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IN VENEZUELA

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PART III. PUPILLIDAE TO OLEACINIDAE

The second part of this paper (1923; this series, no. 137, pp. 8-48) discussed the terrestrial operculates collected by the expedition, with notes on additional species that had been recorded from northern South America. In the introduction were listed (pp. 8-12) the main habitats and stations studied.

In the present part, an attempt will be made to include all of the species that have been definitely recorded from Venezuela. Locality records will also be cited when these are additional to those given by von Martens (1873; *Die Binnenmollusken Venezuela's*). The same habitat and station numbers will be used as in part two (p. 8), and, as each locality is cited for the first time in the present part, its approximate north latitude and west longitude will be indicated in parentheses, preceded by the letter L (*cf.* note; 1923, p. 9). An attempt will also be made to refer to the original description of the forms, and a good figure.

Since the publication of parts I and II, I have received for examination a number of lots of shells obtained in 1914 by an University of Michigan Expedition from the sand hills and forests around Dunoon, near the mouth of the Demerara River (L 7, 58), British Guiana. Notes on the species identified from this collection are appended to the discussions of related Venezuelan forms.

PUPILLIDAE

Gastrocopta servilis (Gould)

Pupa servilis Gould (1843; Boston Jour. N. H. IV, 356); near Matanzas, Cuba. *G. servilis* Pilsbry (1916; Man. Conch. XXIV, figs. xiv, 4-7).

Three specimens, identified by Dr. Pilsbry, from the narrow canyon of Rio Macuto (H, I, b, 1) near La Guaira (L 10.5, 67).

Bothriopupa tenuidens (Adams)

Pupa tenuidens C. B. Adams (1845; P. Boston Soc. N. H., 15); Jamaica. *B. tenuidens* Pilsbry (1917; 229, figs. xxix, 5-7, 11-13), Cariaquita, Venezuela (L 10.5, 63).

Bothriopupa conoidea (Pfr.)

Pupa conoidea "Newcomb" Pfr. (1853; Mon. III, 533); Demerara. *B. conoidea* Pils. (1917; 231, figs. xxviii-7, 8, 11), Cariaquita, Venezuela.

Bothriopupa geminidens Pilsbry

(1917; 228, figs. xxviii, 12-14); Cariaquita, Venezuela.

Pupisoma dioscoricola insigne Pilsbry

(1920; M. C. XXVI, 39, figs. iv-6-8); Brownsville, Texas.

Two specimens from an abandoned cacao plantation at Quebrada La Fría (H, V, b, 41; L 8, 72). In these examples, the spiral sculpture of the later whorls is very sharply marked, although it is beaded by the prominent, growth ribs. The 1½ embryonic whorls are covered with little pits, that lie between irregular and anastomosing growth wrinkles. The typical form has not yet been recorded from Venezuela, although it apparently occurs in Trinidad.

Pupoides simoni (Jousseaume)

?*Pupa fallax* Gibbons (1879; J. of C. II, 131), Puerto Cabello (L 10.5, 68). *Leuchochila simoni* Jouss. (1889; Mem. Soc. Zool. France II, 246, fig. ix-2); Caracas (L 10.5, 67).

According to Dr. Pilsbry, this form is probably very close to, if not identical with, the West Indian *P. marginatus nitidulus* (Pfr.).

Strobilops labyrinthica morsei (Dall)

Strobila labyrinthica morsei Dall (1885; P. U. S. Nat. Mus. VIII, 263); Puerto Cabello.

FERUSSACIIDAE

Cochlicopa lubrica (Müller)

Helix lubrica Müller (1774; Verm. II, 104), Europe. *C. lubrica* Jouss. (1889; 237), Caracas and Tovar (L 8, 71.5); Pilsbry (1908; M. C. XIX, figs. xlix, 33-35), probably introduced.

Caecilioides (Karolus) consobrina minutissima (Guppy)

Glandina minutissima Guppy (1869; P. Sci. A. Trinidad, 239), Trinidad. *C. consobrina minutissima* Pils. (1908; M. C. XX, figs. iv-78, v-80, 84); Vanatta (1915; Naut. XXIX, 83), Cariaquita.

SUCCINEIDAE

Succinea tamsiana Pfr.

S. tamsiana Pfr. (1850; Zeit. Mal., 65), Caripe (? Rio Caribe; L 11, 63); Martens (1873; 193, fig. ii-1), Caracas; Vanatta (1915, 83), Cariaquita. *Neritostoma tamsianum* Jouss. (1889; 252), Valencia (L 10, 68).

This species is apparently quite close to *S. barbadosis* Guilding (1828; Zool. Jour. III, 532, suppl. pl. xxvii, 4-6) from Barbados. A juvenile specimen from the edge of Laguna de Montero (H, XII, 10), near Bejuma (L 10, 68), is probably this or the next species.

Succinea cuvieri Guilding

S. cuvieri Guild. (1826; Zool. Jour. II, 443, sup. pl. xvii bis, 1-5), St. Vincent. *Neritostoma sallei* Jouss. (1889; 252, figs. ix-7, 8), Caracas.

S. aequinoctialis Orb. (1837) from Guayaquil, Ecuador, *S. propinqua* Drouet (1859) from French Guiana, and *S. bogotensis* Pfr. (1866) from Bogotá, Colombia, are all larger shells, but must be closely related.

Succinea repanda Pfeiffer

S. repanda Pfr. (1854; P. Z. S., 123), Rio Negro, New Granada; Sowerby (1872; C. Icon., fig. xi-73).

Omalonyx felina Guppy

O. felina Guppy (1872; Proc. Sci. A. Trinidad, 4), Trinidad. *Succinea unguis* Martens (1873; 193), Caracas.

Eleven specimens, from Laguna de Ramón Coronel (H, XII, 9), near Bejuma; on *Pistia* floating in the water; semi-amphibious. In these specimens (fig. vi-22), the columellar fold is less prominent than in *O. unguis* (Orb.) from Rio Paraná, near Corrientes, Brazil. The growth lines are also harsher, and the irregular, impressed radial lines more evident. As in the Trinidad specimens, the mantle can almost completely cover the shell.

	Shell			Aperture		Whorls ¹
	long	wide	deep	long	wide	
Largest	9.1	54(5.9)	20(1.8)	90(8.2)	72(5.9)	about 1
Figure	8.1	64(5.2)	22(1.8)	95(7.7)	67(5.2)	about 1

ENDODONTIDAE

Radiodiscus bactricolus (Guppy)

Helix bactricola Guppy (1868; Ann. Mag. N. H., 440), Trinidad. *Thysanophora bactricola* E. A. Smith (1896; J. of C. VIII, fig. viii-5); Vanatta (1915; 82), Cariaquita.

Forty specimens, all of the living ones slightly immature, from rich humus on mountain sides and in an abandoned cacao plantation (H, I, b, 23, 24, V, b, 41) near Aroa (L 10.5, 69) and at Quebrada La Fría. This species is translucent and light olive-horn in color. The apical $1\frac{3}{8}$ whorls show com-

¹ See note 33, page 34, this series, no. 152.

pressed growth wrinkles and lower, very fine, spiral ridgelets. The later whorls have, in addition, regularly-spaced, high, growth ribs (10 or 11 to the mm. on the last whorl). The minor, interstitial, growth riblets are compressed, wider than their interspaces, and higher than the very delicate, spiral ridgelets, which scarcely bead them; this microscopic sculpture is continued on the sides of the larger ribs. While the sculpture is completely that of the genus *Radiodiscus*, it is finer and more regular than in any other member of the genus that I have examined.

The jaw (from a dried specimen, La Fría) consists of 23 plates, with 11 narrow, rectangular ones on each side of the tapering, central piece; it is quite similar to that in the genus *Punctum*. The radular formula (fig. vii-30) is 11-8-1-8-11. The central is tricuspid with a practically square base; the entire tooth is slightly smaller than the 1st lateral, while the cusps are considerably reduced. The 5 inner teeth are almost symmetrical and very similar to the central; this part of the transverse row is almost straight and the bases of the teeth are slightly separated from each other. The next 3 teeth are somewhat more asymmetrical and the row bends sharply anteriorly. The 9th and 10th teeth begin to split the entocone, while beyond these the row straightens out again and both the ectocone and entocone break up into smaller cusps. The outer teeth are shorter and the outermost are reduced in size until the 19th is a mere denticle. This radula appears quite similar to that of *Helicodiscus*.

***Radiodiscus ditzleri*, new species²**

Four specimens, from rich leaf humus in an abandoned cacao plantation that had returned to practically the condition of original forest, near Quebrada La Fría (H, V, b, 41).

Shell (fig. vi-23): small; depressed turbinate; heavy and coarse in texture; opaque, reddish horn in color with indistinct, chestnut flammulations. Whorls: $4\frac{1}{4}$, rounded, but

² Mr. W. H. Ditzler, a member of the expedition.

with the greatest convexity just outside of the suture; quite gradually increasing; suture very deeply impressed. Sculpture of last whorl: heavy, growth ribs (7 or 8 to the mm.), with numerous (19 counted), low, rounded, growth threads between them and on their sides; these threads are beaded by the slightly more prominent, rounded, spiral threadlets. Embryonic whorls: $1\frac{3}{8}$; high and arched; golden in color; with indistinct growth wrinkles crossed by fine, closely-spaced, spiral ridgelets. Umbilicus: about three times in major diameter. Aperture: subcircular lunate. Peristome: simple, sharp, incomplete.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
<i>ditzleri</i> , type.....	2.43	145 (3.53)	133 (3.22)	56 (1.37)	99 (1.36)	4 $\frac{1}{4}$
another	2.42	133 (3.22)	126 (3.04)	53 (1.28)	96 (1.22)	3 $\frac{3}{4}$
<i>bactricolus</i>	2.69	130 (3.50)	124 (3.35)	50 (1.34)	99 (1.33)	5 $\frac{1}{2}$
(same locality)						

This is a considerably coarser and heavier species than *R. bactricolus*, and has more loosely coiled whorls with noticeably more prominent suture. Although the sculpture of the two species is fundamentally similar, that of *R. ditzleri* is heavier and more rounded; in *R. bactricolus* the minor growth riblets are stronger than the spirals, while the opposite is the case in *R. ditzleri*. In the smaller specimen of which the measurements are given, the last whorl descends slightly, but this is not true of the type and the other examples.

Radiodiscus sp?

R. millicostatus Vanatta (1915, 82); Cariaquita.

This is a young, broken specimen (A. N. S. P. 105208), similar to *R. millicostatus* Pilsbry (1906), from Arizona, and *R. mariae* Pilsbry (1921), from Bogotá, Colombia, in shape, but with more closely-spaced growth riblets than either of them. It is probably a new species, but the specimen is in too poor condition for description.

ZONITIDAE

Guppya gundlachi (Pfr.), and var. *orosiana*
von Martens

Helix gundlachi Pfr. (1840; Arch. Nat. I, 250; Chemn. II, figs. xxx, 25-28), Cuba. *Conulus vacans* Guppy, in part (1866; Ann. Mag. N. H., 53); Trinidad. *Guppya vacans* Mörch (1867; J. de C. XV, 256). *G. orosiana* von Mart. (1892; B. C. A., 123, figs. vi-20), Costa Rica. *G. gundlachi* and *G. semenlini* Vanatta (1915, 82), Cariacuita, Ven.

Six immature specimens, from rich humus on mountain sides and in cacao plantations (H, I, b, 23; V, b, 2, 41) from San Esteban (L 10.5, 68), Aroa and La Fría. Most of these are subangulate (approaching *orosiana*), while one specimen from Cariacuita (A. N. S. P. 110184) is quite markedly angulate. The shells from Venezuela appear to average slightly larger than those from more northern localities; the dimensions of a subangulate specimen (A. N. S. P. 48738), from Cariaco (L 10.5, 63.5) are given below.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
<i>gundlachi</i> (1840)	1.7	147(2.5)	132(2.25)			5
<i>orosiana</i> (1892)	1.75	157(2.75)	143(2.5)			5
Cariaco, Ven.....	2.22	142(3.15)	135(3.00)	50(1.10)	143(1.58)	5
<i>biolleyi</i> (1892).....	2.0	125(2.5)	112(2.25)			5

I feel certain that *Conulus vacans* Guppy includes at least two species; the description of the shell as "obliquely striate above, closely covered with fine, longitudinal striae, visible under a lens, and most distinct on the polished under surface" only applies to a species of *Euconulus*, as is indicated below under *E. cassiquiensis*. On the other hand, the description of the radula, and probably the statement that the animal is "viviparous," indicates quite definitely some species related to *Guppya gundlachi*, very probably that species itself, which Guppy must have confused with young specimens of his *Euconulus*.

In a former paper (1922; this series no. 106, p. 51, figs. xvii-1, 2, 6), I emphasized the fact that two very distinct

types of radulae are found in the tropical American species of "Conulus." As Mörch founded his genus *Guppya* on the radular portion of Guppy's description, that name must continue to be used for the species with practically symmetrical, tricuspid laterals. In other words, the type of *Guppya* is *G. vaccus* Mörch, with *Conulus vacans* Guppy, in part, as a synonym.

The shells of this genus can be recognized by their depressed form and comparatively thin epidermis, which is not thrown up into fine, closely-spaced, growth threads, as on the upper portion of the shell in the genus *Euconulus*. The relative prominence of the spiral ridgelets is not generically distinctive, as two of the species, *G. miamiensis* from Florida and *G. molengraaffi* from Curaçao, practically lack this sculpture. However, the spiral ridges (they are not impressed lines as stated by several writers), when present, are as distinct on the apical as on the basal side of the shell, while in *Euconulus* they are obscured, on the upper side of the shell, by the much more prominent growth threads. *G. biolleyi* Martens (cotypes in A. N. S. P. 84696), from western Guatemala, is a considerably higher shell than *G. gundlachi*; the spiral ridges are very slightly weaker.

