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**THE LAND AND FRESHWATER SNAILS OF
CAMPECHE**

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THE LAND AND FRESHWATER SNAILS OF CAMPECHE

FRED G. THOMPSON¹

SYNOPSIS.—This review of the land and freshwater snails of Campeche, Mexico, records 59 species and subspecies of snails including 47 terrestrial and 12 aquatic forms; 21 are recorded for the first time from the state. *Miradiscops haplocochlion* is described as new; 11 previously recognized taxa are placed in synonymy.

Streptostyla, subgenus *Chersomitra*, is redefined and the soft anatomy of its type species *S. nigricans* (Pfeiffer) is described for the first time. *Brachypodella dubia* (Pilsbry) is resurrected as a species and distinguished from *B. speluncae* (Pfeiffer). New descriptions are given for both these species and for *Choanopoma andrewsae* (Ancey). Material from adjacent states pertaining to Campeche species is also included.

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INTRODUCTION

This study is based primarily upon material the author collected from 24 field stations in Campeche during June 1965, and includes material he collected from adjacent states that add noteworthy distribution records for Campeche species. This study also considers extra-limital species that affect the systematics of Campeche forms.

Campeche is a large state of 50,952 square kilometers in the Yucatan Peninsula. The western third is part of the extensive Eastern Tabasco-Campeche Alluvial Plain; the remainder is formed of low, rolling karst hills. The state is nearly uniform in its physiography, and elevations vary from sea level to about 350 meters. The only prominent topographic feature is a short spur of the Sierrita de Tikul, which rises about 100 meters above the surrounding countryside in the northern corner of the state (West, 1964: 70-73). The karst development allows few permanent bodies of water except in the western alluvial region. Those that do exist are generally inaccessible. A climatic transition from northwest to southeast is reflected in the gradual change from the xeric vegetation along the coast to quasi-rain forest (Wagner, 1964: 228). For purposes of this study the wet forests are simply referred to as rain forest.

Terrestrial mollusks have been collected primarily from the karst regions of the state. Very little material is known from the wetter alluvial plains, except for a collection Morelet made at Palizada in 1852. Therefore most papers pertaining to Campeche (including this one) are ecologically biased in their coverage.

No comprehensive report has been made previously on the land and freshwater snails of Campeche. All early records for the state appeared as miscellaneous inclusions in various monographs and faunal reviews. Bequaert and Clench (1933, 1936) summarized what little was known then and reported a few additions. More recently Branson and McCoy (1963, 1965) reported on small amounts of material collected incidental to other studies. Considering the fragmentary and varied nature of previous contributions, a surprisingly large number of species have been reported.

Currently 59 species and subspecies of land and freshwater snails are known from Campeche. Previous workers have reported 47 forms from the state; 5 of these are of doubtful occurrence in Campeche and 4 are synonyms of other forms. Material that I collected includes 40 species and subspecies, 21 of which are new records for the state.

The following land snails recorded from Campeche are considered of doubtful occurrence:

Neocyclotus dysoni aureus (Bartsch and Morrison)

Catinella avara (Say)¹

Euglandina ghiesbreghti (Pfeiffer)

Euglandina sowerbyana (Pfeiffer)

Polygyra oppilata (Morelet)

The following four named forms recorded from Campeche are now considered synonyms:

Streptostyla maslini Branson and McCoy (= *S. meridana*)

Streptostyla toltecorum Branson and McCoy (= *S. meridana*)

Bulimulus inermis (Morelet) (= *B. unicolor*)

Bulimulus ignavus (Reeve) (= *B. unicolor*)

Most of the material comprising this study is deposited in the Florida State Museum at the University of Florida. Representative specimens are also deposited in the Museo Nacional de Mexico. This material was supplemented by specimens borrowed from other museums. Collecting localities are listed from west to east and from south to north. Records from earlier published reports included in the species accounts appear in parentheses.

For many helpful suggestions and other courtesies that have aided in the completion of this study I am indebted to the following people: Henry van der Schalie and John B. Burch, University of Michigan, Museum of Zoology (UMMZ); Joseph P. E. Morrison, Harold A. Rehder and Joseph Rosewater, United States National Museum (USNM); Tucker Abbott, Academy of Natural Sciences of Philadelphia (ANSP); Wayne King, Florida State Museum, University of Florida (UF). The shell drawings were made by Barbara Weinstein, Miami, Florida. Field material was collected with the aid of The National Institutes of Health research grant NIGMS - RGB, GM 12300.

GAZETTEER

The following place names in Campeche and Quintana Roo are cited in the text. Yucatécan place names are on most maps and are not included.

CAMPECHE

Campeche.—(19° 50' N, 90° 31' W).

Cayál.—A small village about 27 miles e.s.e. Campeche (19° 45' N, 90° 10' W).

- Champotón.—(19° 21' N, 90° 43' W).
Ciudad de Carmen.—(18° 38' N, 91° 50' W).
Dzibalchén.—(19° 31' N, 89° 45' W).
Edzná.—Mayan ruins about 11 miles s.s.w. of Cayál (19° 35' N, 90° 15' W).
Escárcega.—(18° 36' N, 90° 44' W).
Hopelchén.—(19° 16' N, 89° 52' W).
Ich-Ek.—A small village about 10 miles w.s.w. of Hopelchén (19° 44' N, 89° 58' W).
Palizada.—(18° 15' N, 92° 06' W).
Pixtún.—A small village 18 miles south of Champotón (19° 06' N, 90° 43' W).
San Geronimo.—(18° 35' N, 92° 40' W).
Seybaplaya.—(19° 38' N, 90° 39' W).
Silvituc.—(18° 42' N, 90° 16' W).
Tenabo.—(20° 03' N, 90° 12' W).
Tikinmúl.—A small village about 23 miles e.s.e. Campeche (19° 46' N, 90° 13' W).
Xpujil.—A small village about 4 miles west of the Quintana Roo border on road from Escárcega to Chetumál, Quintana Roo (18° 29' N, 89° 24' W).

QUINTANA ROO

- Xiatil.—A small village on the road from Peto, Yucatan to Felipe Carrillo Puerto, Quintana Roo (19° 40' N, 88° 26' W).

ANNOTATED LIST

POMATIDAE

Choanopoma largillierti (Pfeiffer)

CAMPECHE: 10.2 mi. e. Escárcega; 7.2 mi. s. Pixtún; 2.2 mi. s. Pixtún; 0.9 mi. s.w. Champotón; 6.1 mi. s.w. Seybaplaya; 6.2 mi. n.e. Seybaplaya; 7.1 mi. s.w. Campeche; 5.7 mi. e. Campeche; (Champotón, Branson and McCoy, 1965: 13); (Campeche, Solem, 1961: 200); (5-11 mi. e. Campeche; 32 mi. e. Campeche, Branson and McCoy, 1963: 104); 8.4 mi. w. Ich-Ek; Edzná; 5.1 mi. n.n.w. Dzibalchén; 6.0 mi. n. Dzibalchén; 4.3 mi. n. Tenabo; 16.8 mi. s. Tenabo; 3.4 mi. s. Cayál; 3.6 mi. s. Hopelchén; 5.1 mi. w. Tikinmúl.

This is the land snail most commonly encountered in Campeche, abundant in xeric and mesic forests and in agrarian habitats as well.

The material varies greatly in sculpture and size, and both characters vary independently. This variation is geographical and not ecological. I agree with Solem (1961: 201) and Branson and McCoy (1963: 104) that *C. grateloupi* (Pfeiffer) is not distinct from *C. largillierti*.

Choanopoma gaigei Bequaert and Clench

CAMPECHE: 19.2 mi. e. Silvituc; (Champotón; 29.7 mi. s. Campeche, Branson and McCoy, 1965: 13); (5-11 mi. e. Campeche, Branson and McCoy, 1963: 104); 5.7 mi. e. Campeche; 3.4 mi. e. Cayál; 5.1 mi. n.n.w. Dzibalchén; 6.0 mi. n. Dzibalchén; 3.6 mi. s. Hopelchén; 5.1 mi. w. Tikinmúl.

GUATEMALA (DEPT. PETEN): 1 mi. n.w. Pasco Caballo (UMMZ 64768); 4 mi. n. Paso Caballa (UMMZ 64769). After examining the material, I consider Solem's (1961: 197) criticism of these records (Goodrich and van der Schalie, 1937: 32) unwarranted.

This species is found in mesic and submesic forested areas, and apparently is less tolerant of the drier conditions under which *C. largillierti* thrives. *C. gaigei* also shows less tolerance to agrarian disturbances than does *C. largillierti*. I found it only in forests that had not been recently disturbed.

Choanopoma andrewsae (Ancey)

(fig. 6, A-B)

Cyclostoma andrewsae Ancey, 1886; Ann. Malac., 2: 251-252.

Choanopoma andrewsae (Ancey), Martens, 1890; Biol. Cent. Amer., Moll.:16; pl. 1, fig. 4. — Solem, 1961; Arch. Moll., 90:199; pl. 10, fig. 9; pl. 12, fig. 24h.

Choanopoma cozumelense Richards, 1937; Proc. Amer. Phil. Soc., 77: 256; pl. 4, fig. 3. — Solem, 1961; Arch. Moll., 90: 198; pl. 10, fig. 7; pl. 12, fig. 24g.

