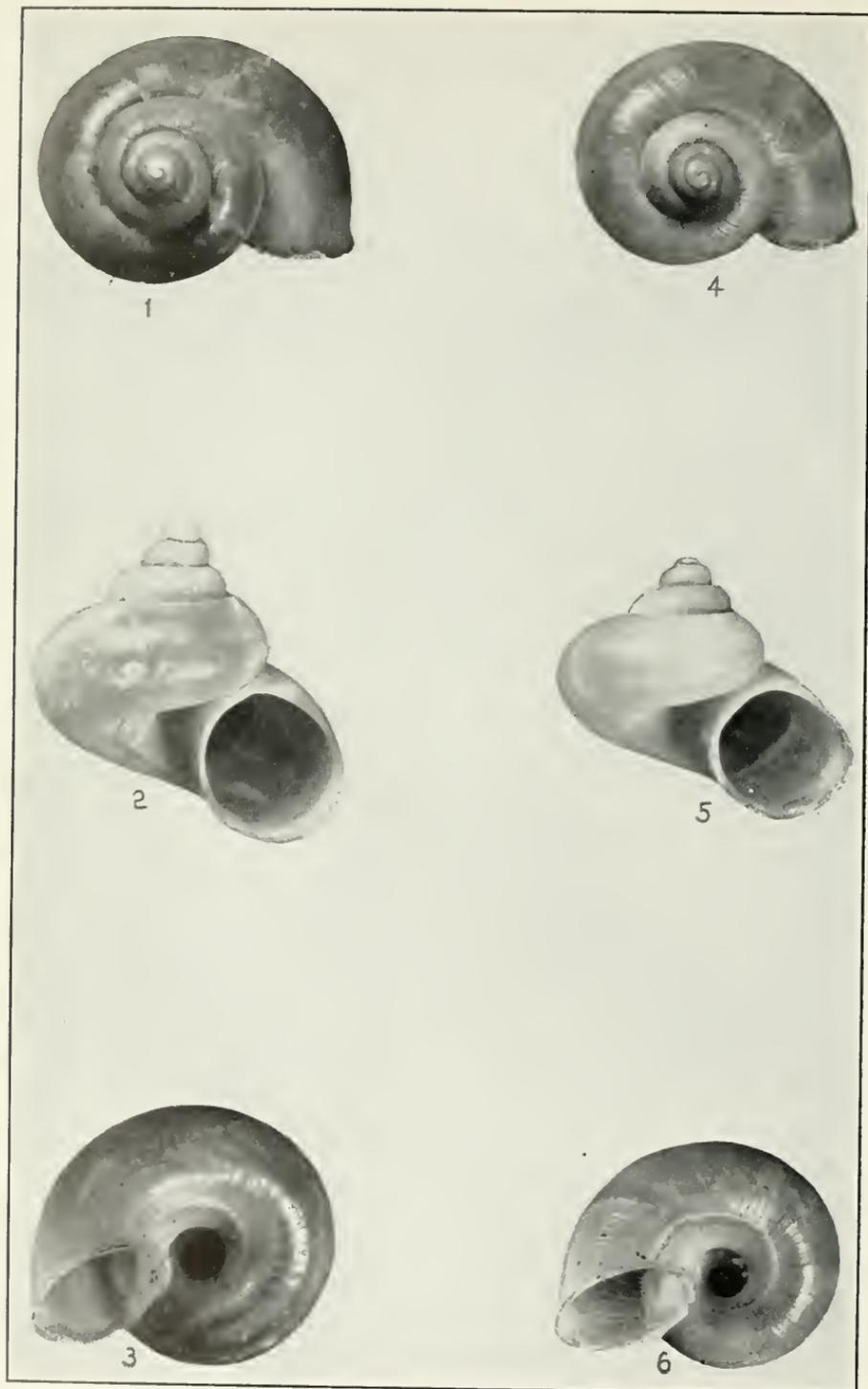


SPECIES OF ANNULARIA (BERMUDEZIA) (X 4).  
1, *bermudezi*; 3, *payroli*; 4, *obliterata*; 5, *capestanyi*; 6, *euglypta*.