Habroconus trochulinus (Morelet) ?

Helix trochulina Mo. (1851; Test. Nov. II, 10), Guatemala. *H. selenkai* Pfr. (1866); Fischer and Crosse (1872; Moll. Mex. I, figs. vii-9).

A young, broken specimen in the A. N. S. P. (no. 1471) from Venezuela (A. D. Brown) may be this species, although it appears more carinate, which is a characteristic of *Hyalinia angasi* Tryon (1886; M. C. II, 182, fig. liv-17) from Costa Rica. The latter species is probably also a member of this genus.

	Shell		Aperture		Whorls
	alt.	maj. diam.	alt.	diam.	
<i>trochulina</i> (1872)	4.0	125(5.0)	60(2.4)	115(2.7)	6
<i>angasi</i> (Angas, 1879).....	3.8	132(5.0)			6½

Both in radula (1922; fig. xvii-4) and in shell characters, this group is quite close to *Euconulus*; the name *Habroconus* has priority. However, the shells in *Habroconus* are thinner and lighter-colored, and the characteristic closely-spaced growth threads on the apical side of the whorls are less developed, both in strength and extent. In *H. trochulinus* (the type) they fade away on the 4th whorl from the apex, and are completely absent on the last whorl. In *H. costaricanus* and var. *elatiior* (Pilsbry), from Costa Rica, they are restricted to about the first three whorls, while in the globose *H. championi* (von Martens), from Guatemala, they appear to be absent, even at the apex. Rather weak, but distinct, spiral wrinkles are present in *H. trochulinus*; more closely-spaced and lower ones on the subacuminate *H. costaricanus*; and almost obsolete lines on *H. championi*.

Euconulus ernsti (Jousseaume)

?*Stenopus lividus* Guilding (1828; 528, figs. xxvii, 1-3), St. Vincent. *S. lividus* von Mart. (1873; 167, fig. ii-4), Venezuela. *Ernstia ernsti* Jous. (1889; 251, figs. ix-17, 18), Caracas; Vanatta (1915, 82), Cariacuita. *Guppya hallucinata* E. A. Smith (1898; J. of C. IX, 28, fig. 7), Trinidad.

Thirteen specimens, from leaf humus in highland and lowland forests (H, I, II, b, 1, 2, 7, 11, 22, 40), at Rio Macuto, San Esteban, Bejuma, Palma Sola (L 10.5, 69) and (?) La Fria; also specimens in the A. N. S. P. (no. 10220) from Cariaco (Cocking). My shells vary considerably in the sharpness of the peripheral angle; the immature specimens are usually markedly angulate (*cf.* Jousseaume's figure), but some of the older ones are almost evenly rounded (fig. vi-24). The single shell from La Fria is considerably more depressed than the others; it is too old and worn for accurate identification.

I suspect that this species is very closely related to, if not identical with, *S. lividus*, as Smith (1896; 239) states that species lacks the spiral lines. Von Marten's figure looks like a young shell of this species, but he gives no measurements. *G. hallucinata* is an excellent description and figure of *E.*

ernsti; Smith does not mention the latter in his description and probably was not familiar with it. Both in sculpture and radula, *E. ernsti* is a true *Euconulus*; the closely-spaced, regular, growth riblets of the apical side of all of the whorls shows why Jousseume proposed *Ernstia* as a substitute for *Conulus*, although he named his own species as type. In fact, it does appear most closely related to the northern group of this genus; it is especially similar to *E. elegantulus* (Pilsbry) from Mexico, but is a more globose shell with larger last whorl and aperture. Both of these species have spiral ridgelets, but they are much weaker than in the next group.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
<i>ernsti</i> (1889)	3.0	100(3.0)				5
<i>hallucinata</i> (1898)	3.0	100(3.0)				6
H, I, b, 7; largest...	3.49	97(3.39)	94(3.29)	44(1.53)	117(1.79)	6¼
<i>cassiquiensis</i>						
(1853)	3.0	133(4.0)				5½
<i>vacans</i> (1866)	3.0	153(4.6)				5
Dunoon, B. G.;						
largest	3.92	119(4.66)	112(4.38)	44(1.74)	138(2.40)	6
<i>sementini</i>						
(No. 78031)	3.62	126(4.57)	119(4.31)	50(1.81)	132(2.40)	5¼

Radular formula of an immature specimen: 25-10-1-10-25. Teeth very similar to those of *E. elegantulus* (1922; fig. xvii-6). As in that species, there are 9 asymmetrical, tricuspid laterals, while the 10th is transitional between these and the marginals, which are mainly bicuspid.

Euconulus (Pseudoguppya) cassiquiensis (Pfr.)

Helix cassiquiensis "Newcomb" Pfr. (1853; 59), Demerara, British Guiana. *Conulus vacans* Guppy, in part (1866; 53), Trinidad. ?*Guppya vacans* Gibbons (1879; 129), Puerto Cabello. *Hyalinia cassiquiensis* Tryon (1886; M.C. II, fig. liii-53). *Guppya sementini* E. A. Smith (1896; 238).

I did not obtain this species in Venezuela, but one shell in the A. N. S. P. (no. 48737) labeled "Venezuela" is a young

specimen of a larger and more heavily sculptured species than *Euconulus ernsti*. The British Guiana collection contains five specimens, from sand hills and reefs near Dunoon; the dimensions of the largest shell (fig. vi-25) are given above.

I quite agree with Smith that *Helix cassiquiensis* and the description of the shell of *C. vacans* represent the same species. *H. semenlini* Moricand (1845; Mem., 3rd suppl., 55), from Bahia, Brazil, is also very closely related, but two specimens (A. N. S. P. 78031) from Sao Paulo, Brazil, labeled as typical by H. von Ihering (with a note on the types) show a slightly more depressed species, with flatter whorls, lighter color, thinner shell, and more delicate and closely-spaced, spiral ridges. The umbilical depression is also somewhat larger, but in both this species and *E. cassiquiensis*, as in most species of *Euconulus* and *Habroconus*, the umbilicus is only superficially rimate, as the axis of the shell is closed by a shell deposit a short distance above the columellar reflection of the peristome. Although the unique type specimen is rather worn, *Euconulus browni* (Pilsbry), from Panama, evidently belongs in this group of large, angulate species with exceptionally prominent, spiral sculpture, as compared to *Euconulus* s. s. *E. mayi*. (Fred Baker), from northeastern Brazil, is another member, very closely related to *E. semenlini* in sculpture, but near *E. cassiquinensis* in shape.

Jaw of *E. cassiquiensis* as in *E. elegantulus*; the slight notch in the anterior edge of my figure (1922; xvii-5) is actually filled out by a thinner continuation of the edge. Radular formula (fig. vii-31) in two specimens: 39-12-1-12-39 and 36-12-1-12-36 (latter immature). The central and the 12 laterals are fundamentally like those of *E. elegantulus*, but are considerably more elongate, so that they approach slightly those of *Habroconus trochulinus*. In addition, the entocoines and ectocoines, especially the former, are comparatively smaller. Sixteen bicuspid marginals are present; the 29th tooth is tricuspid; and the outer teeth gradually become reduced in size, until the last is a mere denticle. In the wide field of the central and laterals, the transverse rows are almost

straight, but they curve anteriorly at an angle of about 45° in the marginal region, to straighten out again at the very edge of the ribbon. The jaw and radula of *E. semenlini* are very similar throughout; radular formula 32-12-1-12-32. These differences in the central and lateral teeth of the radula, together with the prominence of the spiral ridges on the large, angular shell, are sufficient grounds for the establishment of a new section, **Pseudoguppya**, with *H. cassiquiensis* as genotype.

Pseudohyalina umbratilis (Guppy)

Zonites umbratilis Guppy (1868; Ann. Mag. N. H., 440; 1871; Amer. J. C. VI, fig. xvii-3), Trinidad.

One young specimen in the A. N. S. P. (no. 105207), from Cariaquita, is apparently this species. It is almost identical in shape with the next species, but is much smaller for the same number of whorls. The growth lines are also somewhat stronger.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
<i>umbratilis</i>						
(1868)75	200(1.5)		67(.5)		5½ to 6
<i>maya</i> (1920)	1.1	160(1.75)				almost 4
H, V, b, 41	1.17	157(1.84)	139(1.63)	62(.73)	101(.74)	4¼
<i>parana</i> (1913, fig 12)	1.04	144(1.5)		53(.55)	123(.68)	5
<i>lobaterita</i>						
(type)	1.31	144(1.89)	132(1.73)	55(.72)	115(.83)	4¾

Pseudohyalina maya Pilsbry

P. maya Pils. (1920; P. A. N. S. Philadelphia LXXI, 216, figs. xi-5), Quirigua, Guatemala.

Two specimens from abandoned cacao plantation at Quebrada La Fría (H, V, b, 41). Although this species has traces of spiral wrinkles, they are exceedingly indefinite and irregular.

Pseudohyalina lobaterita, new species

A single specimen from near the base of the steep slope (H, I, b, 38) that forms the right side of the canyon-like valley of Rio Lobaterita, just east of Estación Táchira (L 8, 72).

Shell (figs. vi-26): minute; depressed turbinate; light horn-colored, almost white; shining and transparent. Whorls: $4\frac{3}{4}$, well rounded, gradually increasing; suture fine but well impressed. Sculpture: fine, closely-spaced, impressed growth lines; practically no trace of spirals. Umbilicus: about $4\frac{1}{2}$ times in major diameter. Aperture; subcircular lunate; almost vertical. Peristome: simple, sharp, incomplete.

In shape, this species is nearest *Zonitoides parana* Fred Baker (1913; P. A. N. S. P., 632, figs. xxi, 12-14) from Para, Brazil, but it is larger, much lighter in color, and has more delicate growth wrinkles. In addition, *P. parana* has irregular, but evident, spiral lines (stronger than in *P. maya*), while they are practically absent in *P. lobaterita*. In both of these species, the spire is more elevated and the whorls increase more gradually in height (*i.e.*, the last whorl is lower and more depressed) than in *P. umbratilis* or *P. maya*, although *P. lobaterita* resembles the last in color and texture.

Pseudohyalina opal Pilsbry

P. opal Pils. (1920; 216, figs. xi-7), Polvón, Nicaragua.

Two young specimens, one from near Rio Lobaterita (H, I, b, 38), the other from the flats of Quebrada La Fría (H, V, b, 41). Although the only distinct sculpture of the apical whorls of this species consists of distant growth wrinkles, the later whorls show quite distinct and regular spiral ridgelets, which are almost as prominent as in *Guppya gundlachi*. The umbilicus is much larger ($6\frac{1}{2}$ times in major diameter) and the color is much lighter (light yellowish horn) than in any *Guppya*. The growth wrinkles are more angular than in *Pseudohyalina maya*. From the description and figures, *Vitrea luntii* E. A. Smith (1898; J. of C. IX, 27, figs. 1, 2), from Trinidad, may be somewhat similar to *P. opal*, but Smith's species is much more depressed and has a much larger umbilicus ($\frac{1}{3}$ the major diameter); apparently both species have similar sculpture.

STREPTAXIDAE¹

For convenience of discussion, both the Streptaxidae and the somewhat related "Circinariidae" will be taken up together; I am rather doubtful if any species of the latter family have been described from South America. As some changes are necessary in the nomenclature, the following list includes all of the group names which affect the American species of these two families.

Stenopus Guilding (1828; 527); not "Latreille" Desmarest (1825; Consp. Gen. Crust., 226). Type chosen by Gray (1847; P. Z. S., 169), *S. cruentatus* Guild. (*l. c.*) from St. Vincent.

Streptaxis Gray (Sept., 1837; Loudon's Mag. N. H., 485); type chosen by Gray (1847; 174), *Helix contusa* Férussac, from Brazil.

Circinaria Beck (1837; Ind., 23); type chosen by Herrmannsen (1847; Ind. I, 237), *Helix puichella* Müller. Synonym of Vallonia.

Macrocyclus Beck (1837; 24); type chosen by Herrmannsen (1847; II, 3), *Helix peruviana* Lamarck. Belongs in the Acavidae.

Artemon Beck (1837; 48); type chosen by Gray (1847; 174), *Helix contusa* Férussac. Type chosen by Ancy (1884; Le Naturaliste II, 399), *Solarium candidum* Spix (1827), from southern Brazil.

Polygyratia Gray (1847; 173); author's type *Helix polygyrata* Born (1780), from Brazil.

Ophiogyra "Beck" Albers (1850; Die Hel., 91); monotype *H. polygyrata*.

Ammonoceras Pfr. (1855; Mal. Bl. II, 122); not Lamarck (1822). Type by tautonomy is *Helix ammonoceras* Pfr. (1854; 54), from Santa Ana, New Granada.

Systrophia Pfr. (1855; 136); type by tautonomy is *Helix systrophia* Albers (1854) from upper Maranyon, Colombia. Not *Systrophia* Illiger (1806) or Hübner (1816).

Odontartemon Pfr. (1855; 172); type chosen by Ancy (1884; 399), *Helix dejecta* Petit (1842), from Bahia, Brazil. Type chosen by Kobelt (1905; Chemn. II, 91), *Streptaxis eburnea* Pfr. (1861; P. Z. S., 23), from Cochin-China.