Choanopoma andrewsae roatanense Richards, 1938; Proc. Amer. Phil. Soc., 79: 174; pl. 3, figs. 1, 7. — Solem, 1961; Arch. Moll., 90: 200; pl. 10, fig. 10; pl. 12, fig. 24i.

HONDURAS: Utilla Island (Univ. Miami, ex Simpson).

CAMPECHE: 5.1 mi. n.n.w. Dzibalchén; 3.6 mi. s. Hopelchén; 3.4 mi. s. Cayál.

QUINTANA ROO: 4.0 mi. e. Xpujil, Campeche; 7.1 mi. n.n.w. Xiatil; 2.3 mi. s.s.e. Xiatil; San Sabastian, Cozumel Island.

YUCATAN: 0.8 mi. n.e. Becanchén; 10.0 mi. n.e. Becanchén; Chichen Itza (6 paratypes of *Choanopoma gaigei* Bequaert and Clench, UMMZ).

SHELL. Medium sized. Ovate-conical, 0.69-0.82 times as wide as long (females, 0.69-0.77; males, 0.75-0.82). Dull light brown with about 10-12 faint, broken, dark spiral bands or rows of spots which

may be indistinct on old shells. Outer lip and aperture same color as rest of shell. Early whorls slightly darker. Decollate, 2.8-3.5 whorls remaining (females, 3.0-3.5; males, 2.8-3.1); 2 embryonic whorls lost from decollate shells. Apical plug sloping, dorsally flattened, about $\frac{1}{8}$ whorl long, purplish. Suture deeply impressed. Whorls broadly inflated, evenly rounded, not shouldered. Umbilicus transversely oblong due to lateral displacement of aperture; about $\frac{1}{8}$ - $\frac{1}{10}$ diameter of last whorl. Aperture adnate to preceding whorl; 0.40-0.49 times length of shell (females, 0.40-0.46; males, 0.45-0.49); broadly ovate, 1.00-1.09 times as high as wide. Inner lip projecting forward slightly. Outer lip narrow, of nearly uniform width around aperture; 0.3-0.5 mm. wide or about $\frac{1}{10}$ - $\frac{1}{15}$ width of aperture. Upper corner of outer lip vertical and slightly wider than elsewhere. Outer lip weakly reflected forward over parietal wall. Sculpture consisting of predominant axial ribs and very low, broad spiral chords that are most evident by the wavy appearance that they impart on the ribs, which are raised and slightly thickened over the chords. Spiral chords most evident about periphery of whorls and in umbilical region. Axial ribs abruptly appearing on postembryonic whorls. Initially ribs are widely spaced and high, but become progressively closer and finer along spire; ribs finest and closest behind lip. About 10-12 ribs/mm. on face of last whorl in mature females, 7-8/mm. in mature males. Upper ends of ribs weakly crenulate along suture. Ribs continuous into umbilicus as sharp threads. Two embryonic whorls, when present, elevated and smooth.

Operculum consisting of about 3.5 whorls. Basal chondroid plate convex. Calcareous lamella broadly reflected over face of chondroid plate, with its outer edges fused with succeeding turns to form a flat continuous calcareous plate that completely covers chondroid plate. Occasionally in specimens from Cozumel Island some turns of the lamella may fail to fuse and leave a short, narrow gap between adjacent whorls. Operculum not retractable into adult shell because of wide calcareous face plate.

Measurements of mainland females: length, 9.2-11.3 mm.; width, 6.8-8.1 mm.; aperture height, 4.0-4.8 mm.; aperture width, 3.9-4.5 mm.

Measurements of mainland males: length, 7.6-8.1 mm.; width, 5.7-6.4 mm.; aperture height, 3.6-3.8 mm.; aperture width, 3.2-3.6 mm.

Measurements for the various insular forms are given by Solem (1961). My measurements of length and width do not include the

outer peristome. The distinction in size between females and males is not so discrete as the measurements suggest. A few unsexable dead shells whose measurements are not included fall within the intermediate ranges.

This is a widely distributed and variable species. Insular specimens tend to be smaller than those from the mainland, but differences of size and proportions are not constant, even within single populations. The forms from Cozumel Island (*cozumelense*) and the mainland tend to have distinct spiral chords below the suture, while the forms from the Bay of Honduras (*andrewsae* and *roatanense*) usually lack subsutural chords although spiral chords are usually present in the umbilical region. The differences between the named varieties are too slight and variable to justify recognition.

Solem (1961) recognizes the similarities between *andrewsae* and *cozumelense* but contends that the forms are specifically distinct, and that the similarities are the independent result of convergent evolution from different mainland species. He postulates that *andrewsae* evolved from *C. pleurophora* (Pfeiffer) and that *cozumelense* evolved from *C. martensianum* (Pilsbry). These assumptions were partially influenced by his lack of *andrewsae* material from the mainland. The wide distribution and variation of *andrewsae* on the mainland render untenable his theories on the evolution and relationship of these forms.

C. andrewsae occurs in mesic and submesic tropical forests. It may be found with *C. largillierti* and *C. gaigei*, although the three species are ecologically segregated. *C. andrewsae* inhabits loose rock piles at a relatively deep level where it is constantly damp and cool. *C. largillierti* also occurs in rock piles as well as under scattered rocks, but usually remains beneath the surface layer of rocks where it is relatively dry. *C. gaigei* occurs in leaf mold and debris on the forest floor, but never under rocks even though it may be found within a few inches of the other two species.

CYCLOPHORIDAE

Neocyclotus dysoni (Pfeiffer)

CAMPECHE: 0.9 mi. s.w. Champotón; 6.1 mi. s.w. Seybaplaya; 8.4 mi. w. Ich-Ek; 7.1 mi. s.w. Campeche; 3.4 mi. s. Cayál; 3.6 mi. s. Hopelchén.

QUINTANA ROO: 2.3 mi. s.s.e. Xiatil.

Specimens from these localities are intermediate between *N. d. berendti* and *N. d. cooki*, and also show intergradation with *N. d. ambiguum*. The three subspecies are distinguished on the basis of color and sculpture. *N. d. berendti* is dark olivaceous brown or green with several light spiral lines, and its sculpture is fine, irregular, and sigmoid but not vermiculated or reticulated. *N. d. cooki* and *N. d. ambiguum* have light brown unicolored shells with strong anastomosing sculpture. In *N. d. ambiguum* the anastomosing sculpture occurs on the body whorl and the penultimate whorl, whereas in *N. d. cooki* it is confined to the body whorl. The specimens listed above are intermediate between *berendti* and *cooki* in sculpture, but only a few individuals show banding. Some specimens also tend to have anastomosing sculpture on the penultimate whorls, indicating intergradation with *ambiguum*. Specimens from 5-11 mi. e. Campeche Branson and McCoy (1963: 103) recorded as *N. d. aureus* (Bartsch and Morrison) of the Pacific drainage of Oaxaco probably are referable to these intergrading forms.

N. d. berendti is confined to the Yucatan Peninsula where it occurs in the states of Yucatán and adjacent areas of Campeche and Quintana Roo. *N. d. cooki* is generally distributed in the Peten region of Guatemala and adjacent parts of British Honduras, Campeche and Quintana Roo. *N. d. ambiguum* occurs from northern Chiapas and Tabasco north and west to central Veracruz. A series of 56 *ambiguum* specimens in the U.F. from near San Andres Tuxtla, Veracruz shows no intergradation with *berendti* as Solemn (1956: 53) reports.

Neocyclotus d. berendti (Pfeiffer)

CAMPECHE: 5.1 mi. n.n.w. Dzibalchén; (Campeche, von Martens, 1890:5).

QUINTANA ROO: 7.1 mi. n.n.w. Xiatil; 4.0 mi. e. Xpujil, Campeche.

YUCATAN: 0.8 mi. n.e. Becanchén; 10.0 mi. n.e. Becanchén.

Neocyclotus d. cooki (Bartsch and Morrison)

CAMPECHE: 7.2 mi. s. Pixtún; 19.2 mi. e. Silvituc; 10.2 mi. e. Escárcega.

HELICINIDAE

Helicina t. tenuis Pfeiffer

CAMPECHE: 10.2 mi. e. Escárcega.

CHIAPAS: 15.8 mi. n.w. Ocozocoautla, 2700'.

This species is very rare in Campeche. The only specimen collected was a dead shell.

Helicina amoena Pfeiffer

E. von Martens (1890: 28), recorded this species from Campeche from specimens collected by Albers. It has not been recorded from the state since, but may have been overlooked because of its arboreal habits.

Oligyra f. flavida (Menke)

CAMPECHE: 10.2 mi. e. Escárcega.

QUINTANA ROO: 4.0 mi. e. Xpujil, Campeche.

CHIAPAS: ruins of Palenque.

Its known distribution shows this species is apparently restricted to submesic forested areas.

Oligyra arenicola (Morelet)

CAMPECHE: 7.1 mi. s.w. Campeche; 5.7 mi. e. Campeche; 5.1 mi. w. Tikinmúl; 3.4 mi. s. Cayál; 2.2 mi. s. Pixtún; 8.4 mi. w. Ich-Ek; 3.6 mi. s. Hopelchén; 5.1 mi. n.n.w. Dzibalchén; 6.0 mi. n. Dzibalchén; 7.2 mi. s. Pixtún; 19.2 mi. e. Silvituc.