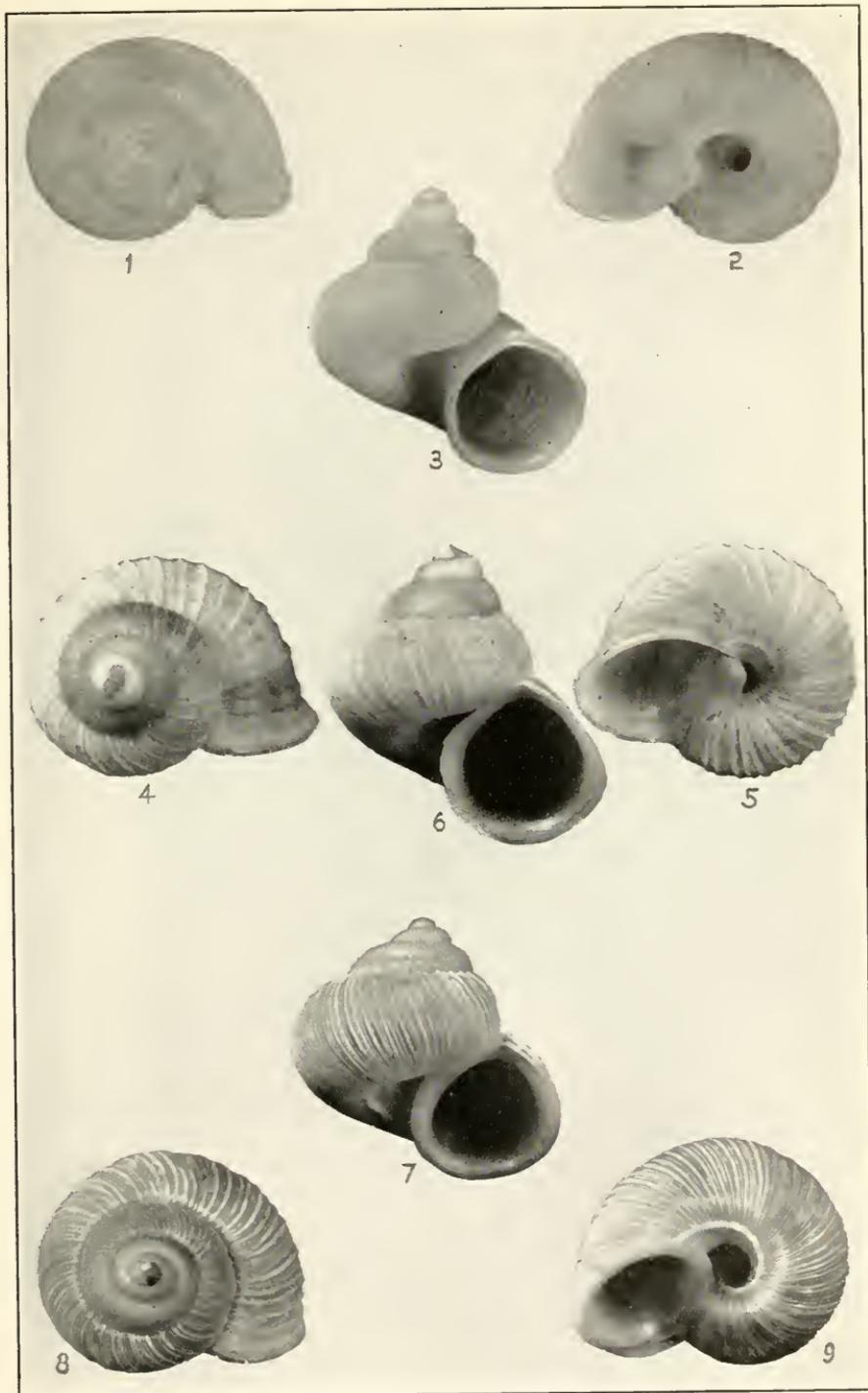


SPECIES AND SUBSPECIES OF ANNULARIA (LUGARENIA) (X 4).

1, *lirata lirata*; 2, *eurystoma chorrillensis*; 3, *biayensis*; 4, *sifontesi*; 5, *lirata parva*; 6, *eurystoma eurystoma*;  
7, *najazaensis najazaensis*; 8, *najazaensis palomarensis*.