Mörchia Albers-Martens (1861; Die Hel., 71); not Mayer or A. Adams (1860). Author's type is *Helix concolor* Férussac, from Porto Rico.

Guestieria Crosse (1872; J. de C. XX, 290); author's type *Helix powisiana* Pfr. (1848), from Quindío, Colombia.

Scolodonta Döring (1875; Bol. Acad. Cordoba I, 438); author's type *S. semperi* Döring (*l. c.*) from Sierra de Cordoba, Argentine.

Eustreptaxis Pfr. (1877; Mal. Bl. XXIV, 5); nude name.

Epistylia "Swainson" Pfr. (*l. c.*); nude name; not Swainson (1840; Malac., 165).

Selenites Fischer (1878; Not. Mal. Shuttleworth, Heft II, 8); not Hope (1840); substitute for *Mörchia*, same type.

Eustreptaxis Pfr.-Clessin (1881; Nom., 15); *Streptaxis* s. s., same type.

Haplotrema Ancey (1881; Le Nat. I, 453); author's type *Helix durantii* Newcomb (1864), from California.

Guesteria Scudder (1882; Nom. Zool. Univ. Index, 137); misspelling of *Guesteria*.

Baudonia Binney (1885; Man., 81); not Mabilie (1868); apparently a substitute for *Mörchia*, same type.

Hoplobienia Binney (1885; Man., 86); a remarkable misspelling of *Haplotrema*; same type.

Entodina Ancey (1887; Conch. Ex. I, 64); author's type *Helix reyrei* Souverbie (1858), from Guayaquil, Ecuador.

Martinella Jousseau (1887; Bull. Soc. Zool. France XII, 173); monotype *M. martinella* Jous. (l. c.), from Ecuador.

Happia Bourguignat (1889; Moll. Afr. Equat., 39); type chosen by Gude (1902; P. Mal. Soc. V, 201), *Helix vitrina* Wagner-Spix (1827), from southern Brazil.

Drepanostomella Bgt. (1889; 42); monotype *Helix ammonitiformis* "Orb." Bgt. (*H. ammoniformis* Orb., 1835), from Bolivia.

Alcidia Bgt. (1889; 46); not Westwood (1879; Trans. Zool. Soc. London X, 510). Type chosen by Gude (1902; 201) in *Helix cypsele* Pfr. (1849), habitat unknown.

Ridleya Ancey (1901; J. de C. XLIX, 17); author's type *Helix quinquelirata* E. A. Smith (1890), from Fernando Noronha. Not *Ridleya* Dendy (1888).

Streptartemon Kobelt (1905; 33); author's type *Helix streptodon Moricand* (1851), from Bahia, Brazil.

Austroselenites Kobelt (1905; 49); author's type, although not definitely chosen, *Helix euspira* Pfr. (1854), from Venezuela.

Zophos Gude (1911; P. Mal. Soc. IX, 269); substitute for *Mörchia*; author's type *Helix concolor* Férussac.

Rectartemon, new genus; genotype *R. jessei*, new species, from Estación Táchira, Venezuela.

Tamayoa, new genus; genotype *T. (trinitaria) venezuelensis*, new subspecies, from La Fría, Venezuela.

Miradiscops, new genus; genotype *M. variolata*, new species, from La Fría, Venezuela.

Punctodiscops, new subgenus; genotype *Scolodonta punctata*, new species, from La Fría, Venezuela.

Systrophiella, new subgenus; genotype *Scolodonta eudiscus*, new species, from La Fría, Venezuela.

Happiella, new section; genotype *Stenopus guildingi* Bland (1865), from near San Esteban, Venezuela.

As will be seen from the above, *Streptataxis* and *Artemon*, both published in the same year, are absolute synonyms of each other. While it is possible that *Artemon* is prior, Gray placed it in the synonymy of his group and this action must be accepted unless the accurate date of Beck's Index is ascertained. *Eustreptaxis* is another synonym.

As *Alcidia* is preoccupied, *Rectartemon* becomes the name of the group usually known as *Artemon* (see Ancey's choice of type), but, for reasons given below, I have chosen my species as type.

Odontartemon must apply to the South American species; *Streptartemon* is apparently a synonym.

Haplotrema, the name of the American group variously known as *Macrocyclus*, *Selenites* and *Circinaria*, has *Hoplobienia* for a synonym. *Austroselenites* is also prior to *Zophos*, the synonymy of which includes *Mörchia*, *Selenites* and *Baudonia*, all preoccupied.

Happia presents a rather peculiar problem. Bourguignat plainly named it as a substitute for *Ammonoceras*, but placed the type of that group, *H. ammonoceras*, in another genus. I am following Gude's choice of type; most of the other species included by Bourguignat belong in *Austroselenites*. *Stenopus* is probably a synonym.

In order to give a brief outline of the groups recognized, the following key is presented:

- A' Animal said to have a jaw.....'Selenitidae''
 B' Jaw certainly present; radula with inner laterals
 quite similar to the marginals in some *Zonitidae*;
 North America*Haplotrema*
 B'' Jaw said to be present; shells darker in color.
 C' Radula with central, laterals indeterminate;
 South America*Austroselenites*
 C'' Central absent, laterals purely *Streptaxid*;
 West Indies*Zophos*
 A'' Animal without jaw; radula with elongate laterals
 with rounded bases, quite similar to those in
Oleacinidae (exc. *Tamayoa* and *Guestieria*).
 D' Shell usually small, translucent to transparent, with
 simple, sharp peristome.

- E' Shell at least perforate.
- F' Whorls flattened above, shell conical; aperture narrowly lunate (crescentic).....*Martinella*
- F'' Whorls rounded to subangulate; aperture broader.
- G' Radula with unicuspid central (when present) and laterals; shell without carina in umbilicus.
- H' Radula with central present; shell not distinctly pitted.
- I' Radula with elongate central and numerous (more than 50) laterals; shell depressed but scarcely discoid, usually narrowly perforate (*Happiella*), without spiral sculpture, suture scarcely impressed*Happia*
- I'' Radula with very small or circular central; shell discoid or broadly umbilicate, usually with spiral sculpture, suture impressed.
- J' Peristome with incision at parietal angle, growth wrinkles very prominent; radula with circular central and large 1st laterals.....*Drepanostomella*
- J'' Peristome simple, growth wrinkles not especially prominent.
- K' Shell small, no spiral sculpture described; radula with "short rhombic" central and "dagger-shaped" laterals.....*Scolodonta*
- K'' Shell much larger or with definite spiral sculpture.
- L' Shell minute, with spiral rows of minute papillae; radula unknown*Punctodiscops*
- L'' Shell without such sculpture; radula with central and 1st laterals much smaller than 2nd laterals*Systrophiella*
- H'' Radula without central; shell pitted, but without spiral sculpture.....*Miradiscops*
- G'' Radula with tricuspid central and fimbriate (multicuspid) laterals; shell with carina in umbilicus*Tamayoa*

- E" Shell imperforate; radula without central and with multicuspid inner laterals.....*Guesteria*
- D" Shell usually larger, more opaque, with thickened or reflected peristome, often with teeth or lamellae.
- M' Shell discoid to subdiscoid, very closely coiled, yellowish to brownish, translucent to opaque.
- N' Shell with multilamellate aperture; Fernando Noronha*Ridleya*
- N" Aperture not so; mainland.
- O' Aperture of shell without teeth or lamellae.
- P' Shell large, with internal lamellae (Dr. Pilsbry)*Polygyratia*
- P" Shell smaller, without internal lamellae.....*Systrophia*
- O" Aperture with teeth or lamella.....*Entodina*
- M" Shell higher, usually whitish.
- Q' Shell with regularly conical spire*Rectartemon*
- Q" Shell with spire inclined to side.
- R' Shell smaller, translucent or with teeth in aperture*Odontartemon*
- R" Shell usually larger, quite opaque, without teeth in aperture*Streptaxis*

Austroselenites euspira (Pfr.)

Helix euspira Pfr. (1854; P. Z. S., 54; Reeve, C. I. fig. 1277); Brazil (*sic*); later Venezuela. *Macrocyclus euspira* Binney (1875; P. A. N. S. P., 247, fig. xxi-3); jaw and radula of specimens from Venezuela (Swift).

The Swift collection is now in the A. N. S. P., which has 10 specimens of this species, five of which are labeled Puerto Cabello. I have not been able to examine the animal. According to Binney, the jaw is low and crescentic, with pointed ends and a decided, sharp, median projection. The radular formula is given as 30-1-30. The elongate central is emarginate above (?) and expanded below; it bears a long, aculeate cusp. The transverse rows are chevron-shaped, and the laterals are aculeate, but additional characters cannot be determined from the figures. These data are not sufficient to discuss the systematic position of the group.

The shells of *Austroselenites* quite closely resemble those of the West Indian species, for which *Zophos* has been proposed.

Through the generosity of Dr. Pilsbry I have been able to examine a radula, mounted by him, from a Porto Rico specimen of the type species, *Helix concolor*. Radular formula (fig. vii-32): 34-0-34. The central is absent. The 1st laterals are somewhat separated; the right one is a little more anterior than the left. The teeth gradually increase in size out to about the 12th, which is twice the length of the 1st and has a much longer cusp. All of the teeth are strictly aculeate, with the rounded, knobby, posterior end on the base that is so characteristic of the Streptaxidae and the Oleacinidae. This radula has very little resemblance to that of *Haplotrema*, but is clearly a highly specialized Streptaxid type. Binney's statement (Ann. Lyc. N. Y. X, 305) that a jaw is present in *Zophos baudoni* certainly requires verification.

Happia (Happiella) mediocris (Pfr.)

Helix mediocris Pfr. (1854; P. Z. S., 51), Santa Ana, New Granada;³ Reeve (1854; fig. 1337).

Twenty-six specimens, mainly from leaf and root humus on mountain slopes (H, I, b, c, 7, 13, 15, 23, 24, 35, 39, 42), but also in lowland forest (H, II, b, 40) and an abandoned cacao plantation (H, V, b, 41), at Bejuma (also La Mona and Cerro Chiriguara, nearby), Aroa, Estación Táchira and La Fría. Also three specimens in the A. N. S. P. (No. 48791) from Caracas (Cocking).

From the very meager description of this species, and a single juvenile specimen (A. N. S. P. 33236) which is labeled as from the type locality (Bland), I believe this is a species of *Happia* (fig. vi-27), which is widely distributed in the mountains of Venezuela. It is smaller and more closely coiled than

³ Four localities with this name are shown on the maps I have examined. One is in southeastern Colombia (L 2, 68). Of the three in Venezuela, one is on the Goajira Peninsula (L 12, 72), another on the Paraguana Peninsula (L 12, 70), and a third on Margarita Island (L 11, 64). From the species of which this is the type locality, I suspect that it is actually some small town in the Cordillera Oriental near the boundary between Colombia and Venezuela.

H. guildingi, which is bright, amber horn-colored, with very faint growth wrinkles, while the present form is almost white with slightly incised lines between the wrinkles. The umbilicus is also slightly larger ($1/10$ the major diameter as measured to the point of attachment of the last whorl; $1/13$ as measured to the jutting margin of the peristome). From von Martens' figure (1892; figs. vi-12), it is possible that *Helix paucilirata* Morelet 1851; 8), from Guatemala, is related to the present form.

In this genus, the highly polished shell shows only faint growth wrinkles, or weakly incised lines, and no spiral sculpture. Each succeeding whorl increases rapidly in diameter, partially envelops the preceding one, and is obliquely beveled at the sutural union, so as to practically obliterate the sutural groove and give the impression of a wide margin around the fine sutural line. The spire is very low and the umbilicus is usually reduced to a small perforation (section *Happiella*), although the last is not true of the type species, *Happia vitrina* (Wagner), from southern Brazil (*Happia* s. s.).

Happia (Happiella) guildingi (Bland)

Stenopus? guildingi Bland (1865; A. Lyc. N. H. N. Y. VIII, 157-9, figs. 3), Puerto Cabello (Swift); figures of shell, animal, radula and jaw (*sic*) given.

Two almost mature specimens from a stump in the lower cloud-forest near Las Quiguas on the Rio San Esteban (H, I, c, 7), and a single juvenile from rather high, dry forest near Palma Sola (H, II, b, 22). Lot no. 48788, in the A. N. S. P. (Swift Collection) probably consists of cotypes; it is labeled "San Estevan, near Puerto Cabello." In this species (fig. vi-28), the last whorl and the aperture are very large and envelop the preceding whorl to such an extent that the umbilicus is invaded deeply by the oblique columellar limb of the peristome and reduced to about $1/19$ the major diameter (as measured from the point of attachment of the last whorl).

The spike-like appendage at the posterior end of the exceedingly narrow and definitely margined foot of this species

	alt.	Shell		Aperture		Whorls
		maj. diam.	min. diam.	alt.	diam.	
<i>mediocris</i>						
(1854)	2.25	222(5.0)	200(4.5)			4
A. N. S. P. 48791,						
largest	3.92	175(6.86)	153(6.01)	76(2.97)	109(3.25)	4½
<i>guldingi</i>						
(1865)	3.0	267(8.0)	233(7.0)			4
A. N. S. P. 48788,						
largest	5.19	188(9.76)	165(8.55)	82(4.29)	114(4.88)	4¼
<i>decolorata</i>						
(1859)	3.0	215(6-7)				5
Dunoon, B. G.,						
largest	3.46	191(6.62)	166(5.74)	79(2.73)	112(3.06)	4½
<i>surinamensis</i>						
(1872)	3.0	200(6.0)	167(5.0)			4
Dunoon, B. G.,						
largest	4.47	192(8.60)	167(7.48)	79(3.55)	115(4.07)	4¼

has already been figured by Bland. In addition, he presents figures of the radula and jaw. In regard to the last, he probably was misled by his belief that his species belonged to the Zonitidae, as, after examination of four animals, I am convinced that no jaw is actually present. In one of the specimens the anterior end of the body was mounted, before it was entirely dissolved by the alkali, and the material washed away bit by bit. The region around the mouth appears to be covered with polygonal, cornified cells, which retain their identity even after a considerable stay in the hydroxide. What I take to be the cleft of the mouth itself remains as a clear space (when the cells are all washed away, its outline disappears) with a shape very much like Bland's figure, but I am fairly positive that the jaw is lacking. In addition to the rounded mass, with the pocket for the forming radula, the radular cartilage dissolves out as two, long, narrow strips, which form a trough for the central portion of the tongue.