QUINTANA ROO: 7.1 mi. n.n.w. Xiatil; 2.3 mi. s.s.e. Xiatil.

YUCATAN: 3.2 mi. s. Progreso; 1.0 mi. s.s.e. Puerto Telchac.

This species is generally distributed throughout the xeric and mesic regions of the Yucatan Peninsula. Live specimens were found only on trees and shrubs.

Lucidella lirata (Pfeiffer)

CAMPECHE: 8.1 mi. s.w. Champotón; 5.1 mi. n.n.w. Dzibalchén; 4.9 mi. w. Hopelchén; 3.4 mi. s. Cayál; 7.2 mi. s. Pixtún; 10.2 mi. e. Escárcega; 19.2 mi. e. Silvituc; (Ciudad de Carmen, Branson and McCoy, 1963:102).

QUINTANA ROO: 4.0 mi. e. Xpujil; 7.1 mi. n.n.w. Xiatil.

This species is characteristic of mesic and rain forests. Specimens collected from 8.1 mi. s.w. of Champotón were found in a swampy area that remains constantly wet.

PILIDAE

Pomacea flagellata (Say)

CAMPECHE: Laguna de Nan, 1.4 mi. w. Silvituc; temporary pond 8.8 mi. s.w. Campeche; (3.5 mi. s. Champotón; 17.2 mi. s. Champotón. Branson and McCoy, 1965:14); (15 mi. s. Champotón; 16 km. e. Champotón. Bequaert and Clench, 1936: 73).

Pomacea yucatanensis (Crosse and Fischer)

CAMPECHE: (San Geronimo. Type locality, Fisher and Cross, 1890: 240).

HYDROBIIDAE

Pyrgophorus coronatus (Pfeiffer)

CAMPECHE: (Pantel Aguada, Champotón; Uluman Savanna, Rio Champotón. Bequaert and Clench, 1936: 73).

All the Mexican forms of *Pyrgophorus* have been referred to *P. coronatus* at one time or another. This complex badly needs further study, which could well show the Mexican forms are recognizably distinct.

Helisoma caribaeum (Orbigny)

CAMPECHE: (Yalic Aguada, nr. Champotón. Bequaert and Clench, 1936: 66).

Tropicorbis orbiculus (Morelet)

CAMPECHE: (Isla de Carmen and Palizada. Type localities, Morelet: 1849:16); (Laguna de Terminales. Bequaert and Clench, 1936: 66).

Tropicorbis obstructus (Morelet)

CAMPECHE: (Isla de Carmen. Type locality, Morelet, 1849: 17); (Yalic Aguada, Champotón. Bequaert and Clench, 1936: 68).

Tropicorbis maya (Morelet)

CAMPECHE: (Campeche. Type locality, Morelet, 1849:16).

Tropicorbis retusus (Morelet)

CAMPECHE: (Isla de Carmen. Type locality, Morelet, 1849: 17).

PHYSIDAE

Aplexa s. spiculata Morelet

CAMPECHE: (Pantel Aguada, nr. Champotón. Bequaert and Clench, 1936: 69); (Campeche. Type locality, Morelet, 1849: 18).

Aplexa spiculata gracilis (Fischer and Crosse)

CAMPECHE: (nr. Champotón. Bequaert and Clench, 1936: 70).

Aplexa princeps (Phillips)

CAMPECHE: (3.5 mi. s. Champotón. Branson and McCoy, 1965: 11).

Aplexa maugeriae (Sowerby)

CAMPECHE: (Palizada. Bequaert and Clench, 1936: 69).

VERONICELLIDAE

Veronicella moreleti (Crosse and Fischer)

CAMPECHE: (Isla de Carmen. Fischer and Crosse, 1878: 682).

PUPILLIDAE

Gastrocopta pellucida (Pfeiffer)

CAMPECHE: 7.1 mi. s.w. Campeche; 8.1 mi. s.w. Champotón.

YUCATAN: 1.0 mi. s.s.e. Puerto Telchac; 0.8 mi. n.e. Becanchén.

Gastrocopta riograndensis Sterki

CAMPECHE: 8.1 mi. s.w. Champotón.

YUCATAN: 1.0 mi. s.s.e. Puerto Telchac.

Gastrocopta servilis (Gould)

CAMPECHE: (Isla de Carmen. Pilsbry, 1916: 70).

Pupisoma dioscoricola (C. B. Adams)

CAMPECHE: 11.4-mi. e. Cayál; (Ciudad de Carmen. Branson and McCoy, 1963: 108).

QUINTANA ROO: 7.1 mi. n.n.w. Xiatil.

TABASCO: Cardenas.

YUCATAN: Tikúl; 0.8 mi. n.e. Becanchén.

These specimens were collected by shaking small trees and bushes over a sheet.

SUCCINEIDAE

Succinea carmenensis Fischer and Crosse

CAMPECHE: (Isla de Carmen. Type locality).

[*Catinella avara* (Say). Bequaert and Clench (1936: 65) recorded this species from Pantel Aguada, near Champotón. The record was based on shell material and must be confirmed, for generic and specific identifications within this family are dependent on anatomical and histological data.]

SPIRAXIDAE

Euglandina cylindracea (Phillips)

CAMPECHE: 7.2 mi. s. Pixtún; 2.2 mi. s. Pixtún; (Ciudad de Carmen. Branson and McCoy, 1963: 105); 6.1 mi. s.w. Seybaplaya; 6.2 mi. n.e. Seybaplaya; 7.1 mi. s.w. Campeche; 5.7 mi. e. Campeche; (Campeche. Fischer and Crosse, 1870); 3.6 mi. s. Hopelchén; 5.1 mi. n.n.w. Dzibalchén; 5.1 mi. w. Tikinmúl; 10.2 mi. e. Escárcega.

QUINTANA ROO: 7.1 mi. n.n.w. Xiatil.

YUCATAN: 0.8 mi. n.e. Becanchén; Uxmal; 19.1 mi. s.s.e. Uman; 7.0 mi. s.s.e. Uman.

This species is most commonly associated with semi-xeric and mesic forests. Specimens from near Escárcega show it is able to exist in tropical rain forests, but populations are sparse in this biome.

Euglandina carmenensis (Morelet)

CAMPECHE: 7.1 mi. s.w. Campeche; 2.2 mi. s. Pixtún (Ciudad de Carmen. Type locality, Morelet, 1849: 14).

[*Euglandina ghiesbreghti* (Pfeiffer). Branson and McCoy (1965: 5) record this and the following species from Champotón, Campeche. Both are mountain forms known from limited areas in Chiapas and Oaxaca respectively. The different ecological and climatic conditions in Campeche make their occurrences there unlikely. The specimens they cite could not be located to confirm the identifications.]

[*Euglandina sowerbyana* (Pfeiffer). See previous species.]

Euglandina cumingi (Beck)

CAMPECHE: (17.2 mi. s. Champotón. Branson and McCoy, 1965: 4).

Streptostyla

This genus of about 60 species distributed through Central America and Mexico is divided into five subgenera. These subgenera were originally defined on the basis of shell characters, but because of the number and diversity of the species involved, the distinctions between the subgenera by shell characters is not always clear. Baker (1941, 1943) redefined three of the subgenera by means of anatomical characters, but his system of classification is only partially satisfactory because of the small number of species whose anatomies are known.

The first anatomical studies of *Streptostyla* were made by Strebel (1878: 16, 22-23) who described the soft parts of *S. streptostyla* (Shuttleworth) (as *S. coniformis*), *S. nicoleti* (Shuttleworth) and *S. physodes* (Shuttleworth). Baker (1943) described the soft parts of *S. streptostyla* (genotype of *Streptostyla*), *S. nicoleti* (genotype of *Eustreptostyla*), *S. physodes*, *S. lymneiformis* (Shuttleworth), *S. i. irrigua* (Shuttleworth) and *S. i. quirozi* Strebel. Baker placed *S. physodes* and *S. lymneiformis* in the subgenus *Rectoleacina* because of the similarities of their shells to this otherwise Cuban group. *S. irrigua* he placed in *Chersomitra* because of similarities of its shell to *S. nigricans* (Pfeiffer) (genotype of *Chersomitra*). He separated *Chersomitra* from *Streptostyla* only as a "section" (= species group) because of the anatomical similarities of the species he examined.

While studying the relationships of the Campeche species of *Streptostyla*, I dissected two specimens of *S. nigricans* to verify the identity of *Chersomitra*. The characters of the epiphallus and penis proved similar to those Baker described for *S. physodes* and *S. lymneiformis*, and quite different for those he reported for *S. irrigua*. This necessitates the following systematic changes: (1) *Chersomitra* in-

cludes *S. nigricans*, *S. physodes* and *S. lymneiformis*, and is used in place of *Rectoleacina* for mainland species. (2) *Streptostyla* includes *S. streptostyla* and *S. irrigua* as well as *S. ventricosula* (Morelet) and *S. meridana* (Morelet) as discussed below. (3) The subgeneric relationships of most of the other species of *Streptostyla* usually placed in the typical subgenus or *Chersomitra* remain uncertain, for convergent evolution in shell characters has occurred in both groups. (4) *Rectoleacina* is again restricted to Cuba, and its anatomy and relationships to mainland taxa remain unknown.