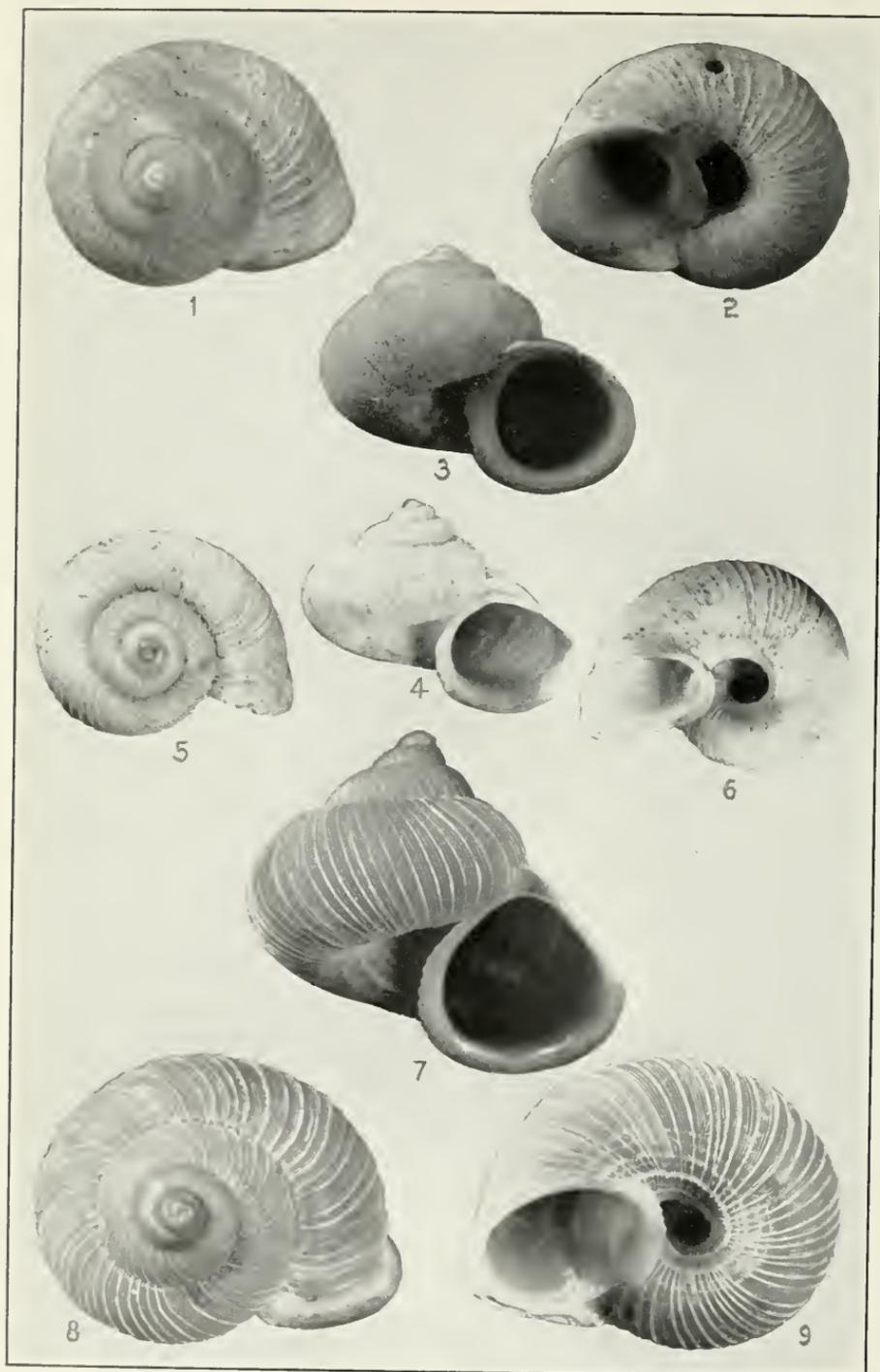


SUBSPECIES OF ANNULARIA (ANNULAROSA) FRAGILIS (X 4).  
1-3, *fragilis*; 4-6, *juliani*.



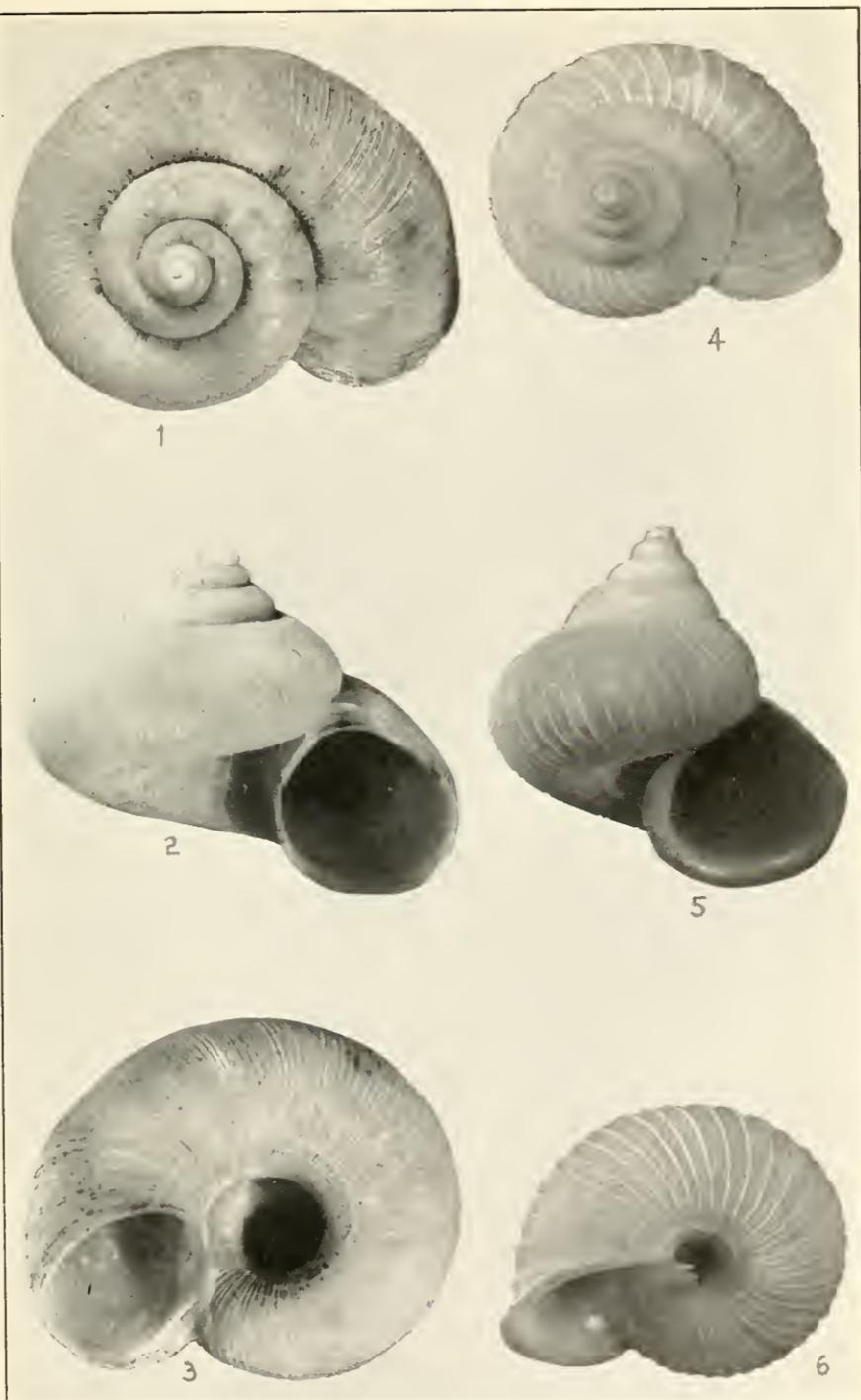
SPECIES OF ANNULARIA (ANNULARELLA) (X 4)