Radular formula (fig. vii-33): 75 to 71-1-71 to 75. The transverse rows (84 counted in one radula) extend obliquely anteriad, quite abruptly at first, but curved so as to be almost exactly transverse at the outer edge. The central is elongate,

with a single, lanceolate cusp and a narrow, peculiarly constricted base. It is usually almost hidden by the blades of the 1st laterals, and, as in many Streptaxidae, must be practically functionless. The lateral teeth are all similar to each other in shape, and consist of a narrow, aculeate cusp, which tapers down to a point at the anterior end, and a ridiculously small, tapering base. Each tooth appears to be attached at its anterior end and at the handle-like base, so that the actual blade is raised some distance above the basement membrane, although almost parallel to it. The teeth increase slightly in length out to the region of the 15th and then decrease gradually until the outermost are exceedingly minute. The small base is farther back from the tip of each successive tooth, so that the free blade is proportionately longer in the outer ones. The radula of *Happia surinamensis* (see below) is very similar to that of *H. guildingi*; in the specimen examined, the formula is 66-1-66.

In the British Guiana collection are seven lots of a closely related species from swampy places and forests of the sand hills near Dunoon. I identify these as *Helix surinamensis* Pfr. (1872; Mal. Bl. XIX, 75, fig. ii, 14-16), from Paramaribo, Surinam. This species is lighter in color than *H. guildingi*, and the last whorl envelops the preceding one to a less extent; the umbilicus is larger (about 10 times in the major diameter), and the growth wrinkles are more pronounced. The dimensions of the largest shell are given.

In two lots with these, and in two additional sets from these sand hills, there is a smaller species, with very much the same shape, which seems to satisfy the description and figures of *Helix decolorata* Drouet (1859; Moll. Guy. Franc., 50, figs. I, 3-5), from French Guiana. Three lots of the same form are in the A. N. S. P., from Demerara (Newcomb). Although smaller, the shell appears heavier and much more opaque (cloudy whitish); the whorls are slightly flattened above, the umbilicus is comparatively larger ($1/7$ the major diameter), and widely and irregularly spaced, well-incised, radiating lines (much stronger than in *H. mediocris*) are present, in

addition to the obscure growth wrinkles. These specimens may represent a dwarfed race of the larger form, but I find no intergrading individuals, and so am inclined to regard *Happia decolorata* and *H. surinamensis* as distinct species. *Happia nitidula* (Dohrn) and *H. amazonica* (Dohrn), both from Para, Brazil, were also described as very similar to *H. surinamensis*; I have seen no specimens. I suspect that *Stenopus cruentatus* Guilding (1828), from St. Vincent, is also a *Happia*.

Drepanostomella ammonoceras (Pfr.)

Helix ammonoceras Pfr. (1854; 54; Reeve, fig. 1338), Santa Ana, New Granada.

Nine specimens, from rich leaf humus, on brook flats, near Rio Lobaterita, above and opposite Estación Táchira (H, I, b, 35). In addition to the incision at the parietal angle of the peristome, and the peculiarly depressed form (fig. vi-29), this species is characterized by its prominent, closely-spaced growth wrinkles, which are heightened with irregular, epidermal riblets, and by its spiral sculpture, which consists of rows of minute papillae, slightly oblique to the suture (*i.e.*, not exactly spiral). On the thin and transparent $1\frac{1}{4}$ embryonic whorls the growth wrinkles are more obscure and the spiral rows (9 counted, one whorl from apex, fig. viii-35) correspondingly distinct. On the later whorls these papillae are also present, but the rows are irregular and more widely spaced; on old, dead shells they appear to be absent or very indistinct, which leads me to believe that they are largely epidermal.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
<i>ammonoceras</i>						
(1854)	1.5	300(4.5)	250(3.75)			4
H, I, b, 35;						
largest	2.15	189(4.07)	167(3.60)	84(1.82)	82(1.49)	3 $\frac{1}{4}$
<i>excisa</i> (1854)	2.0	225(4.5)	200(4.0)			4
Λ.N.S.P.23774...	2.76	166(4.57)	151(4.16)	64(1.75)	80(1.39)	4

The jaw is apparently lacking; two dried specimens were examined and in one the epidermis around the mouth was seen

(*cf.* *Happia*). Radular formula (fig. vii-34) 19-1-19. The transverse rows are shaped much as in *Happia*, but the entire radula is, of course, much narrower in proportion to its length. The central has a single, claw-shaped cusp which rises from a small, almost circular base. The lateral teeth are all similar in shape to those of *Happia*, but the cusps are deeper, more noticeably curved and claw-like, and the small bases are proportionately heavier and more knob-like. The teeth increase in size out to about the 7th, and the free blades become relatively longer and more slender out to the minute denticles of the lateral edges. This species is ovoviviparous.

Drepanostomella excisa (Pfr.)

Helix excisa Pfr. (1854; 54; Reeve, fig. 1260), Santa Ana, New Granada.

I did not obtain this species, and it is included among Venezuelan species only on account of the doubt as to the location of the type locality. In the A. N. S. P. (no. 23774) are four specimens from Marmato, Colombia (Bland). The resemblance to *D. ammonoceras*, and the peculiarly arched spire are indicated in the description and figure cited; although the earlier whorls project much above the last whorl, *D. excisa* actually has the larger umbilicus of the two species ($2/5$ the major diameter as compared to practically $1/3$). Most of the growth wrinkles of this species are similar to those in the preceding, but every 3rd to 5th one, on the later whorls, is much higher, so that the shell appears to have widely spaced riblets. In addition, the spiral sculpture of the $11\frac{1}{2}$ embryonic whorls consists of scalloped, but continuous, spiral ridges (11 counted, one whorl from apex; fig. vii-36), while on the later whorls of young shells it is represented by peculiar, thorn-like projections along the epidermal growth riblets (fig. viii-37). These appear to be absent on the last whorl of adults, but may be worn away in the specimens examined.

As used here, this genus is characterized: by the peculiar way each whorl appears pushed up over the preceding one,

although, unlike *Happia*, a well impressed suture is developed; by the prominent, epidermal growth wrinkles, and by the incision at the parietal angle. Spiral sculpture also seems to be characteristic, although it has not been described in the much larger genotype, *D. ammoniformis* (Orb.). *Hyalinia stollivon* Martens (1892) clearly belongs to this group; in A. N. S. P. specimens (no. 107631; Quirigua, Guatemala), sculpture appears to be lacking on the apical whorls (possibly eroded away), but rather obscure spiral ridges are present on the later whorls, in addition to the generic wrinkles. *Ammonoceras lyzarzarburui* Jousseume (1887), from Ecuador, is probably another member; I have seen no specimens.

Scolodonta (?) *implicans* (Guppy)

Zonites implicans Guppy (1868; 440), Trinidad. *Vitrea implicans* Smith (1896; fig. viii-3). *Polita implicans* Vanatta (1915; 82), Cariacuita, Venezuela.

Except for the obscure growth wrinkles this minute species appears to lack definite sculpture, but I have only examined dead specimens. The type of the genus *Scolodonta* is *S. semperi* Döring, from Sierra de Cordoba, Argentina. I have not seen the original description (1875; Bol. Ac. Cordoba I, 438), but the shell is apparently small, depressed and without the parietal incision of *Drepanostomella*; it has never been figured nor the sculptured details published. According to von Martens (1877; Zool. Rec. XII, 181), Döring gives a figure of the dentition, which shows "all teeth of the radula dagger-shaped, the median very short, rhombic," and contrasts it with that of *D. ammoniformis* (Orb.) with "all teeth spiniform, median small." Although this is very vague, it satisfies the radula of *Systrophiella* (see below) more than it does that of any other group examined, so I am tentatively using *Scolodonta* s. s. for the small species, similar to those of *Systrophiella* in form, and without spiral sculpture.

Scolodonta (Punctodiscops) punctata,

new subgenus and species

Four specimens, from abandoned cacao plantation, at Quebrada La Fría (H, V, b, 41; type locality), and base of cliffs along quebrada, near Aroa (H, I, b, 23).

Shell (figs. viii-39): minute, subdiscoid; transparent and almost white. Whorls: $4\frac{1}{4}$ to $4\frac{1}{2}$, evenly rounded, gradually increasing; suture well impressed. Sculpture of last whorl: rounded but well-marked, closely-spaced growth wrinkles, crossed by numerous and quite regular spiral rows of minute papillae. Embryonic whorls: $1\frac{5}{8}$ with indistinct growth wringles and spiral rows (19 on upper surface, $1\frac{1}{4}$ whorls from apex) of papillae, which run exactly parallel to the suture (fig. viii-38). Umbilicus: a little more than $\frac{1}{3}$ the major diameter. Aperture: lunate, subcircular. Peristome: simple, sharp, incomplete.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
type	0.76	207(1.57)	187(1.43)	71(0.54)	103(0.55)	$4\frac{1}{4}$

I have not examined the radula of this species and it may belong to the Endodontidae. Although the rows of papillae are exactly spiral, and more closely spaced, the sculpture is quite similar to that of *Drepanostomella ammonoceras*, while the shape of the shell places it in Scolodonta. It is just possible that *Vitrea lunti* Smith may belong to this group, instead of in Pseudohyalina, where I have already tentatively placed it.

Scolodonta (Systrophiella) starkei,

new species

Three juvenile specimens from Ravina de las Palmas, near San Esteban (H, I, b, 5). My specimens are far too young for description, but, through the generosity of Dr. Pilsbry, I am able to describe it from specimens in the A. N. S. P.; lot 8868 contains one shell, the type, from San Esteban, Venezuela (C. F. Starke); 23899, ten specimens, labeled Puerto

Cabello (C. F. Starke); 23898, eight specimens, from Cariaco (Cocking).

Shell (fig. viii-40): small, subdiscoid; semitransparent, pale horn color, clouded with whitish; smooth and shining. Whorls: 5, quite evenly rounded but slightly flattened above; later whorls rapidly increasing in diameter and height; suture slightly impressed. Sculpture of last whorl: growth wrinkles feeble; spiral sculpture of very fine, impressed lines which separate rounded wrinkles, distinct and regular. Embryonic whorls: 2, gradually increasing in diameter, so that juvenile shells bear little resemblance to the adults; growth wrinkles obscure; spiral sculpture very distinct and regular. Umbilicus: quite small (4.3 times in major diameter), constricted by the jutting, columellar margin of the last whorl. Aperture: large, lunate subcircular, inclined slightly downwards but more nearly vertical than in many species of the subgenus (less than 30° obliquity). Peristome: simple, sharp, incomplete; parietal callus very thin.

	Shell			Aperture		Whorls
	alt.	maj.diam.	min.diam.	alt.	diam.	
<i>starkei</i> , type	4.3	188(8.1)	170(7.3)	83(3.6)	101(3.6)	5
<i>cayennensis</i> (1842)...	4.5	244(11.0)	211(9.5)			5
Dunoon, Brit. Guiana	5.1	206(10.6)	175(9.0)	75(3.9)	112(4.3)	5

Jaw: absent. Radular formula (fig. ix-48): 34-1-1-1-34; radula long and narrow; transverse rows (43 counted, but probably incomplete) directed obliquely antieriad from the center, but recurved so as to extend obliquely posteriad at the outer margin. Central: minute, with an elongate base (somewhat similar to *Happia*) and a stout, claw-like cusp. First lateral: larger than the central, but slightly less than one half as long as the 2nd tooth; cusp claw-shaped, relatively more slender than that of the central. Second lateral: the largest, with a blade like that of a hunting knife and a stout, handle-like base; the cusp usually overlaps the central field so as to mask the central and 1st lateral. The next two or three teeth are about equal in size, but beyond this they decrease rapidly

in size, while the blades become relatively longer and more slender, and stand out from small bases at a considerably greater angle. The anterior end of the outer teeth is usually curved inwards. The outermost teeth are very minute, much smaller than the central.

This species is most closely related to *Helix cayennensis* Pfr. (1842; Symb. II, 24; Chemn. II, figs. lxxxiv, 11-13), from Cayenne. In the British Guiana collection are six specimens, of the latter form, from the sand hills around Dunoon; the dimensions of the largest are given. *S. starkei* is smaller and has a relatively smaller umbilicus than *S. cayennensis* (3.8 times in major diameter); in addition, the latter is darker in color, has more prominent growth lines, more distinct suture, and its whorls increase more gradually and at equal rate throughout, so that the last whorl is relatively smaller and the entire shell more depressed. *S. cayennensis* is ovoviviparous, but I am not sure about *S. starkei*; the radulae of the two species are very similar, but, peculiarly enough, the larger species has the smaller number of teeth (25-1-1-1-25). As compared to those of typical *Systrophiella* (see below), these radulae show a slightly closer approach to that in *Happia*.