The subgenera that are known anatomically may be distinguished as follows:

Streptostyla: epiphallus absent; penis simple, without accessory appendages; salivary gland forming a complete ring around the esophagus.

Eustreptostyla: epiphallus present; penis simple, lacking accessory appendages; a "stimulator" presents on inside of penis wall; salivary gland incomplete across ventral surface of esophagus.

Chersomitra: epiphallus present; penis with a single lateral appendage; salivary gland forming a complete ring around the esophagus.

Peteniella and *Streptostylella* are still unknown anatomically.

Streptostyla nigricans (Pfeiffer)

CHIAPAS: 3.5 mi. s. Rayón, 5500' (two specimens dissected).

Sides of foot and snout bright yellow bordered dorsolaterally on each side of body by a broad black band that is continuous over dorsal surface of tail. Nape with a narrow bright yellow middorsal stripe that is continuous to snout. Mantle collar dull yellow. Outer wall of lung black fading into dark brown near collar. Rest of mantle light pinkish yellow.

Tail pointed, rounded above, without distinct pedal groove. Lung about twice as long as wide. Minor venations of lung distinct. Kidney T-shaped, almost triangular (fig. 1, F). Pericardium about 0.8 times length of kidney base. Esophagus entering dorsal side of buccal bulb anterior to radula. Salivary gland continuous around esophagus (fig. 1, A). Right ocular retractor muscle passing through genital atrium. Genital atrium connected to body wall by a relatively long slender neck (fig. 1, C). Ovary consisting of six lobes with 3-9 alveoli per lobe (not illustrated). Spermatheca pressed against uterus by aorta,

and resting behind prostate. Albumen gland bright orange in color, very large, elongate, sausage-shaped with a broad furrow in basocolumellar side where it rests against intestine. Prostate relatively large, about $\frac{2}{3}$ length of uterus and closely appressed; located near top of enlarged uterine folds. Vas deferens enlarged into an epiphallus about half way between prostate and penis. Penial retractor muscle long and slender, attached to diaphragm over salivary gland, enveloping epiphallus for a short distance above penis. Penis long and moderately stocky, with a large diverticulum located about $\frac{1}{4}$ of distance below epiphallus. Inside of diverticulum with numerous oblique longitudinal folds. Inside of penis with large opposing longitudinal ridges.

Radula (one specimen examined) containing 60 transverse rows of teeth, with 56 teeth per row. Inner tooth longest, or only slightly shorter than next tooth, about $175\ \mu$ long. Following teeth gradually decreasing in size through outer marginal tooth, which is about $30\ \mu$ long. Cusps on teeth simple, dagger-shaped. Ribbon 7.6 mm. long.

Although fundamentally similar in anatomical characters to *S. physodes* and *S. lymneiformis*, *S. nigricans* is very distinct from these two species by the large size of its albumen gland and by the long neck that connects the genital atrium to the body wall. The extension of the right ocular retractor muscle through the genital atrium in *S. nigricans* has not been recorded from other species of *Streptostyla*.

Streptostyla ventricosula (Morelet)

Glandina ventricosula Morelet, 1849; Testac. Noviss., I: 15. (Type locality: Merida, Yucatan).

Streptostyla ventricosula (Morelet), von Martens, 1892; Biol. Centr. Amer., Moll.: 97; pl. f, fig. 20. — Pilsbry, 1907; Man. Conch., Ser. II, 19:153; pl. 30, figs. 87, 89.

Streptostyla yucatanensis Pilsbry, 1907; Man. Conch., Ser. II, 19: 153-154; pl. 30, figs. 90, 91. (Type locality: Tekanto, Yucatan).

Streptostyla yucatanensis var. *distorta* Pilsbry, 1907; Man. Conch., Ser. II, 19: 154; pl. 30, fig. 92. (Type locality: Tekanto, Yucatan).

CAMPECHE: 7.2 mi. s. Pixtún; 6.1 mi. s.w. Seybaplaya; 6.2 mi. n.e. Seybaplaya; 7.1 mi. s.w. Campeche; 5.7 mi. e. Campeche; (32 mi. e. Campeche. Branson and McCoy, 1963: 103); 8.4 mi. w. Ich-Ek; 3.6 mi. s. Hopelchén; 5.1 mi. w. Tikimúl; 5.1 mi. n.n.w. Dzibalchén; 10.2 mi. e. Dzibalchén.

YUCATAN: 19.1 mi. s.s.e. Uman; 0.8 mi. n.e. Becanchén.

This species is primarily found in semi-xeric and mesic forests, and is known only from Yucatan and Campeche, where it usually occurs with *S. m. meridana*.

I cannot separate *S. yucatanensis* Pilsbry satisfactorily from *S. ventricosula* (Morelet). Pilsbry (1907: 153-154) recognized *S. yucatanensis* on the basis of a deeper suture, a narrower subsutural clear zone, a more cylindrical last whorl, and a weaker columellar fold. The specimens before me show all intermediate stages between these two forms. The variety *distorta* Pilsbry was based upon an aberrant specimen, and merits no further recognition as a taxonomic entity.

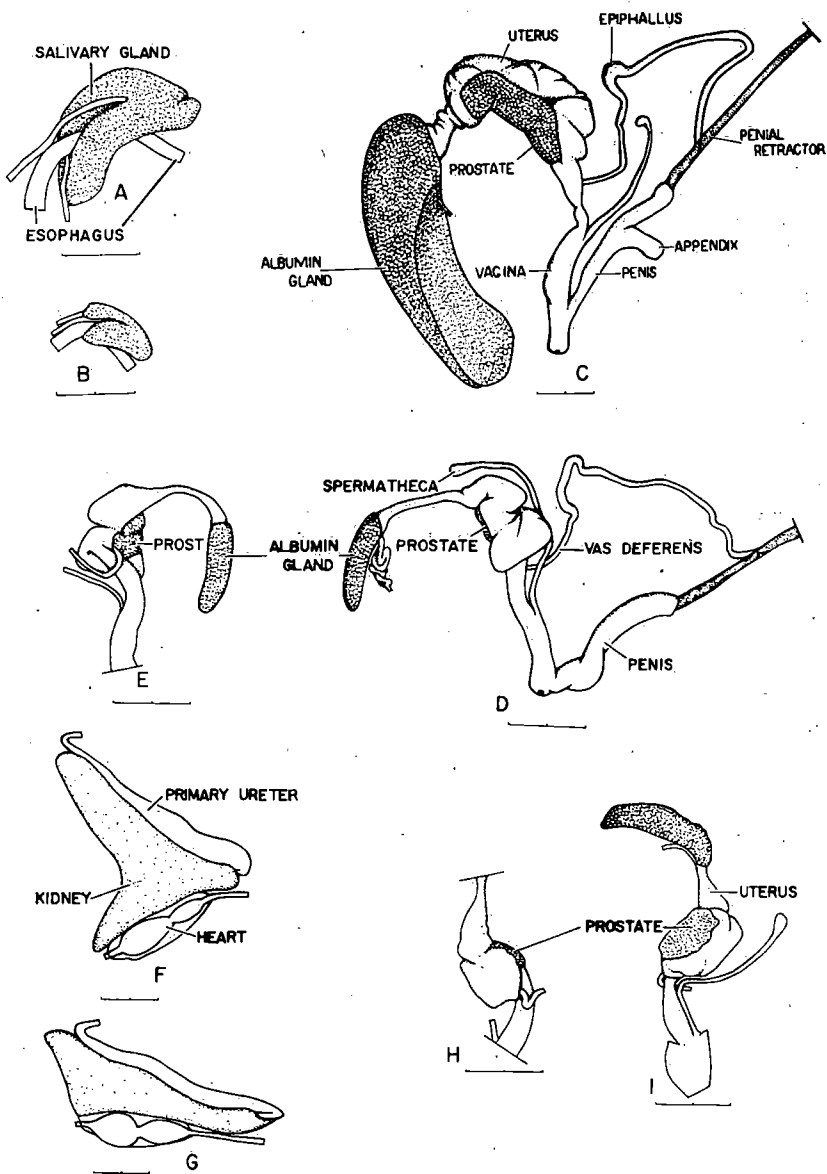
Animal (two specimens dissected from 8.4 mi. w. Ich-Ek) similar to that of *S. streptostyla* as described by Baker (1943: 6) except: Animal uniformly dark gray. Lung unmarked, uniformly gray. Kidney triangular and very long, about twice length of oblique base (fig. 1, G). Pericardium about 0.6 times length of kidney. Salivary gland continuous around esophagus (fig. 1, B). Right ocular retractor muscle passing inside from reproductive system. Genital atrium attached directly to body wall, without a connecting neck, (fig. 1, D). Spermatheca columellar, resting at base of albumen gland. Albumen gland small, sausage-shaped, weakly compressed. Prostate very small, primarily restricted to posterior side and middle of uterus (fig. 1, E). Vas deferens slightly enlarged near middle but not forming a distinct epiphallus. Penial retractor muscle attached to inner wall of diaphragm, enveloping vas deferens for about $\frac{2}{3}$ of muscle length. Penis long, but moderately stocky, without accessory appendages or a "stimulator".