1-3, *hendersoni*; 4-6, *römeri*; 7-9, *cumulata*.



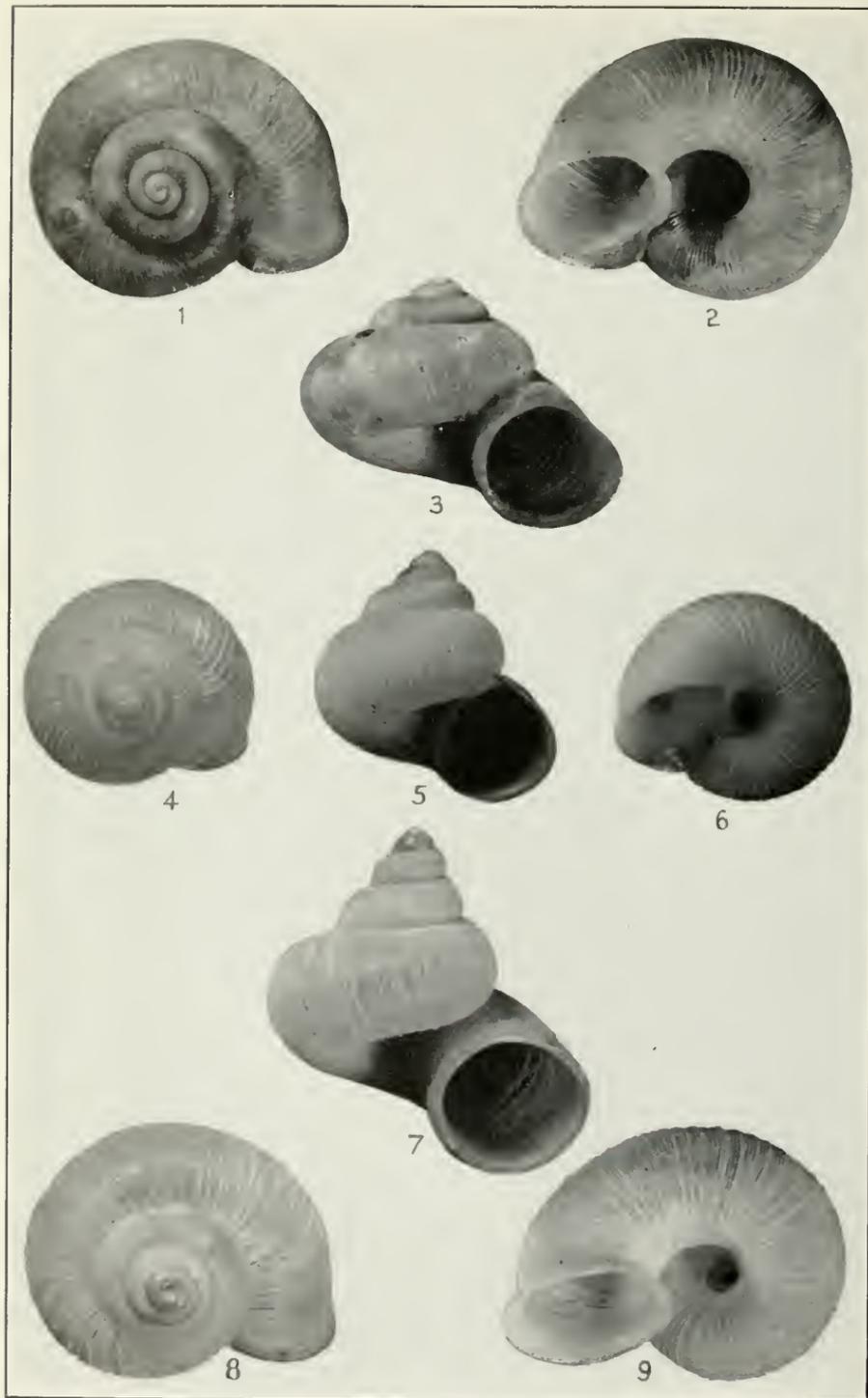
SPECIES OF ANNULARIA (ANNULARELLA) (X 4).

1-3, *heyneimanni*; 4-6, *yaterasensis*; 7-9, *victoris*.