S. starkei is also somewhat similar to *Circinaria ponsonbyi* and var. *clara* Pilsbry and Clapp (1902; Naut. XV, 134, figs. vii, 1-3), from the Santa Marta Mountains, Colombia, but the latter forms are larger, more transparent, and much more flattened above, with a stronger suture. Another related species is the much larger *Happia snethlagei* Fred' Baker (1913), from Madeira River, Brazil. In all four of these species, the whorls increase more rapidly than is usual in the subgenus, although *S. starkei* carries this to a greater extreme than do the others. Other distantly related species are *Helix thomasi* Pfr. (1854), from Marmato, Colombia, and *Helix hondana* Pfr. (1854), from Honda, Colombia; topotypical specimens, of both of these considerably higher and more closely coiled species, are in the A. N. S. P. All six species seem to belong to a rather distinct group, which differs from typical *Systrophiella*, by their distinct and regular, although

extremely minute, spiral sculpture which is well developed on both the embryonic and later whorls, and by their notably smaller umbilicus.

Systrophiella appears to be widely distributed in South America, especially along the Andes, as a number of species, such as *Helix insignis* Orb. (1835), *H. guayaquilensis* Pfr. (1852), *H. baezensis* Hidalgo (1869) and *Ammonoceras cyclina* Cousin (1887), all from Ecuador; *H. bounoboena* Orb. (1835), *H. omalomorpha* Orb. (1835), *H. trochilioneides* Orb. (1835), *H. chalicophila* Orb. (1835), *H. skiaphila* Orb. (1835) and *H. suborbicula* Dohrn (1882), from Bolivia, and *H. cuzcana* Philippi (1869), from Peru, are superficially similar in form. I have seen no authentic specimens of any of these, and nothing is known of their radulae or sculptural details. However, I have examined shells from Los Puentes, Ecuador, which appear close to *S. guayaquilensis*, and these have distinct, spiral sculpture, both on the embryonic and later whorls.

Scolodonta (Systrophiella) alicea (Guppy)

Hyalinia alicea Guppy (1871; Amer. J. C. VI, 309), Oropuche Mountains, Trinidad. *Selenites alicea* Smith (1896; fig. viii-4).

In the A. N. S. P. (48790) are three small, whitish shells, from Cariaco, Venezuela (Cocking), that I believe to be immature (largest with 5 whorls) examples of this species, but I have seen no authentic specimens. Although almost as discoid as *S. eudiscus* (see below), the spiral sculpture of these shells is heavier and more distinct, both on the embryonic and later whorls, than in any other species of *Systrophiella* examined.

Scolodonta (Systrophiella) viridis, new species

Thirty-six specimens, from leaf humus in heavy, lowland forest around Palma Sola (H, II, b, 20). Throughout Venezuela, the species of *Systrophiella* appear especially characteristic of the damper portions of the heavy forests of the flood plains; they are purely terrestrial in their habits.

Shell (fig. viii-41): smallish, subdiscoid; semitranslucent; pale, greenish horn; glossy. Whorls: $5\frac{3}{4}$, quite evenly

rounded, gradually increasing, suture considerably deeper than in *S. starkei* but shallower than in *S. eudiscus*. Sculpture of last whorl: growth wrinkles more distinct than in either of the two just mentioned; spiral sculpture vestigial. Embryonic whorls: $1\frac{3}{4}$; growth wrinkles obscure, spiral sculpture absent. Umbilicus: quite evenly conical; approximately 2.4 times in major diameter. Aperture: quite oblique (about 45°), lunate (deeply invaded by preceding whorl), subcircular. Peristome: simple, sharp, incomplete; parietal callus a little heavier than in *S. starkei*.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
<i>antoni</i> (1842)	4.0	250(10.0)				$5\frac{1}{2}$
<i>zeteki</i> (1920)	4.0	272(10.9)				6
<i>viridis</i> (type)	4.0	276(11.1)	250(10.1)	80(3.1)	99(3.1)	$5\frac{3}{4}$
<i>lobaterita</i> (type) ...	4.9	284(13.8)	264(12.8)	80(3.9)	100(3.9)	6
<i>eudiscus</i> (type)	5.0	325(16.3)	305(15.3)	88(4.4)	100(4.4)	$6\frac{1}{4}$

In size and form, this species is very close to *Scolodonta zeteki* Pilsbry (1920; P. A. N. S. P., 195, fig. 1), from Gatun, Panama; the Venezuelan specimens mentioned in the description of that species (A. N. S. P. 23775) are also *S. viridis*, and probably came from the Aroa River valley. However, in this Venezuelan species, the whorls are slightly more flattened above, the color is much paler and duller (Isabella color in *zeteki*), and the spiral sculpture is practically lacking. In *S. zeteki* the last whorls are very regularly and distinctly sculptured, much as in *S. starkei*, with exceedingly fine, impressed, spiral lines (about 260 to the mm.) which separate rounded ridgelets, while the apical whorls show traces of the same sculpture, which appears to be epidermal as it is invisible in worn specimens. In *S. viridis* these spirals are absent from the embryonic whorls, but very indistinct and irregular traces are present on the last whorl. In this connection attention is called to the fact that *S. zeteki* satisfies the vague description (without figure) of *Helix antoni* Pfr. (1842; 22), from Panama (Anton), with the exception of the statement

that the last whorl is "obsolete angulatus." However, *H. antoni* is quite unidentifiable and little emphasis can be placed on Anton's record of the locality. *S. viridis* is quite similar in sculpture to *S. eudiscus lobaterita* (see below), but is a considerably smaller shell, with a relatively smaller umbilicus.

S. viridis lacks a jaw. Radular formula (fig. ix-49); 18-1-1-1-18. Teeth very similar to those in *S. eudiscus*, which will be described in greater detail, but are slightly shorter and appear heavier. First lateral: about $\frac{1}{3}$ as long as 2nd, not much larger than the central.

Scolodonta (Systrophiella) eudiscus eudiscus,
new subgenus and species

Twenty-eight specimens, from rich leaf humus in damp places in heavy, lowland forest (H, II, b), near La Fría (40, type locality), and on the flats of Quebradas La Fría and Santa Aguita (41, 42).

Shell (fig. viii-43): large (for the genus), discoid; semi-translucent; dull (for the genus), greenish horn. Whorls: $6\frac{1}{4}$, quite evenly rounded but slightly flattened above; gradually increasing; suture shallow but distinct. Sculpture of last whorl: rather prominent rounded growth wrinkles; spiral sculpture absent. Embryonic whorls: almost two; practically smooth, but with obscure growth wrinkles. Umbilicus: quite evenly conical, almost exactly one half the major diameter. Aperture: quite oblique (about 45°), lunate (deeply invaded), subcircular. Peristome: simple, sharp, incomplete; parietal callus thin.

This species, the type of the subgenus, is distinguished by its large size, extreme discoid form, and the complete absence of spiral sculpture.

The anatomy of a specimen in alcohol, from Quebrada La Fría, has been studied. Kidney (fig. x-53): elongate, fully three times as long as pericardium, slightly recurved at proximal end, with a reflexed ureter, which appears to be continued by a closed, secondary ureter, although so transparent as to be indefinite in its middle portion. Lung: very

long and narrow, with a long pulmonary vein, but otherwise very thin and transparent and without coarse venation, although a few short branches occur near the pneumostome and a faint reticulation is visible near the distal end of the columellar muscle. Foot: ridiculously small for the size of the shell, but broader than in *Happia*. The pointed, posterior end of the body slightly projects over the tip of the foot, but is not prolonged into a spike-like appendage as in *Happia*. The reticulation of the sides of the body tends to run vertically.

Reproduction: ovoviviparous. Uterus (fig. x-54): very large, swollen, in the specimens examined (April 23rd), by 17, large eggs with white granulate shells that contain young animals, and by 3, still larger, golden yellow eggs without shells or well-developed animals. Albumen gland: comparatively small, sinuous and finger-shaped, yellowish; talus quite large, bladder-like. Spermatheca: with an exceptionally long and slender duct which is swollen at the base and empties into the short vagina near the inner end of the latter; terminated by a small, long-ovate enlargement, which is embedded in the base of the liver. Penis: long and slender, fusiform; near the base it passes between the pharyngeal and ocular retractors; lumen almost closed by prominent plications; walls thick and muscular; retractor muscle terminal, long and slender (almost as long as penis); entrance of the vas deferens also terminal. Vas deferens: but slightly looped; attached, by a sheathing ligament to the penis at about $\frac{1}{4}$ the length of that organ below its termination, to the angle between the confluence of the penis and vagina, and along the entire length of the uterus. Hermaphroditic duct: quite simple. Ototestis: golden-yellow, elongate.

Jaw absent. Salivary glands: light yellow; tongue-shaped; enormous, the two together almost as long as the uterus, along which they are loosely attached, one proximad to the other but overlapping slightly. Liver: dark purplish-brown; comparatively small. Radular pouch: long, cylindrical, with heavy walls. Radular cartilage: fibrous, trough-shaped, with groove

and pocket for radula; anterior end crescentic (slightly bilobed) and the functional rows of teeth fit over it like a cap. Two long accessory strips dissolve out as in *Happia*, but their complete separation may be due to the action of the alkali. Radular formula (in one of the largest specimens): 25-1-1-1-30; the transverse rows (84 counted) run obliquely forward from the center but curve slightly laterad at the outer margins; entire radula long and slender. The asymmetry of this radula is certainly abnormal, but a larger number of teeth than in the smaller *S. eudiscus lobaterita* (fig. ix-50) would be expected. Central: minute, elongate, with a stout, lanceolate cusp. First lateral: little larger than the central and considerably less than 1/3 as long as 2nd; with an elongate base and a claw-like cusp, which is relatively smaller than in *S. starkei*. Second lateral: shaped much as in *S. starkei*, but with a relatively more slender base. The teeth increase in size out to about the 10th; beyond this, they gradually decrease in length and become more slender, but the outermost teeth are larger than the central. As is usual in the Strep-taxidae, the free blades increase in relative length from the center out. This radula, like that of *S. viridis*, has more large teeth than does that of *S. starkei*, but lacks the long series of minute teeth, with erected cusps, which distinguish the last species and *S. cayennensis*.

***Scolodonta (Systrophiella) eudiscus lobaterita*,**

new subspecies

Thirty-seven specimens, from rich leaf humus, on brook flats, near Rio Lobaterita, opposite and above Estación Táchira (H, II, b, 35). These shells (fig. viii-42) from the mountains are uniformly smaller and slightly more elevated than those from the lowland forests; in addition, the growth wrinkles are somewhat more prominent.

Radular formula (fig. ix-50): 22-1-1-1-22. Teeth very similar to those in *S. eudiscus eudiscus*.

Miradiscops variolata, new genus and species

Five specimens, from rich leaf humus in abandoned cacao plantation, at Quebrada La Fría (H, V, b, 41).

Shell (fig. viii-45): minute, subdiscoid, semitransparent, whitish. Whorls: 4, quite evenly rounded, rather rapidly increasing; suture well impressed. Sculpture of last whorl (fig. viii-46): quite closely spaced, prominent, growth threads which are connected by fine ridges so as to enclose irregular oval pits; these last are not spirally arranged. Embryonic whorls: $1\frac{1}{2}$, growth wrinkles obscure; dotted closely with oval to circular pits which are separated by reticulating wrinkles (fig. viii-44). Umbilicus: about $\frac{1}{3}$ of the major diameter. Aperture: almost vertical, lunate subcircular. Peristome: simple, sharp, incomplete; parietal callus rather heavy for such a small species.

	Shell		Aperture		Whorls
	alt.	maj.diam.	alt.	diam.	
Type; largest.....	0.68	192(1.31)	174(1.19)	71(0.49)	92(0.45) 4

Animal: ovoviviparous. Jaw: not observed, probably absent. Radula: exceedingly minute, long and narrow, with chevron-shaped transverse rows. Formula: 10-0-10. Central: absent (or smaller than the limits of microscopic vision). Laterals: similar in shape to those of *D. ammonoseras*; 1st laterals (fig. ix-51) largest, the left one a little more posteriad than the right.