Radula (one specimen examined) containing 50 transverse rows, with 54 teeth per whorl. Inner tooth 90 μ long. Following four teeth rapidly increasing in size. Fifth tooth about 150 μ long. Remaining teeth gradually decreasing in size through last tooth, which is about 24 μ long. Ribbon 5.0 mm. long.

FIGURE 1. Anatomy of various species of *Streptostyla*.

- A. *S. nigricans* (Pfeiffer). Salivary gland with portions of esophagus and salivary ducts.
- B. *S. ventricosula* (Morelet). Salivary gland with portions of esophagus and salivary ducts.
- C. *S. nigricans* (Pfeiffer). Reproductive system.
- D. *S. ventricosula* (Morelet). Reproductive system.
- E. *S. ventricosula* (Morelet). Ventral view of portion of reproductive system showing restriction and relationships of the prostate.
- F. *S. nigricans* (Pfeiffer). Kidney and associated structures.
- G. *S. ventricosula* (Morelet). Kidney and associated structures.
- H, I. *S. meridana* (Morelet). Portion of the reproductive system showing relationships of the prostate.

Scales equal 2 mm.



This species belongs in the subgenus *Streptostyla* because of the characteristics of its reproductive system. It is anatomically peculiar because of the small size and restriction of the prostate.

Streptostyla m. meridana (Morelet)

Glandina meridana Morelet, 1849; Testac. Noviss., I: 15. (Type locality: Meridá, Yucatan).

Streptostyla meridana (Morelet), Martens, 1892; Biol. Cent. Amer.: 101; pl. 5, fig. 25.—Pilsbry, 1907; Man. Conch., ser. II, 19: 154-155; pl. 30, figs. 93-96. *Salasiella meridaensis* Branson and McCoy, manuscript name; Type: UMMZ 210557.

Streptostyla maslini Branson and McCoy, 1962; Naut., 76: 8; pl. 2, figs. 1a, 1b. (Type: UMMZ 210557. Type locality: 19 miles east of Merida, Yucatan).

Salasiella toltecorum Branson and McCoy, manuscript name; Type: UMMZ 210558.

Streptostyla toltecorum Branson and McCoy, 1962; Naut., 76: 8-9; pl. 2, figs. 2a, 2b. (Type: UMMZ 210558. Type locality: 5 miles east of Campeche, Campeche).

CAMPECHE: 0.9 mi. s.w. Champotón; 8.1 mi. s.w. Champotón; (Ciudad de Carmen; 5-11 mi. e. Campeche. Branson and McCoy, 1963: 105); 6.1 mi. s.w. Seybaplaya; 6.2 mi. n.e. Seybaplaya; 7.1 mi. s.w. Campeche; 5.7 mi. e. Campeche; 5.1 mi. w. Tikinmúl; 3.4 mi. s. Cayál; 2.2 mi. s. Pixtún; 8.4 mi. w. Ich-Ek; 3.6 mi. s. Hopelchén; 5.1 mi. n.n.w. Dzibalchén; 7.2 mi. s. Pixtún; 19.2 mi. e. Silvitú.

QUINTANA ROO: 7.1 mi. n.n.w. Xiatil.

YUCATAN: 7.0 mi. s.s.e. Uman; 1.0 mi. s.s.e. Puerto Telchac; 0.8 mi. n.e. Becanchén.

This species is found most commonly in semi-arid and mesic habitats, where it occurs in second growth as well as virgin forests. Only rarely is it found in rain forests.

S. meridana was adequately described and illustrated by Pilsbry (1907: 154-155; pl. 30, figs. 93-96). My measurements of 50 specimens from Campeche, Quintana Roo, and Yucatan are: length, 8.2-10.4 mm.; width, 3.4-4.3 mm.; length of aperture, 4.8-6.1 mm.; length/width, 2.27-2.48; length/aperture, 1.59-1.73; 4.6-5.5 whorls.

Streptostyla maslini Branson and McCoy and *Streptostyla toltecorum* Branson and McCoy do not differ from typical *S. meridana* (Morelet). The measurements and proportions given by Branson and McCoy (1962: 8-9) fall within the ranges of variation for *S. meridana* given by Pilsbry (1907: 154-155), and which I have found in my population samples. Branson and McCoy's illustrations have little similarity

to the type specimens they represent. Figures of these same specimens (fig. 2, A-D) drawn with the aid of a camera lucida fall well within the variations illustrated for *S. meridana* by Pilsbry (1907: pl. 30, figs. 93-96).

Branson and McCoy originally assigned their material in manuscript to *Salasiella meridaensis* new species, and *Salasiella toltecorum*, new species. After they had deposited their material in various

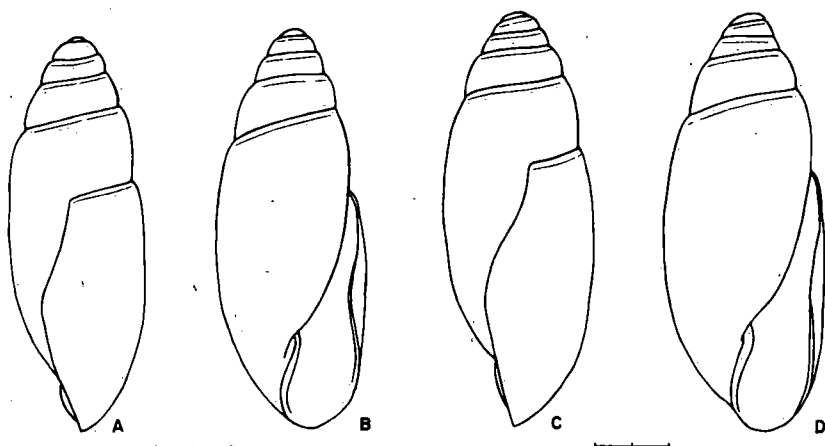


FIGURE 2. HOLOTYPEs of two nominate forms of *Streptostyla meridana* (Morelet).

A, B. *Streptostyla toltecorum* Branson and McCoy (UMMZ 210555).

C, D. *Streptostyla maslini* Branson and McCoy (UMMZ 210557).

Scale equals 2 mm.

museums under their manuscript names, they realized their specimens belonged in the genus *Streptostyla*. In their descriptions (1962) of *S. maslini* and *S. toltecorum* they apparently did not compare this material adequately with all the numerous forms of *Streptostyla*.

Two specimens dissected from 5.1 m. n.n.w. Dzibalchén are similar to *S. streptostyla* except: Animal uniformly light gray. Lung unmarked, uniformly gray. Kidney triangular, about twice as long as oblique base. Pericardium about 0.6 times length of kidney. Salivary glands continuous around esophagus. Right ocular retractor muscle passing inside from genitalia. Genital atrium attached directly to body wall, without a connecting neck (fig. 1, H, I). (Only female half of system illustrated because penis of each dissected specimen was everted and not in usual position). Spermatheca columellar, imbedded at base of albumen gland. Albumen gland elongate sausage-

shaped, slightly compressed. Prostrate about $\frac{1}{3}$ length of uterus, restricted primarily to outer surface, and middle of uterus. Vas deferens slightly enlarged near middle. Penial retractor muscle attached to inner wall of diaphragm, enveloping vas deferens for about $\frac{1}{2}$ of muscle length. Penis long, moderately stocky, without accessory appendages or stimulator.

Radula (1) containing 45 transverse rows of teeth, with 40 teeth per row. Inner tooth about 75 μ long. Following three teeth rapidly increasing in size. Fourth tooth about 110 μ long. Remaining teeth gradually decreasing in size through last tooth, which is about 14 μ long. Ribbon 3.7 mm. long.

The characters of the reproductive system show this species is closely related to *S. ventricosula*. Anatomically it differs from this species in its proportionally larger prostrate, which is located primarily on the outer surface of the uterus.

Streptostyla meridana subsp.

GUATEMALA, DEPT. PETEN: (San Benito; 7.9 m. s.w. San Benito; Flores; 25 mi. s. Flores; Santa Teresa; Puerto Nuevo; 2 km. s. Puerto Nuevo; Santa Ana; San Andres; La Libertad; Tikal; Laguna Sotz; 6 mi. n. Laguna Sotz; 10 mi. n. Laguna Sotz; Laguna Perdida; 3 mi. n. Laguna Perdida; 6 mi. s. Laguna Perdida; Paso Caballo; 1 mi. n.w. Paso Caballo; 5 mi. n. Paso Caballo; 6 mi. e. Paso Caballo. UMMZ).

QUINTANA ROO: 4.0 mi e. Xpujil, Campeche.

The Guatemalan localities are for specimens in the University of Michigan Museum of Zoology reported by Goodrich and van der Schalie (1937:24). My measurements of 50 specimens are: length, 10.3-11.9 mm.; width, 4.3-5.0 mm.; aperture length, 5.8-7.0 mm.; length/width, 2.24-2.48; length/aperture, 1.59-1.75; 5.0-5.5 whorls.

These specimens are intermediate in size between *S. m. meridana* and the larger, more robust *S. m. cobanensis* Tristram. Material from the intermediate areas of Campeche, Peten and Alta Verapaz is not sufficient to determine whether the size differences between these three forms are disjunct or clinal.

FERUSSACIIDAE

Cecilioides consobrinus primus (De Folin)

CAMPECHE: 8.1 mi. s.w. Champotón.

YUCATAN: 0.8 mi. n.e. Becanchén.