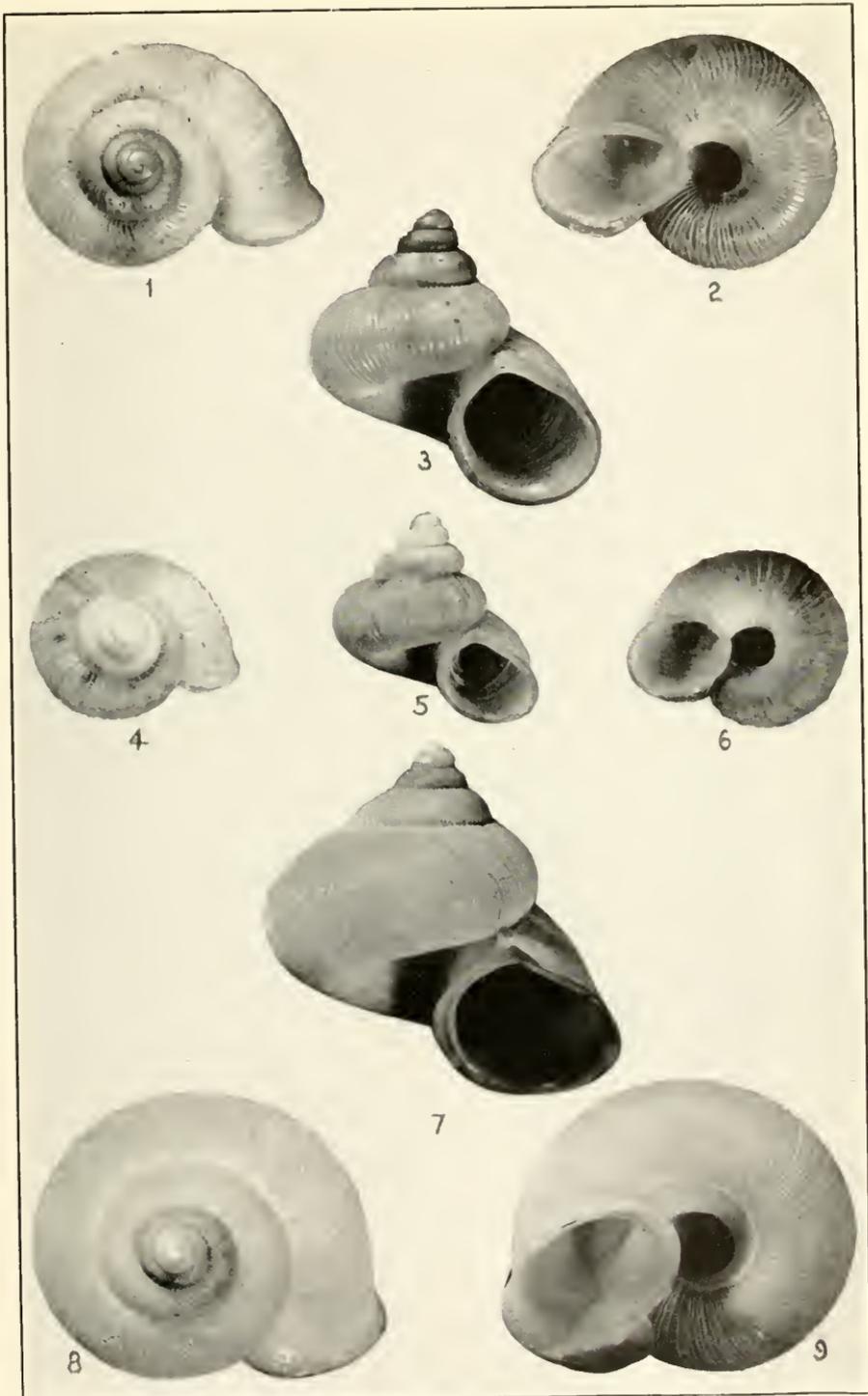
SPECIES OF ANNULARIA (ANNULARELLA) (X 4).

1-3, *pseudalata*; 4-6, *arquesi*.