Tamayoa trinitaria venezuelensis,
new genus⁴ and subspecies

Thirteen specimens, from leaf humus in abandoned cacao plantation, at Quebrada La Fría (H, V, b, 41; type locality), at base of cliffs along a quebrada near Aroa (H, I, b, 23), and on the flats of Rio San Esteban (H, II, b, 2). This form is but doubtfully distinct from the next, but the impressed lines

⁴ Mr. Fernando Carlos Tamayo, who established my first interest in Venezuela.

between the rounded growth wrinkles are a little more conspicuous than in the specimens from Cariaquita; I have not seen any specimens from Trinidad and wish to take the precaution to establish the genus on specimens of which the radula is observed. This species has much the appearance of a minute *Happia*, but the suture is broadly, although shallowly, impressed. In addition, the columella is thrown up into a compressed fold, which is filled in with shell material almost to the margin of the peristome (fig. viii-47). This fold forms a minute carina, that is slightly swollen, at least in the subspecies, just behind the columella, enters the narrow umbilicus (a trifle more than 1/10 the major diameter) and appears to run all of the way to the apex. The young shells are subangulate but the adults are quite evenly rounded, although the whorls are noticeably depressed.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
<i>trinitaria</i> (1898)...	1.5	167(2.5)				4½
<i>venezuelensis</i>	1.37	170(2.39)	150(2.04)	75(1.02)	108(1.10)	4

Animal: either ovoviviparous or containing very large eggs. Jaw: believed to be absent, as, in one of the two dried specimens examined, I succeeded in mounting the tissue around the mouth and observed the chitinized cells mentioned in the discussion of preceding genera. Radular formula (fig. ix-52): 39-1-39; transverse rows shaped like an inverted W; 62 counted; entire membrane long and quite narrow. Central: small, tricuspid, with a roughly hexagonal base. First laterals: the largest teeth; left slightly more posteriad than the right as is common in the Streptaxidae; each with a long blade, which is serrated by distinct cusplets along both its inner and outer margins although more extensively on the latter, and with a rather large (for the Streptaxidae), expanding base. The teeth decrease in size rapidly from the center out; as they are usually tilted inwards, the cusplets along the inner side are mainly hidden by the edge of the blade but appear to become actually less numerous than on the 1st lateral. These

serrations are present out to at least the 25th tooth; the outermost denticles appear simple and aculeate (like *Drepanostomella*), but the cusplets may possibly be so minute as to be beyond the limits of microscopic vision. In the Pulmonata, the nearest approach to the fringed blades of these laterals appears to be in the outer teeth of such Indian Zonitidae as *Durgella mairangensis* Godwin-Austen (1898; Moll. Ind., part VIII, fig. lxxvii-10). However, in Tamayoa, the shape of the entire teeth, especially the outer ones, is closer to those in the Streptaxidae, and the comparatively small number of teeth in each transverse row is also a distinctive character. This dentition certainly has little in common with that of *Sophina*, as figured by Stoliczka (1871; Jour. As. Soc. Bengal, XL-2, fig. xix-4). As at least the Aroa locality was some distance from cultivated ground, I believe that Tamayoa is probably an indigenous group. It is possibly distantly related to *Guestieria*, as that genus is also said to have multicuspoid inner laterals (1878; Bull. Soc. Zool. France, p. 113, fig. 6).

Tamayoa trinitaria trinitaria (Smith)

Sophina trinitaria E. A. Smith (1898; 27, figs. 3, 4); Port of Spain, Trinidad.

A. N. S. P. lot 105206 is a set of 8 specimens from Cariaquita (Brown), that I am considering as the typical form of this species, on account of the close resemblance of the fauna of this locality to that of Trinidad.

***Rectartemon jessei*, new genus and species⁵**

⁵ Mr. Jesse Williamson, one of the members of the expedition.

Two specimens, from under rocks on heavily forested hillside near the mouth of the first brook, on the left side of Rio Lobaterita, above Estación Táchira (H. I, b, 35); apparently very rare, as considerable time was spent in a search for additional specimens.

Shell of type (fig. xi-A): large, depressed turbinate; heavy; almost white. Whorls: $7\frac{1}{2}$; convexly rounded but scarcely

subangulate; gradually increasing; suture distinct but shallow. Sculpture of last whorl: growth threads prominent, closely-spaced (slightly narrower than their interspaces; about 3 to the mm.), regular and slightly angulate above, lower and much more rounded on the glossy base. Embryonic whorls: $2\frac{3}{4}$, comparatively smooth but with obscure growth wrinkles. Umbilicus: about $\frac{1}{8}$ the major diameter of the shell, but slightly invaded by the expanding columellar reflection of the peristome. Aperture: wider than high, quite deeply invaded by the preceding whorl; rather oblique (about 35°). Peristome: thickened and well reflected, white and polished; incomplete; parietal callus thin, and vague in outline.

	Shell			Aperture		Whorls
	alt.	maj.diam.	min.diam.	alt.	diam.	
Type	19.2	146(28.0)	131(25.1)	57(10.9)	126(13.7)	$7\frac{1}{2}$
Other	16.3	158(25.7)	137(22.3)	64(10.4)	126(13.1)	$6\frac{3}{4}$

The other specimen (fig. xi-B) is considerably smaller, more depressed, and barely subangulate; the smaller number of whorls suggests that it is a shell that was arrested in development. The species appears closest to *Streptaxis tumulus* Pilsbry (1897; P. A. N. S. P., 478), from Brazil, but is slightly more depressed, with deeper suture, broader aperture and considerably more prominent growth threads. It is by far the largest species of the genus yet described from Venezuela. This genus probably includes most of the species of *Artemon* Kobelt (1905), but I choose my own species as genotype, because *Rectartemon* cannot be a substitute for *Artemon*, and the habitat of the type of the preoccupied *Alcidia* is unknown.

The type specimen was obtained alive, but unfortunately the animal was broken in removal from the shell. Mantle of living specimen brownish, thickly stippled with reddish orange. Foot and body very similar in appearance to that of species of *Euglandina*; lateral sides with heavy, impressed reticulations. Lung: relatively broader than in *Scolodonta*, with a similar pulmonary vein, which however gives off transverse veins which are fully as prominent as in the lung of

Euglandina; torn away just below the kidney, which must be very much shorter than in *S. eudiscus*. Uterus (fig. x-55): only the basal portion observed. Spermatheca duct: winds across the uterus and is slightly enlarged just above its entrance into the base of the latter. Penis: long and slender, flattened fusiform; internally with very weak wrinkles; surrounded at its base by a heavy, muscular sheath which is connected by a ligament to the uterus.

Jaw: absent. Salivary gland (only the lower one saved): enormous and similar to that in *S. eudiscus*; duct enters at the side of the oesophagus in the angle between the latter and the pharynx. Stomach: thin-walled; opens, through the narrow oesophagus, into the pharynx, just opposite the anterior end of the radular cartilage. Radular pouch: large, cylindrical, with very heavy walls. Radular cartilage: long and slender, trough-shaped, with anterior end slightly expanded; the ribbon fits into the trough and has two, large retractor muscles which attach, at a little less than one half the distance from the posterior end, to form a muscular sheath for the anterior portion of the radula. Radular formula (fig. x-56): 26-1-26; transverse rows (87 counted) chevron-shaped; entire ribbon long and slender. Central: with a single, raised, aculeate cusp and a thin, slightly asymmetrical, oval base. Laterals: increase gradually in size out to about the 7th, beyond which they decrease until the outermost tooth is smaller than the central; free blades heavy and aculeate, each becoming proportionately longer from the first lateral outward; enlargement at the anterior end of each base (homologous with the handle-like bases in *Happia* and *Scolodontia*) small and knob-like; anterior ends slightly expanded, each with an obliquely transverse area of attachment.

Rectartemon conoideus (Pfr.)

Streptaxis conoidea Pfr. (1854; P. Z. S., 149); Malacca (*sic*); Martens (1873; 166, fig. ii-2); Caracas.

Rectartemon costulosus (Pfr.)

Helix costulosa Pfr. (1852; P. Z. S., 136; Chemn. II, figs. clxi, 29-31); Solomon Islands (*sic*). *Streptaxis costulosus* Kobelt (1905; Chemn., 175); Venezuela.

Streptaxis (Odontartemon) glaber normalis Jous.,
and approaching *glaber* Pfr.

S. candeanus von Martens, in part (1873; 165), Caracas. *S. deformis* Mart. (*l. c.*), Caracas, Puerto Cabello (apparently approaching typical *glaber*); Vanatta (1915; 82), Cariaquita. *S. normalis* Jous. (1889; 247, figs. ix, 19-21), San Esteban and Valencia. *S. glaber* Kobelt (1905; 40, figs. li-16, 17), Puerto Cabello.

Seven adults and numerous immature specimens from Rio Macuto (H, I, b, 1), San Esteban (H, V, b, 2), Palma Sola (H, II, b, 20, 22) and Boquerón (H, II, b, 28; L 10.5, 69). This form is quite variable and the peculiar distortion of the spire makes the interpretation of its shape especially difficult. However, as Jousseau pointed out after examination of the type, *Helix deformis* Férussac (Hist.; fig. xxxii, a-1), from the Isle de Goze (?), is certainly quite distinct from any specimens yet cited from northern South America. Examination of the above small series of specimens and the 30 adults in the A. N. S. P., from "Venezuela" (Brown), Caracas (Cocking) and Puerto Cabello (Swift Coll.) shows that two extremes occur: a higher, more globose form which approaches *S. glabra* Pfr. (1849; P. Z. S., 126; Chemn. II, Helix, figs. cxxiv, 4-7) from Demerara, British Guiana, and a more depressed form that I take to be typical *normalis* (text fig. 59). But, I cannot agree with von Martens' decision that these two forms are specifically distinct. The higher specimens from Venezuela (one adult from San Esteban, and one set from Caracas and another labeled "Venezuela" in the A. N. S. P.) resemble those from Trinidad, and are smaller than most specimens from Demerara (three lots in the A. N. S. P.; text fig. 58).

The pallial region of a specimen from Barbados has been figured by Pilsbry (1907; M. C. XIX, fig. lii-5). Jaw absent. Radular formula of a specimen from Rio Macuto (shell, text

fig. 59; radula, fig. x-57): 20-1-20; transverse rows (66 counted) chevron-shaped near the center but recurved at the outer margins; entire ribbon long and slender. Central: small and difficult to detect, with a weak, raised cusp and a very thin, oval (subcircular) base. Inner laterals: somewhat similar to those of *Rectartemon jessei*, but with the anterior portion of each tooth greatly expanded so as to form an oval area for attachment. The teeth increase gradually in length out to about the 5th; beyond this they decrease in size and become more slender, until the outermost ones are but little larger than the central and lack the peculiar enlargement of the anterior portion. As in most Streptaxidae, the free blade becomes relatively longer in the series, from the 1st lateral outwards.

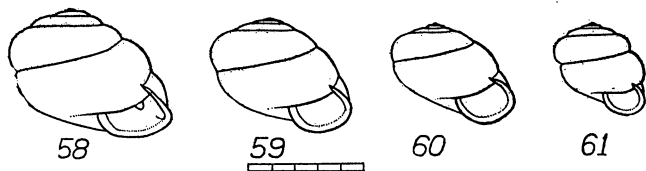


FIG. 58. *Streptaxis glaber glaber*. Shell ($5\frac{3}{4}$ whorls) from Demerara (A. N. S. P. 23745).

FIG. 59. *Streptaxis glaber normalis*. Shell ($5\frac{1}{2}$ whorls) from Rio Macuto, Ven. (H, I, b, 1).

FIG. 60. *Streptaxis glaber aroae*. Type ($5\frac{1}{4}$ whorls) from near Aroa (H, I, b, 23).

FIG. 61. *Streptaxis candei*. Shell ($5\frac{1}{2}$ whorls) from Baranguilla (Baranguilla), Colombia (A. N. S. P. 23751).

***Streptaxis (Odontartemon) glaber aroae*,**
new subspecies

Eleven adults from along a quebrada near Aroa (H, I, b, 23; type locality) and from Banco Largo near Bejuma (H, I, b, 7). A lot of five specimens in the A. N. S. P. (no. 23748), labeled Venezuela (Tate) also appear to be this form, while two specimens from Caracas closely approach it. This subspecies (text fig. 60) is considerably smaller than *normalis*,

and is usually even more excentrically depressed although with slightly more prominent apex. All of my specimens lack the parietal tooth. In size, *S. glaber aroae* approaches *Helix candei* Petit (1842; Rev. Zool., 177), from Cartagena, Colombia. Although the original description of this last species is rather vague, both it and the type locality indicate that *Streptaxis candei* is the same as *S. gibbosa* Pfr. (1859; Mon. IV, 330), from Baranguilla (Barranquilla), Colombia. Numerous specimens in the A. N. S. P. from this last locality show that *S. candei* (text fig. 61) is not the *S. candeanus* of most authors, although *S. candeana* Pfr. (1842; Symb., 109) is a substitute for *Helix candei*, but is smaller, with more globose whorls and more distinctly impressed suture.

Streptaxis funcki (Pfr.)

Helix funcki Pfr. (1847; P. Z. S., 229; Chemn. II, figs. ci-40, 41); Merida (L 8.5, 71).

Streptaxis suturalis von Martens

S. suturalis Mart. (1860; Mal. Bl. VI, 19; 1873; fig. ii-3); Merida?

The actual occurrence of these two species in Venezuela would appear to require verification.

OLEACINIDAE

Streptostyla (*Chersomitra*) *subcallosa* (Pfr.)

Spiraxis subcallosa Pfr. (1855; P. Z. S., 99), Venezuela (*sic*).

Probably an error in locality.

Euglandina truncata (Gmelin)

Bulla truncata Gmelin (1790; Syst. Nat. XIII, 3434); type locality unknown. *Glandina subvaricosa* Albers (1854; Mal. Bl. I, 220); Venezuela. *Euglandina truncata* Pils. (1907; 177, figs. xxi-4, 10-12), near "Yueacas" (Tucacas; L 11, 68.5) and woods of "Arva" (Aroa).

Eighteen specimens from the forest around Palma Sola (H, II, b, 20), near Aroa (H, I, b, 23), and in the Cerritos de Yumarito (H, II, b, 28) near Boquerón. Apparently widely

distributed in the Aroa River valley, this species shows a preference for the drier portions of the evergreen forest and the borders of the semi-deciduous type. The eggs are laid in clusters of four or five, buried in the leaf humus.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
H, II, 20, largest.....	62.0	40(24.8)	38(23.3)	47(29.1)	54(15.6)	7
H, I, 23, largest.....	56.9	39(22.4)	37(20.8)	48(27.4)	46(12.5)	6¾
H, II, 28, largest.....	54.9	43(23.7)	41(22.3)	51(27.8)	53(14.6)	6¾

Euglandina venezuelensis (Preston)

Glandina venezuelensis Preston (1909; Ann. Mag. N. H., 508, fig. 10), Merida.