ACHATINIDAE

Lamellaxis gracilis (Hutton)

CAMPECHE: 8.1 mi. s.w. Champotón; 0.9 mi. s.w. Champotón; 6.1 mi. s.w. Seybaplaya; 6.2 mi. n.e. Seybaplaya; 7.1 mi. e. Campeche; 3.6 mi. s. Hopelchén; 5.1 mi. n.n.w. Dzibalchén.

Subulina octona (Bruguère)

CAMPECHE: (Campeche. von Martens, 1898: 299); (Ciudad de Carmen. Branson and McCoy, 1963: 107).

SYSTROPHIIDAE

Miradiscop maya (Pilsbry)

YUCATAN: 0.8 mi. n.e. Becanchén.

Miradiscops haplocochlion new species

(fig. 3, A-C)

TYPE LOCALITY. 8.1 miles southwest of Champotón, Campeche.

TYPE: UF 19058; collected 14 June, 1965 by Fred G. Thompson.

PARATYPES: UF 19059 (2); same data as type.

DESCRIPTION. Shell depressed-conical. Openly umbilicate, umbilicus contained 3.7 times in major diameter. Nearly transparent. Whitish, with a silky luster. About 5 whorls (4.9) that gradually increase in size. Whorls evenly rounded. Suture weakly impressed, narrowly margined. First whorl smooth, with very faint, fine radial striations. Following whorls with fine, closely spaced, oblique axial striations that are continuous over the periphery of the whorls and into the umbilicus; slightly coarser near suture. Very faint, fine growth wrinkles along suture between striations. No spiral sculpture present. Aperture oblique, lying at about 30° to axis; subround; preceding whorl incised into about $\frac{1}{4}$ of aperture. Peristome thin, incomplete; columellar lip slightly reflected near umbilicus.

Major diameter, 2.37 mm.; minor diameter, 1.99 mm.; height of shell, 1.37 mm.; aperture 0.89 mm. high; 0.96 mm. wide.

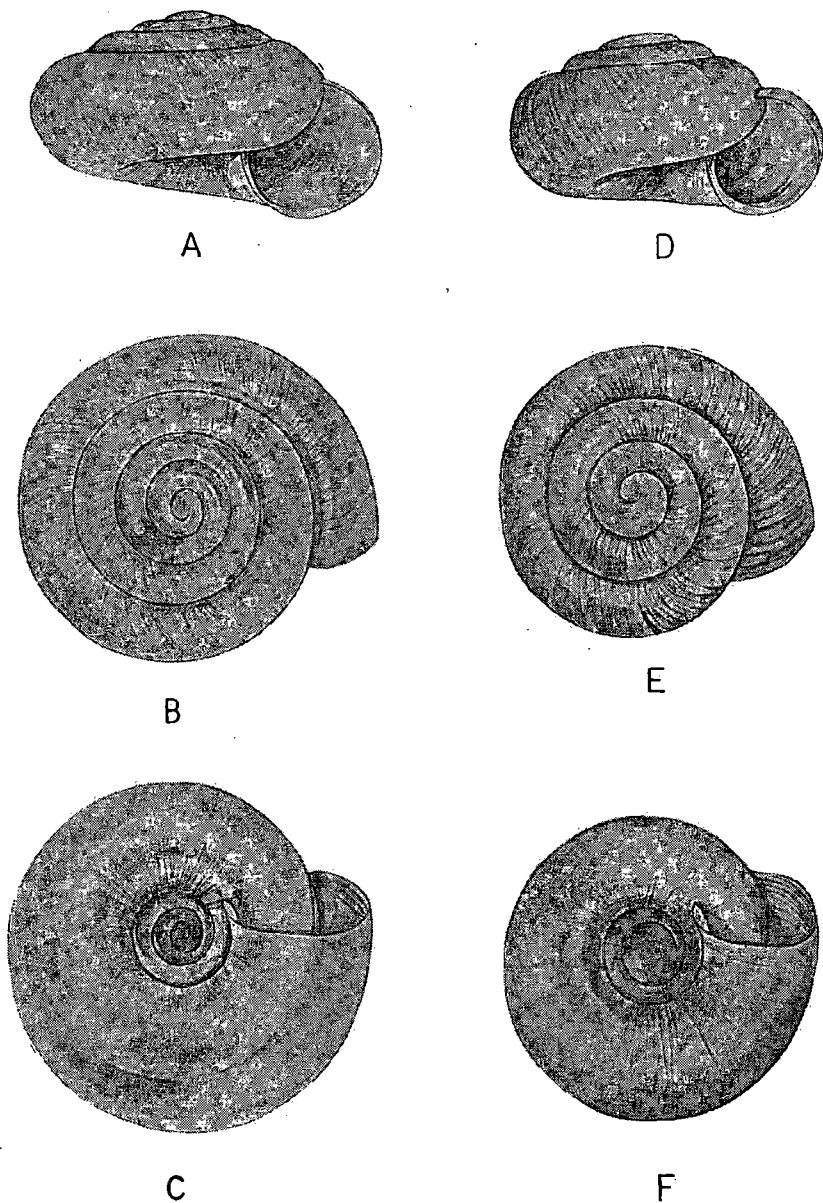


FIGURE 3

- A-C. *Miradiscops haplocóchlion* new species, TYPE (UF 19058). 8.1 miles s.w. Champotón, Campeche.
- D-F. *Hawáia minuscula* (Binney). 8.1 miles s.w. Champotón, Campeche.

This species is most similar to *M. maya* (Pilsbry), but differs by its whitish color, by having a relatively larger umbilicus, and by having a depressed conical spire. *M. maya* is pale yellow in color, has an umbilicus that is contained slightly more than 4 times in the major diameter, and has a depressed dome-shaped spire. The latter species is also smaller and has only four whorls, but this may be only a matter of individual sizes (Pilsbry, 1919: 216).

I name this species with some hesitation, but its whitish color and larger umbilicus do not allow it to be identified with any of the other named species of *Miradiscops*.

The type specimens were found under a broken block of caliche near a black mangrove swamp.

ZONITIDAE

Habroconus pittieri (von Martens)

CAMPECHE: 5.1 mi. n.n.w. Dzibalchén; 8.1 mi. s.w. Champotón; 7.2 mi. s. Pixtún; 19.2 mi. e. Silvituc.

QUINTANA ROO: 4.0 mi. e. Xpujil, Campeche; 7.1 mi. n.n.w. Xiatil.

YUCATAN: 0.8 mi. n.e. Becanchén.

These specimens are similar in all characters of the description and illustrations given by von Martens (1892: 121), except that they have slightly finer sculpture. In this respect they are similar to *H. elegantula* (Pilsbry), but the spire is not as high nor do they have as many whorls as that species.

Guppya gundlachi (Pfeiffer)

CAMPECHE: 8.1 mi. s.w. Champotón.

QUINTANA ROO: 4.0 mi. e. Xpujil, Campeche; Cozumel Island, 1.5 km. n.n.e. San Miguel.

Hawaiiia minuscula subsp.

(fig. 3, D-F)

CAMPECHE: 8.1 mi. s.w. Champotón; 7.2 mi. s.w. Pixtún.

The specimens from Campeche are slightly more obese than any of the subspecies described from farther north, but my material is inadequate to determine the geographical distribution of this variation.

ORTHALICIDAE

Orthalicus princeps (Sowerby)

CAMPECHE: (29.7 mi. s. Campeche. Branson and McCoy, 1965:8); (32 mi. e. Campeche. Branson and McCoy, 1963: 106); 3.4 mi. s. Cayál; 8.4 mi. w. Ich-Ek; 3.6 mi. s. Hopelchén; 5.1 mi. n.n.w. Dzibalchén; (15 mi. s. Champotón. Bequaert and Clench, 1936:64).

Bulimulus unicolor (Sowerby)

Bulinus unicolor Sowerby, 1833; Proc. Zool. Soc.: 73.

Bulimus umbraticus Reeve, 1849; Conch. Icon.: pl. 77, fig. 559.

Bulimus ignavus Reeve, 1849; Conch. Icon.: pl. 77, fig. 562.

Bulimus petenensis Morelet, 1852; Testac. Noviss., II: 10.

Bulimulus sanmiguelensis Richards, 1937; Proc. Amer. Philos. Soc., 77: 253-254; pl. 4, fig. 6.

CAMPECHE: 17.2 mi. s. Champotón (USNM 635742); 0.9 mi. s.w. Champotón; 6.1 mi. s.w. Seybaplaya; 6.2 mi. n.e. Seybaplaya; 7.2 mi. s. Pixtún; 2.2 mi. s. Pixtún; Campeche (USNM 467448); 5.1 mi. w. Tikinmúl; 16.8 mi. s. Tenabo; 3.6 mi. s. Hopelchén; 3.4 mi. s. Cayál; 5.1 mi. n.n.w. Dzibalchén; 10.2 mi. e. Escárcega; 19.2 mi. e. Silvituc.

CHIAPAS: (USNM 162504).

QUINTANA ROO: Cozumel Island, 1.5 km. n.n.e. San Miguel; 7.1 mi. n.n.w. Xiatil; 2.3 mi. s.s.e. Xiatil; 4.0 mi. e. Xpujil.

TABASCO: (USNM 10555).