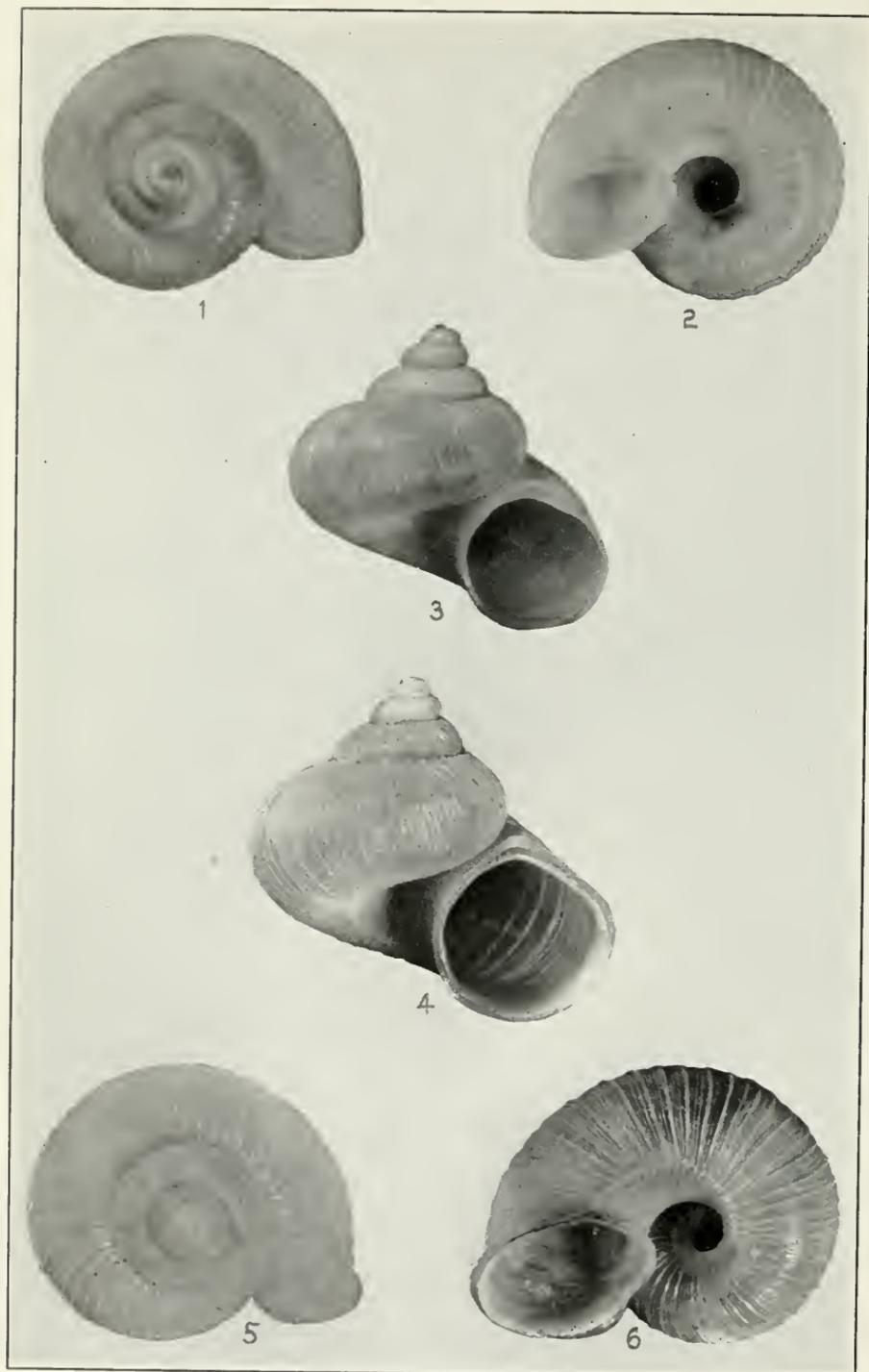
SPECIES OF ANNULARIA (ANNULARELLA) (X 4).

1-3, *holguinensis*; 4-6, *yumuriensis*; 7-9, *nipensis*.