I suspect that this is a subspecies of *E. truncata*, but have seen no specimens. From the figure, which evidently represents a shell with the basal portion of the peristome broken away, *E. venezuelensis* is a very slightly more slender, sub-acuminate shell, with the columellar wall of the peristome a little longer and somewhat straighter. The spiral striae also appear to be somewhat more prominent. Some of my specimens, especially that from Aroa, slightly approach this form.

Euglandina swifti Pilsbry

E. swifti Pils. (1907; 178, figs. xxi, 1-3), mountains near Coro (L 11.5, 69.5).

Apparently allied to *E. truncata*, this species is much more slender and has very heavy growth sculpture.

Euglandina plicatula cinnamomeofusca (Tryon)

Oleacina plicatula cinnamomeo-fusca Tryon (1885; M. C. I, 37), Cumbres between Puerto Cabello and Valencia (type locality); Chino, near San Felipe (L 10.5, 69); Caracas.

I did not find this shell at San Esteban, and suspect that it comes from higher altitudes (cloud forest?) than those collected (less than 1,000 meters).

Euglandina cumingii (Beck)

Glandina cumingii Beck (1837; 78), Central America; von Martens 1891; B. C. A., 59, fig. iv-7, var "flavida." *Achatina petiti* Deshayes (Hist. II, 175, fig. cxxii, 12-14), Nicaragua.

Seven specimens from the mouth of Quebrada Uracá near Estación Táchira (H, II, b, 37), and from the lowland forest at La Fría (H, II, b, 40) Quebrada La Fría (41) and Quebrada Santa Aguita (42). These specimens (figs. xi-C, D) are quite similar to those from Panama and Colombia, which usually have less globose whorls, shallower sutures and straighter columellae than do those from the more northern localities (typical *cumingii*). *A. petiti* represents a shell with straighter columella but with almost as globose whorls as the typical form. My shells have a slightly stronger, rounded columellar swelling than is usual in *E. cumingii*, and in this feature somewhat approach *Achatina ornata* Pfr. (1846; Zeit. Mal. III, 117) from Quendeu (Quindío?) Mountains, Colombia, but they lack the shouldered last whorl of that species. *Euglandina striata* (Müller) may also occur in Venezuela, as it has been reported from both Guiana and Colombia; this last species also has a quite straight columella but the spiral swelling is obsolete and the entire shell is more slender and sub-acuminate.

	Shell			Aperture		Whorls
	alt.	maj. diam.	min. diam.	alt.	diam.	
H, II, 40, largest.....	46.8	44(20.6)	41(19.0)	51(23.8)	47(11.1)	6½
H, II, 41, largest.....	49.6	46(22.6)	43(21.2)	52(25.7)	44(11.4)	6¾
H, II, 42, largest.....	50.7	42(21.4)	40(20.3)	50(25.1)	45(11.2)	6¾

Euglandina assimilis (Reeve)

Achatina assimilis Reeve. (1849; C. I., fig. xv-67), habitat unknown.
Oleacina assimilis Tryon (1885; 24), Venezuela.

The type locality of this small, very smooth species is unknown and I cannot ascertain Tryon's basis for its citation from Venezuela.

	Shell			Aperture		Whorls
	alt.	maj. diam.	alt.	diam.		
Pfr. (1853; Mon. III, 508).....	20	45(9)	52(10.5)	20(4)	5½	

APPENDIX

Since the publication of Part II a single specimen of *Lucidella venezuelensis* (1923, 21) has turned up in a vial of small shells, from near Aroa (H, I, b, 23), and adds another locality for this species. In the British Guiana collection are three specimens of *Poteria* (*Neocyclotus*) *translucida trinitensis* (Guppy) and a set of *Oligyra* (*Alcacia*) *sericea sericea* (Drouet) from near Dunoon. The last species, like *O. riparia tachirensis* (1923; 13), has both brown and greenish-yellow color forms.

DESCRIPTION OF PLATES AND TEXT FIGURES

All drawings are made with the aid of the camera lucida. The scales for the figures of shells are divided into units of one millimeter, while those of the radular figures are marked off into subdivisions which indicate lengths of 10 microns (.01 mm.). In the figures of radulae, the teeth are simply oriented in regard to the long axis of the entire ribbon, and are not shown in their usual relations to each other, unless specifically stated otherwise in the keys. Plates I to V, and figures 1 to 21 were published with Parts I and II.

PLATE VI

FIG. 22. *Omalonyx felina*. Shell from Laguna de Ramón Coronel (H, XII, 9).

FIG. 23. *Radiodiscus ditzleri*. Type shell, from Quebrada La Fría (H, V, b, 41). Only the coarser sculpture shown; lateral view.

FIG. 24. *Euconulus ernsti*. Largest shell, from Banco Largo (H, I, b, 7), near Bejuma. Lateral view; same scale as fig. 25.

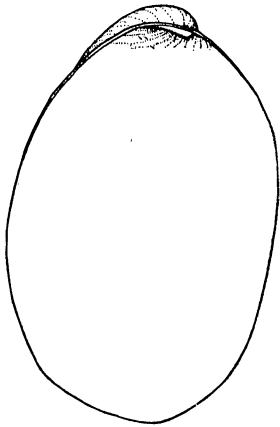
FIG. 25. *Euconulus (Pseudoguppya) cassiquinensis*. Largest shell, from near Dunoan, British Guiana. Same scale as fig. 24.

FIG. 26. *Pseudohyalina lobaterita*. Type shell, from near Estación Táchira (H, I, b, 38). Lateral and apical views.

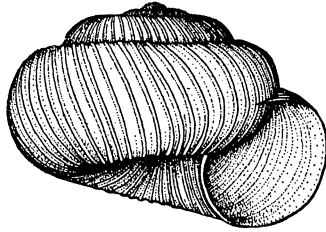
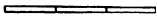
FIG. 27. *Happia (Happiella) mediocris*. Large shell, from Caracas (A. N. S. P. 48791). Lateral and apical views; same scale as fig. 28.

FIG. 28. *Happia (Happiella) guildingi*. Largest shell among paratypes, from San Esteban (A. N. S. P. 48788). Lateral and apical views; same scale as fig. 27.

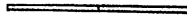
FIG. 29. *Drepanostomella ammonoceras*. Largest shell, from near Estación Táchira (H, I, b, 35). Lateral and apical views.



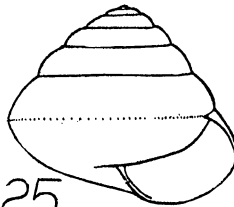
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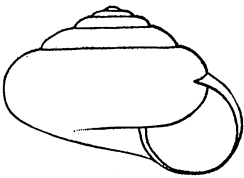
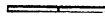
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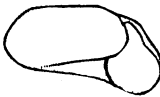
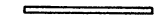
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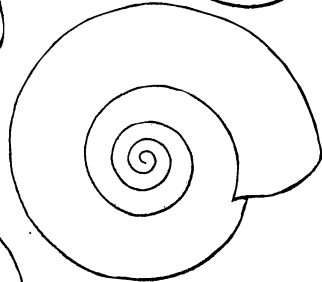
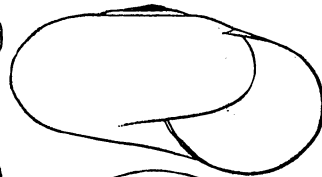
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PLATE VII

FIG. 30. *Radiodiscus bactricolus*. Radula of an almost mature specimen, from Quebrada La Fría, Venezuela (H, V, b, 41). Central and 1st lateral shown in usual relation to each other; 5th, 7th, 9th and 14th teeth.

FIG. 31. *Euconulus (Pseudoguppya) cassiquiensis*. Radula of shell in fig. 25, from near Dunaan, British Guiana. Central and 1st lateral shown in usual relation; 7th, 12th, 13th (the last two in usual relation), and 21st teeth. The hair line above the scale represents the shape of a transverse row.

FIG. 32. *Zophos concolor*. Radula, from Porto Rico, mounted by Dr. Pilsbry. Left and right 1st laterals, shown in relation; 7th, 14th, 21st and 34th (outermost) teeth. The 7th tooth is figured as viewed directly from above; the others are tilted inwards. Shape of a transverse row shown at the right.

FIG. 33. *Happia (Happiella) guildingi*. Radula, from near San Esteban (H, I, b, 7). Central and both 1st laterals, shown slightly pressed apart but otherwise in usual relations; 7th, 14th, 21st, 35th, 52nd and 70th teeth. The left 1st lateral is drawn as viewed from above; the other teeth are tilted inwards. Shape of transverse row indicated at the right, above the scale.

FIG. 34. *Drepanostomella ammonoceras*. Radula, from Estación Táchira (H, I, b, 35). Central and 1st lateral slightly pressed apart but otherwise as usually seen; 3rd, 7th and 10th teeth. The 3rd is viewed from above; the others are tilted inwards. Shape of the transverse row intermediate between that of *Zophos* and that of *Happia*, but more like the latter.

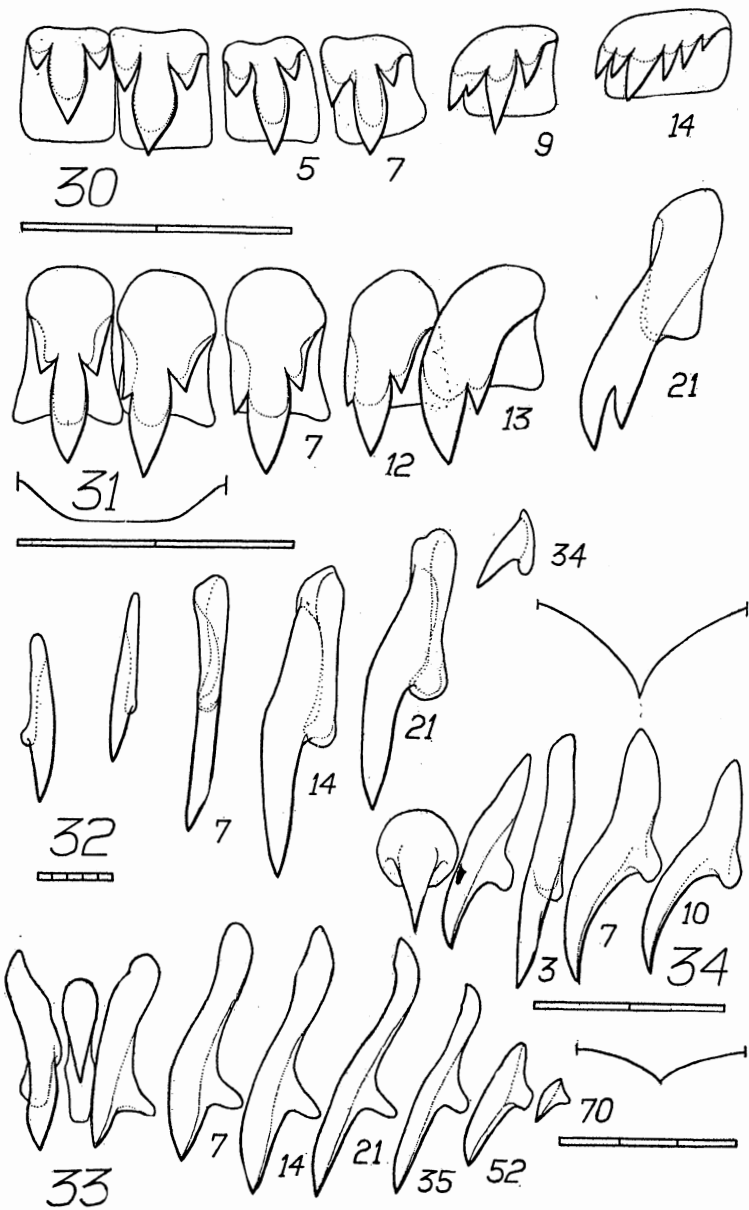


PLATE VIII

FIG. 35. *Drepanostomella ammonoceras*. Same shell as fig. 29. Sector, one whorl from apex, with four of the nine spiral rows of papillae. Inner sutural line at top, outer at bottom. Magnification can be judged from fig. 29.

FIG. 36. *Drepanostomella excisa*. Topotype, from Santa Ana, New Granada (A. N. S. P. 23774). Sector, one whorl from apex, with two of the eleven, scalloped, spiral ridges. Arrangement and magnification similar to fig. 35.

FIG. 37. *Drepanostomella excisa*. Same shell and magnification as fig. 36. Portion of exterior surface of 3rd whorl just below the suture (the upper line), to show the peculiar, spirally arranged projections on the epidermal, growth ribs.

FIG. 38. *Scolodonta (Punctodiscops) punctata*. Same shell as fig. 39. Sector, $1\frac{1}{4}$ whorls from apex, with six of the nineteen spiral rows of papillae. Arrangement as in fig. 35.

FIG. 39. *Scolodonta (Punctodiscops) punctata*. Type shell, from Quebrada La Fría (H, V, b, 41). Lateral and apical views.

FIG. 40. *Scolodonta (Systrophiella) starkei*. Type shell, from near San Esteban (A. N. S. P. 8868). Lateral, apical and basal views.

FIG. 41. *Scolodonta (Systrophiella) viridis*. Type shell, from near Palma Sola (H, II, b, 20). Lateral and basal views. Same scale as figs. 42 and 43.

FIG. 42. *Scolodonta (Systrophiella) eudiscus lobaterita*. Type shell, from near Estación Táchira (H, II, b, 35). Lateral view; same scale as figs. 41 and 43.