YUCATAN: Chichen Itza (USNM 432848, 467451, 251660); San Ignacio (ANSP 256918); Merida; Uxmal; 0.8 mi. n.e. Becanchén; 10.0 mi. n.e. Becanchén; 7.0 mi. s.s.e. Uman; 1.0 mi. s.s.e. Puerto Telchac.

BRITISH HONDURAS: w. of Gales Point (USNM 382717); Benque Viejo (USNM 194123); Benque Viejo Riv., 1 mi. from Cayo (USNM 382733); Belize Riv. (USNM 41167).

GUATEMALA, DEPT. PETEN: "Peten" (ANSP 25629 — paratype of *B. petenensis* Morelet); Paso Caballo (ANSP 177303); Flores (ANSP 177285); Puebla Nueva (USNM 423983); Remate (USNM 382773); Id. in Lake Eckixil (USNM 423984); Uaxactún (USNM 382983).

GUATEMALA, DEPT. ZACAPA: around Zacapa (USNM 426005, 426015, 426017).

HONDURAS, CHIQUIMULA PROV.: Between Jocotan and Jumusna (USNM 426011, 426012, 426013).

This highly plastic species undergoes considerable geographic and ecological variation that has resulted in at least five synonyms.

The group was most recently reviewed by Pilsbry (1897: 50-58), who presented descriptions, based upon type material, of all of the forms named at that time. These forms may be briefly diagnosed as follows:

- B. unicolor* — a medium sized, conical form, 14-19 mm. long with about 5-6 whorls, weak incremental sculpture, no spiral sculpture, and a thin shell with a corneous-brown periostracum.
- B. umbraticus* — similar to *B. unicolor*, but transparent white streaked with pale brown near the apex.
- B. ignavus* — similar to *B. unicolor*, but a small form about 9 mm. long, and with about 7 whorls (?).
- B. petenensis* — similar to *B. unicolor*, but with alternating light and dark streaks on the periostracum.
- B. sanmiguelensis* — similar to *B. unicolor*, but with nearly flat whorls united by a relatively superficial suture.

Since they were originally proposed, these named forms have been assigned to different taxonomic ranks by various authors. Pilsbry (1897: 50-58) followed previous authors in his treatment of this group. He recognized *umbraticus* as a separate species, *petenensis* as a geographic race of *unicolor*, and *ignavus* as a "variety" of *B. dysoni* (Pfeiffer), though doubtfully so. More recently Richards (1937: 253-254) described *sanmiguelensis*, and Harry (1950: 12-15) elevated *ignavus* to specific status.

Material I have examined indicates that the size of the shell varies with the climatic areas of the Yucatan Peninsula as follows (fig. 4):

Dry coastal areas of Campeche and Yucatan, and the Polochic Valley of Guatemala — (*ignavus*) size small, 9.0-10.0 mm. long, 0.50-0.62 times as wide as long; aperture 0.44-0.58 times length of shell; 4.3-5.1 whorls.

Mesic deciduous forests of Campeche and Yucatan — (intermediate sized form) 10.0-12.6 mm. long; 0.56-0.64 times as wide as long; aperture 0.45-0.57 times length of shell; 4.7-5.7 whorls.

Moist deciduous and evergreen forests of Yucatan, Quintana Roo, British Honduras and Peten — (*unicolor*, *petenensis*) moderately large forms 12.3-16.5 mm. long; 0.48-0.69 times as wide as long; aperture 0.45-0.52 times length of shell; 5.5-6.1 whorls.

Wet rain forests of Quintana Roo and British Honduras — (*unicolor*, *sanmiguelensis*) size large, 14.8-18.7 mm. long; 0.48-0.59

times as wide as long; aperture 0.44-0.51 times length of shell; 5.5-6.3 whorls.

Distinctions based on size between any of these forms are not tenable because of the continuous series of intergradations that occur (fig. 5). There is still some question about the identity of *Bulimus*

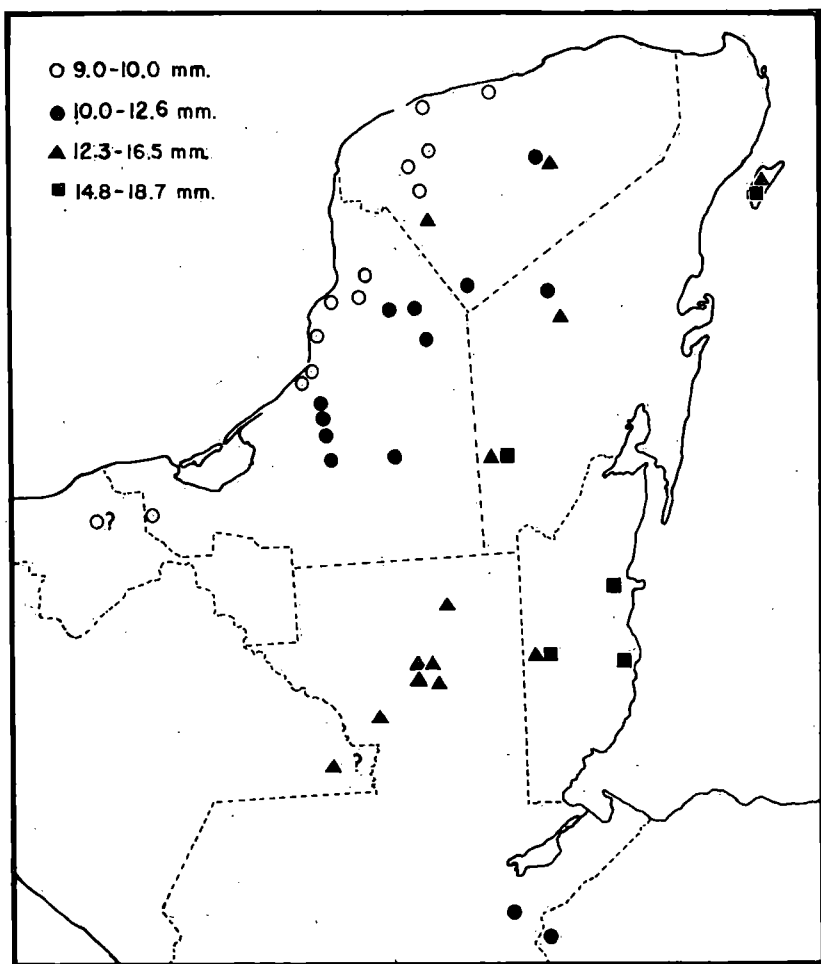


FIGURE 4. The geographic distribution of *Bulimus unicolor* (Sowerby) in the Yucatan Peninsula and adjacent areas, showing the distribution of size forms throughout the region. Open circles represent a small form 9.0-10.0 mm. long. Solid circles represent a larger form 10.0-12.6 mm. long. Triangles represent a larger form 12.3-16.5 mm. long. Squares represent large specimens 14.8-18.7 mm. long.

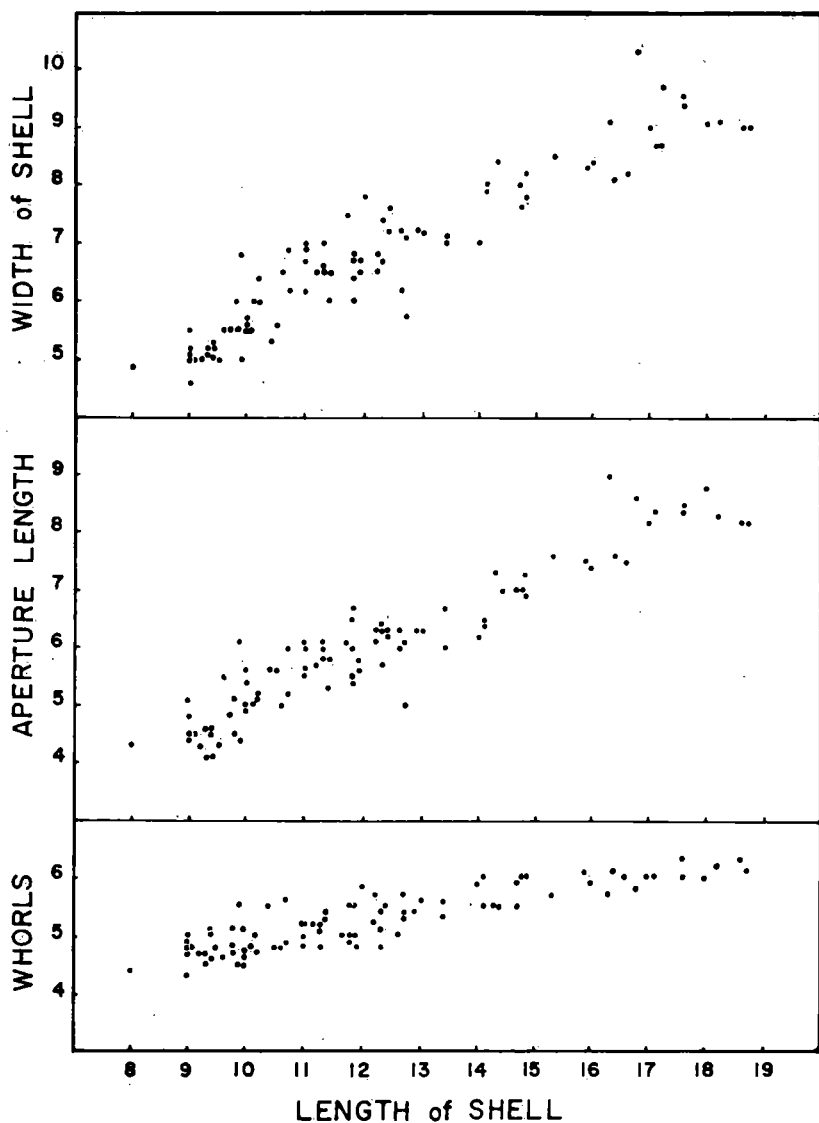


FIGURE 5. Graph showing the relationships between the length of the shell, and the width of the shell, the length of the aperture and the number of whorls in *Bulimulus unicolor* (Sowerby). No breaks in the trends occur that would allow the recognition of more than one form on the basis of these ratios.