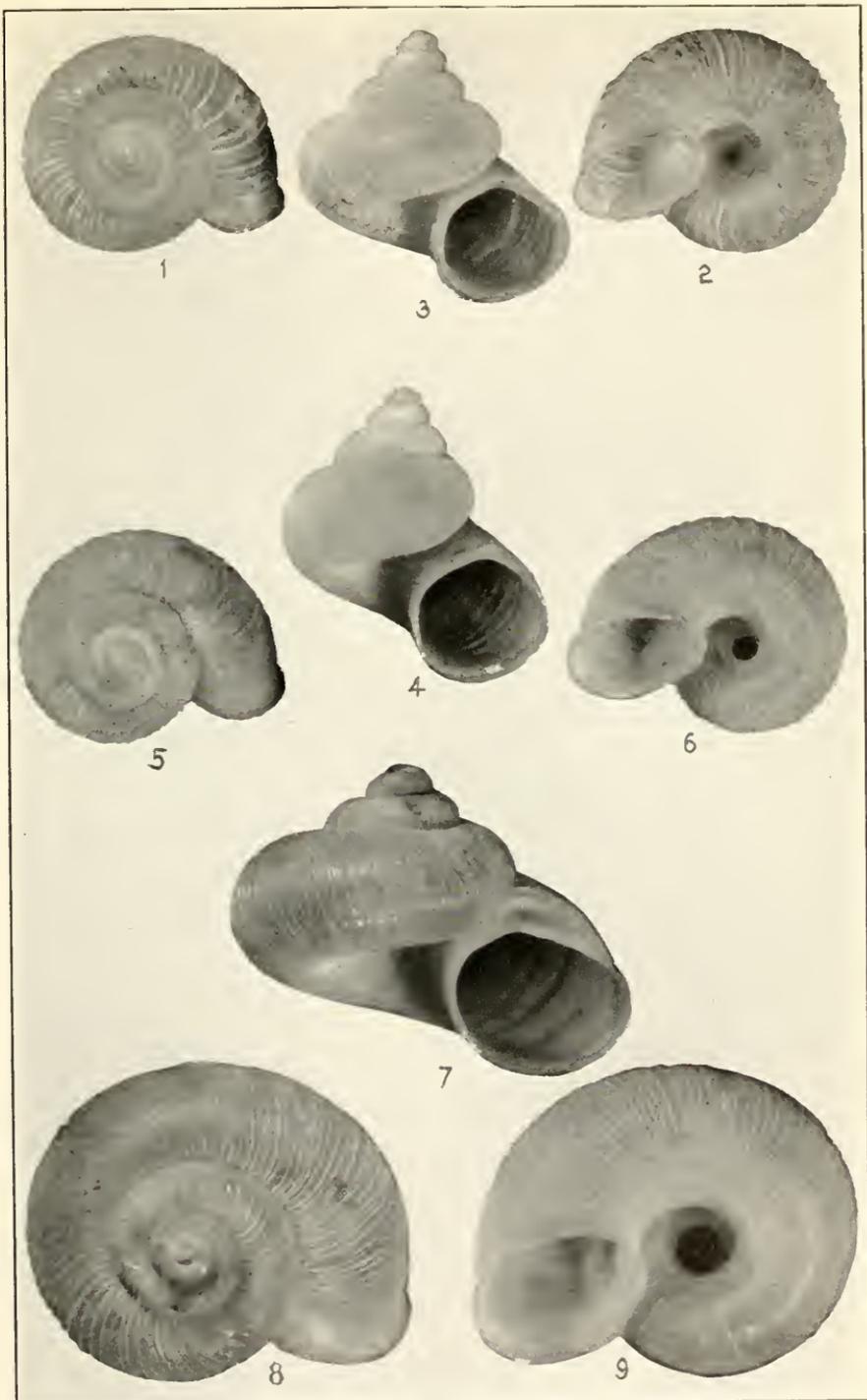


SPECIES OF ANNULARIA (ANNULARELLA) (X 4).

1-3, *tanamensis*; 4-6, *natensoni*; 7-9, *libanoensis*.

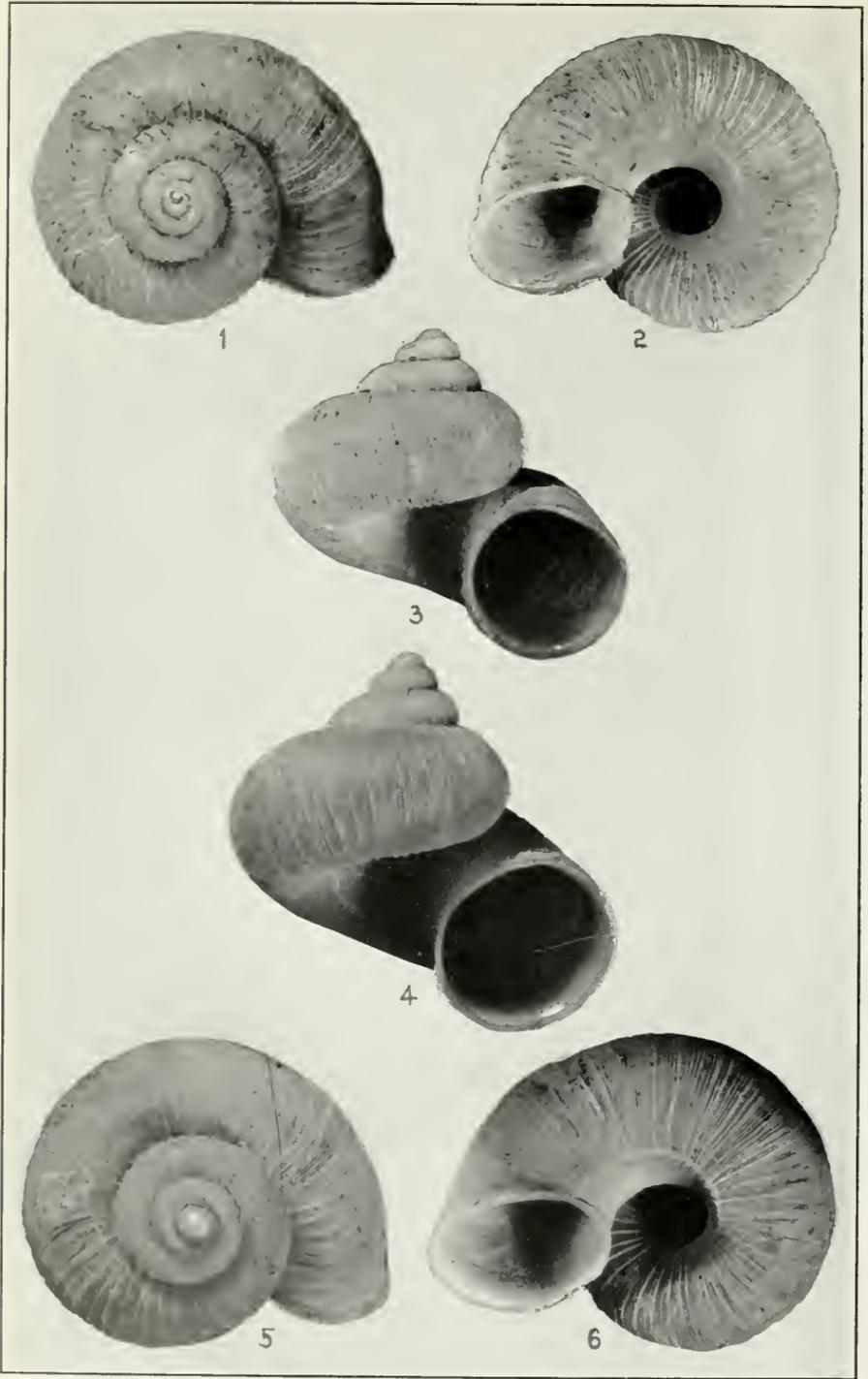


SPECIES OF ANNULARIA (ANNULARELLA) (X 4)  
1-3, *toroensis*; 4-6, *interstitialis*.