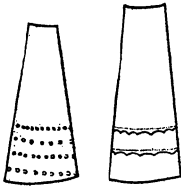
FIG. 43. *Scolodonta (Systrophiella) eudiscus eudiscus*. Type shell, from La Fría (H, II, b, 40). Lateral and apical views. Same scale as figs. 41 and 42.

FIG. 44. *Miradiscops variolata*. Same shell as fig. 45. Sector, one whorl from apex, with a portion of the minute pits which are characteristic of the embryonic whorls. Same arrangement as fig. 35.

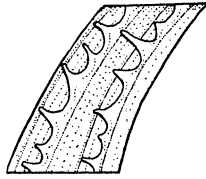
FIG. 45. *Miradiscops variolata*. Type shell, from Quebrada La Fría (H, V, b, 41). Apical and lateral views.

FIG. 46. *Miradiscops variolata*. Same shell as fig. 45; same arrangement as fig. 37. Portion of exterior surface of last whorl, just below the suture, to show irregular, oval pits between the growth lines.

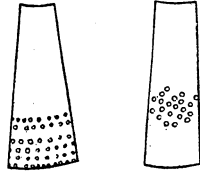
FIG. 47. *Tamayoia trinitaria venezuelensis*. Paratype, from Quebrada La Fría (H, V, b, 41). Umbilical region, to show carina entering umbilicus.



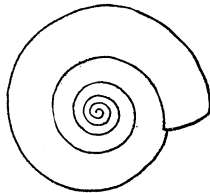
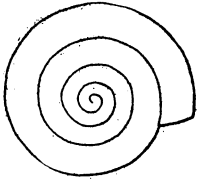
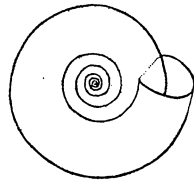
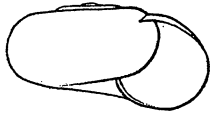
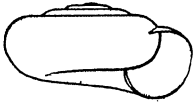
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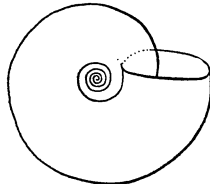
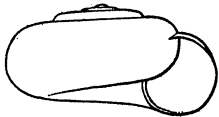
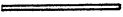


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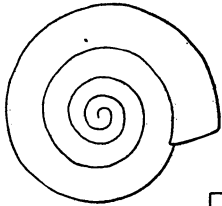
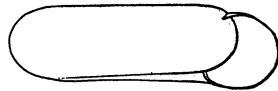
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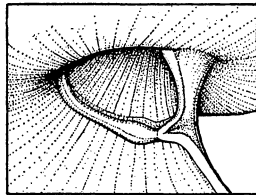
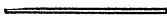


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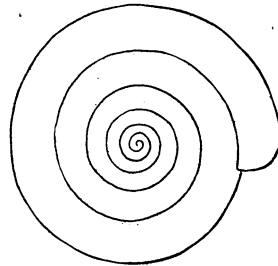
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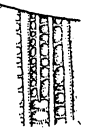
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PLATE IX

FIG. 48. *Scolodonta (Systrophiella) starkei*. Radula of a large specimen, from "Puerto Cabello." Central, left and right 1st laterals, and right 2nd tooth, shown in usual relations to each other except for considerable laterad separation of the last two; 7th, 14th, 21st and 28th teeth. Left 1st lateral and central as viewed from above, the others tilted inwards. Shape of a transverse row indicated to the right of the scale.

FIG. 49. *Scolodonta (Systrophiella) viridis*. Radula of a paratype, from Palma Sola (H, II, b, 20). Central and left and right 1st laterals and right 2nd tooth, shown as usually seen except for slight laterad separation of the last, which is figured as viewed directly from above, and the inward tilt of the left 1st lateral. Same scale as next figure; also similar shape of transverse row.

FIG. 50. *Scolodonta (Systrophiella) eudiscus lobaterita*. Radula of a paratype, from near Estación Táchira (H, II, b, 35). Central, 1st lateral and 2nd tooth shown as usually seen except for slight laterad separation; 7th, 14th, 20th and 22nd (outermost) teeth. All laterals, with the exception of the 1st, are tilted inwards. The shape of a transverse row is indicated under the 22nd tooth.

FIG. 51. *Miradiscops variolata*. Radula of a paratype, from Quebrada La Fría (H, V, b, 41). Left and right 1st laterals, tilted inwards, but otherwise in usual relation to each other.

FIG. 52. *Tamayoa trinitaria venezuelensis*. Radula of largest cotype, from Quebrada La Fría (H, V, b, 41). Central and 1st lateral, in usual position except for slight laterad separation; both figured as viewed directly from above. 7th, 13th and 28th teeth, all tilted inwards. Hair-line under right end of figures shows the shape of a transverse row.

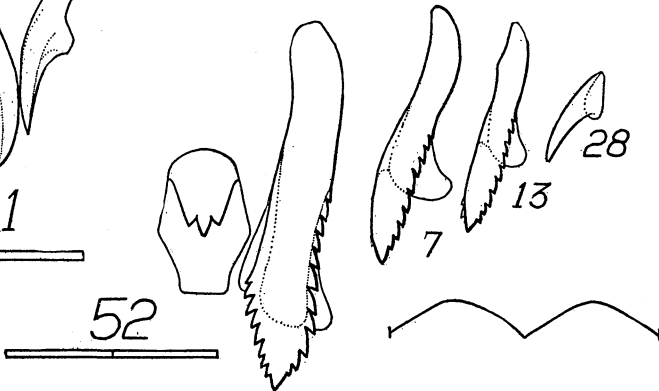
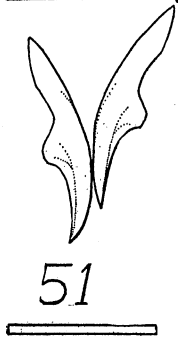
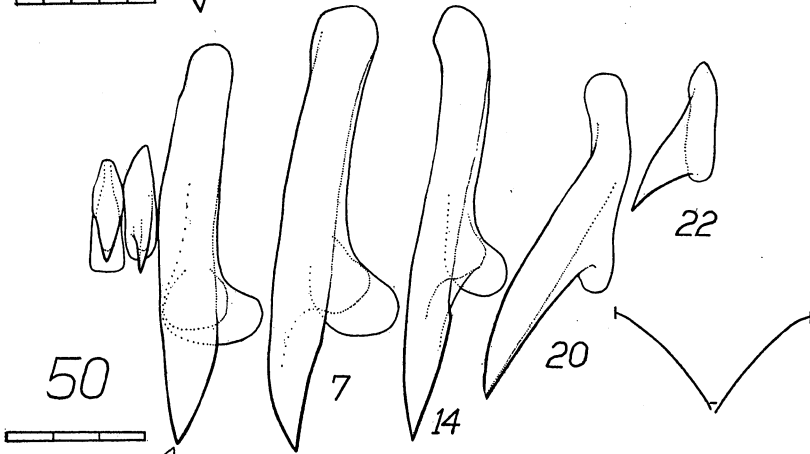
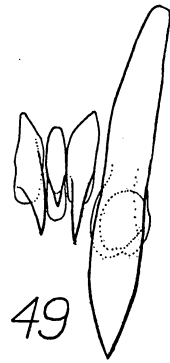
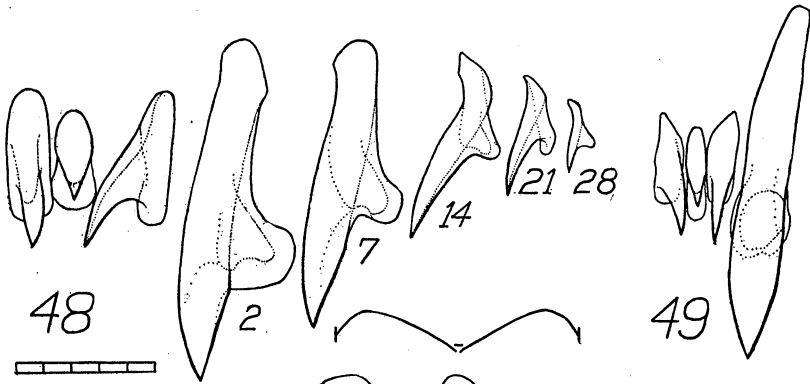


PLATE X

FIG. 53. *Scolodonta (Sytrophiella) eudiscus eudiscus*. Internal view of pallial region, of a large specimen from Quebrada La Fría (H, V, b, 41). The scale is divided into units of one millimeter.

FIG. 54. *Scolodonta (Sytrophiella) eudiscus eudiscus*. Genital systems of the same specimen as fig. 53, under similar magnification. Cross-sections of the penis were made at A and B, and the drawings are labeled with these same letters.

FIG. 55. *Rectartemon jessei*. Basal portions of genital systems, from type specimen, collected near Rio Lobaterita (H, I, b, 35). Only the base of the uterus and the spermatheca are shown. Note the large sheath around the base of the penis; the position of the latter, inside this, is indicated by the broken lines. Cross-sections of the base of the uterus and of two regions of the penis are shown opposite the places where they were made.

FIG. 56. *Rectartemon jessei*. Radula of type specimen. Central and 1st lateral, separated laterad, but otherwise in usual relation to each other; 3rd, 7th, 14th and 21st teeth. The 7th tooth is most tilted inward; the 3rd least. The shape of a transverse row is indicated below the scale.

FIG. 57. *Streptaxis (Odontartemon) glaber normalis*. Radula of a dried specimen (text fig. 59) from Rio Macuto, near La Guaira (H, I, b, 1). Central (also tip of next one anterior) and 1st lateral shown in usual position; 3rd, 7th and 14th teeth. The 1st and 7th are tilted inwards more than are the 3rd and 14th. The shape of half of a transverse row is represented in the lower right hand corner, above the scale.

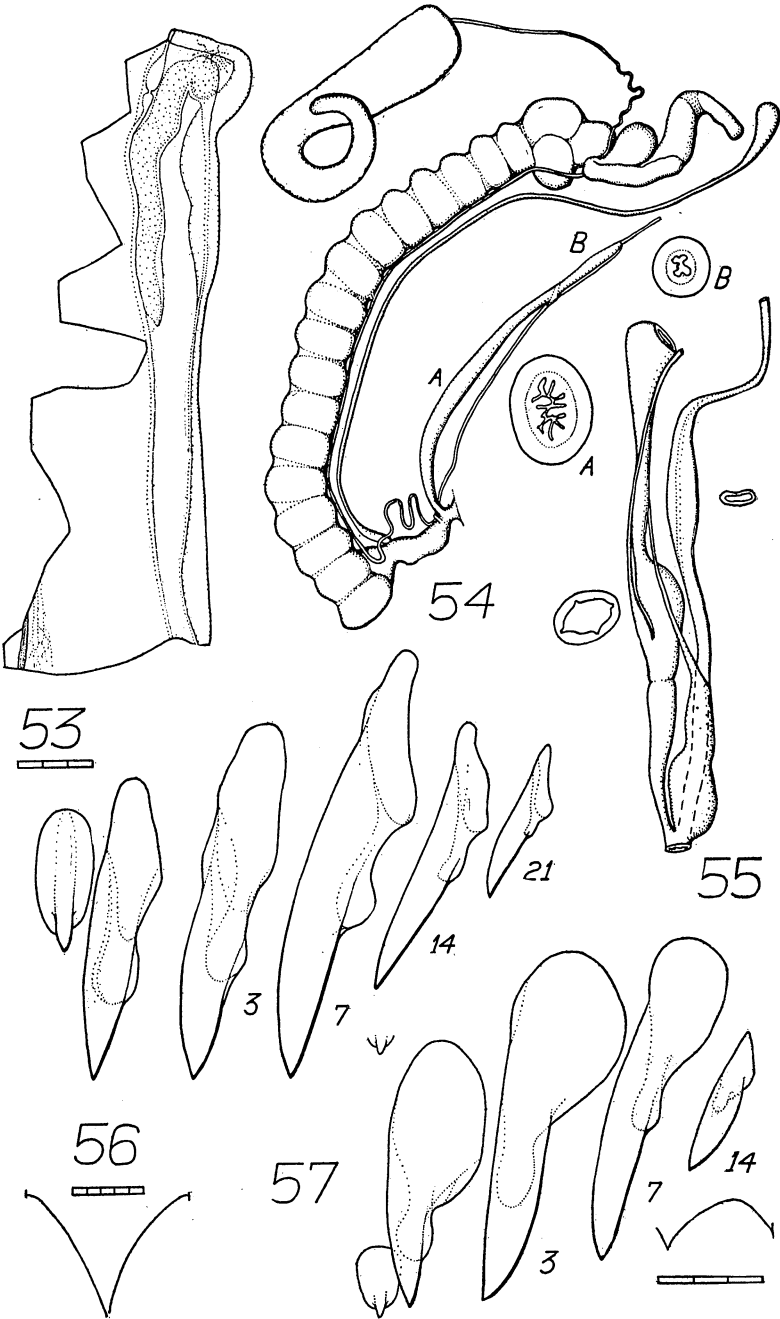


PLATE XI

FIG. A. *Rectartemon jessei*. Lateral view of type specimen, from near Rio Lobaterita (H, I, b, 35).

FIG. B. *Rectartemon jessei*. Lateral view of, the other specimen, from the same locality.

FIG. C. *Euglandina cumingii*. Lateral view of largest specimen from La Fría (H, II, b, 40).

FIG. D. *Euglandina cumingii*. Lateral view of largest specimen from Quebrada Santa Aguita (H, II, b, 42).