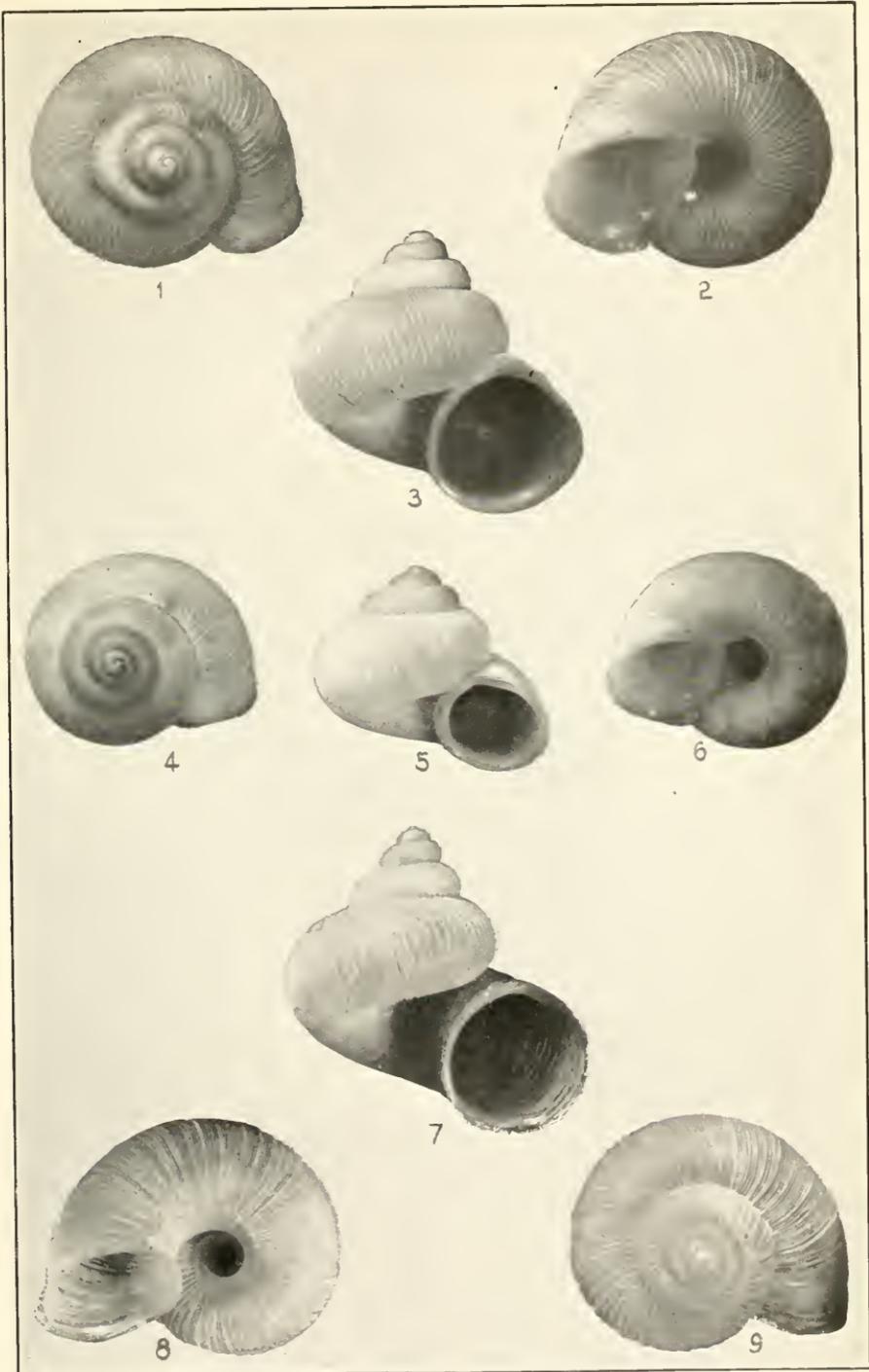
SPECIES OF ANNULARIA (ANNULARELLA) (X 4).

1-3, *yunquensis*; 4-6, *wrighti*; 7-9, *mayensi*.



SUBSPECIES OF ANNULARIA (ANNULARELLA) MAYARIENSIS (X 4).

1-3. *mayariensis*; 4-6. *welchi*.



SPECIES AND SUBSPECIES OF ANNULARIA (X 4).

1-3, *A. (Chondropomatus) mimetica*; 4-6, *A. (C.) lata*; 7-9, *A. (Annularella) mayariensis canapuensis*.