ignavus. In his original account Reeve (1849) stated that it had seven whorls, but no specimen corresponding to its size has subsequently been found with as many whorls. Harry (1950: 13) apparently worked on the assumption that Reeve's short description and figure were in error or that the type was based upon an abnormal specimen, and assigned the small form discussed above to *ignavus*. *B. petenensis* appears to be only a geographic color variation of *unicolor*, and is confined to the Peten region of Guatemala. Some populations found in the same region consist entirely of the form *unicolor*, and most series of *petenensis* also have some specimens that can be identified as *unicolor*. *B. umbraticus* appears to be only an extreme variation of the *petenensis* color form. The characteristic of the flat whorls that Richards used to separate *B. sanmiguelensis* is also untenable, for this character varies widely among different series of specimens from over the whole range of the species.

Bulimus inermis Morelet, 1851, is probably also synonymous with *B. unicolor*. The type specimen is 9.0 mm. long, 4.0 mm. wide, has an aperture 3.0 mm. long, and 7 whorls (Fischer and Crosse, 1878: 550). A single specimen that I collected from 7.0 mi. s.s.e. Uman, Yucatan, and two specimens from Tabasco (USNM 10555) approach these proportions, but do not have as short an aperture or as many whorls.

B. unicolor may be properly diagnosed as follows: a highly variable Central American species of the subgenus *Bulimulus*, 9.0-18.7 mm. long; 0.48-0.63 times as wide as long; aperture 0.44-0.56 times length of shell; 4.9-6.3 whorls; postembryonic sculpture consisting of incremental striations only; generally unicolor or various hues of brown, but may be streaked or shaded; aperture oblique, but nearly straight edged in lateral profile.

This species probably intergrades with *B. corneus* (Sowerby) which occurs farther south but sufficient material from Guatemala and Honduras to determine this is not available.

Drymaeus sulphureus (Pfeiffer)

CAMPECHE: (Ciudad de Carmen; 16 mi. e. Campeche. Branson and McCoy, 1963: 106).

Drymaeus tropicalis (Morelet)

CAMPECHE: 5.1 mi. n.n.w. Dzibalchén; 3.6 mi. s. Hopelchén; 5.7 mi. e. Campeche; (5-11 mi. e. Campeche; 32 mi. e. Campeche. Branson and McCoy, 1963: 106); Edzna; (Campeche. Type locality, Morelet, 1849:9); 19.2 mi. e. Silvituc.

QUINTANA ROO: 4.0 mi. e. Xpujil.

YUCATAN: 0.8 mi. n.e. Becanchén; 19.1 mi. s.s.e. Uman.

This species appears to be common in semi-mesic, mesic and rain forests within its range. It is an abundant snail, judging from the number of dead shells in recently cleared areas.

Drymaeus dominicus (Reeve)

CAMPECHE: 19.2 mi. e. Silvituc; (11 mi. e. Campeche. Branson and McCoy, 1965: 8).

QUINTANA ROO: 4.0 mi. e. Xpujil, Campeche.

Drymaeus multilineatus (Say)

CAMPECHE: (11 mi. e. Campeche. Branson and McCoy, 1965: 8).

Drymaeus serperastrum (Say)

CAMPECHE: 7.1 mi. s.w. Campeche.

A single dead shell was found in a semi-xeric scrub forest.

UROCOPTIDAE

Microceramus concisus (Morelet)

CAMPECHE: 7.1 mi. s.w. Campeche; 6.1 mi. s.w. Seybaplaya; 6.2 mi. n.e. Seybaplaya; 0.9 mi. s.w. Champotón; 2.2 mi. s. Pixtún; 5.7 mi. e. Campeche; 5.1 mi. w. Tikinmúl; 3.6 mi. s. Hopelchén; 5.1 mi. n.n.w. Dzibalchén; 6.1 mi. n. Dzibalchén; 4.3 mi. n. Tenabo; 7.2 mi. s. Pixtún; (5-11 mi. e. Campeche. Branson and McCoy, 1963: 107).

This species is found in xeric and mesic habitats, and generally is common where it is found.

Brachypodella dubia (Pilsbry)

(fig. 6, C-E)

Cylindrella speluncae var. *dubia* Pilsbry, 1891, Proc. Acad. Nat. Sci. Phil.: 316; pl. 15, figs. 14, 14a. (Type locality: Labna, Yucatan).

Cylindrella speluncae Pfeiffer, Pilsbry, 1891, Proc. Acad. Nat. Sci. Phil.: 315; pl. 15, figs. 15, 15a.

Brachypodella speluncae (Pfeiffer), Pilsbry, 1904, Man. Conch., Ser. II, 16: 70-71, pl. 6, figs. 13, 14. — Bequaert and Clench, 1933, Pub. Carnegie Inst. Wash.,

(431): 535. — 1936, Pub. Carnegie Inst. Wash., (457): 65. — 1938, Pub. Carnegie Inst. Wash., (491): 258. — Richards, 1937, Proc. Amer. Philo. Soc., 77: 254. — Harry, 1950: Occ. Pap. Mus. Zool. Univ. Mich., (524): 16. — Branson and McCoy, 1965: Univ. Colorado Stud. Biol., (13): 9.

CAMPECHE: 19.2 mi. e. Silvituc (1); 7.2 mi. s. Pixtún (6); 6.1 mi. s.w. Seybaplaya (3); 6.2 mi. n.e. Seybaplaya (1); 7.1 mi. s.w. Campeche (18); 5.1 mi. n.n.w. Dzilbalchén (49); 5.1 mi. w. Tikinmúl (4).

QUINTANA ROO: 7.1 mi. n.n.w. Xiatil (6); Cozumel Island, 1.5 km. n.n.e. San Miguel (29).

YUCATAN: 10.0 mi. n.e. Becanchén (1).

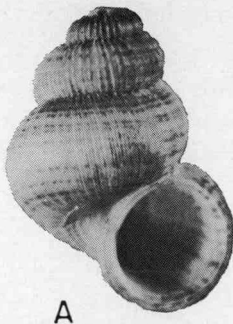
This species is common and generally distributed throughout Campeche and Yucatán. It is infrequently collected because it usually lives deep in rock crevices and piles of broken rock.

Shell dull; light beige; aperture and peristome white. Imperforate. Subtranslucent. Elongate cylindric-conical. Spire attenuate. Upper $\frac{1}{2}$ - $\frac{3}{4}$ of spire increasing uniformly in size; lower portion of shell nearly uniform in diameter, decreasing slightly at last two whorls. Spire usually decollate at maturity. 19.7-23.2 whorls in mature shells with complete spires; 11.3-13.4 whorls below apical plug. Whorls moderately convex; periphery lying above middle of whorl. Aperture extending forward and down on a long neck that is about one half as long as diameter of shell. Neck with a strong basal ridge. Aperture nearly circular, slightly wider than high. Peristome moderately expanded; widest in basocolumellar region; 0.2-0.3 mm. wide along columellar margin, or about one fifth diameter of aperture. Aperture broadly angulate in basal and outer margins. 3.2-3.5 embryonic whorls, nearly uniform in size; second embryonic whorl 0.5-0.6 mm. wide. Embryonic whorls with very fine axial threads that are 0.02-0.05 mm. apart. Following whorls sculptured with relatively strong axial ribs that are more closely spaced on the spire than on lower whorls; 12-20 ribs on antipenultimate whorl. Ribs oblique and very weakly sigmoid; slightly higher than wide. Interspaces nearly smooth, with occasional faint axial striations. Internal axis thin, rounded, weakly spiral.

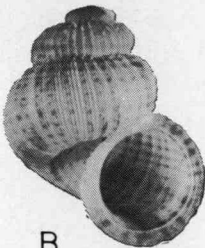
Length of shell with complete spire, 12.1-16.1 mm.; length of shell

FIGURE 6

- A, B. *Choanopoma andrewsae* (Ancey). 5.1 miles n.n.w. Dzilbalchén, Campeche. A. Female. B. Male.
C-E. *Brachypodella dubia* (Pilsbry). 5.1 miles n.n.w. Dzilbalchén, Campeche.
F-H. *Brachypodella speluncae* (Pfeiffer). Knoll on road to Santa Ana, 2 km. s. Puebla Nueva, Dept. Peten, Guatemala. (UMMZ 64538).



A



B



C



D



E



F



G



H

to apical plug, 10.0-12.3 mm.; width of shell, 2.0-2.3 mm.; width of aperture including peristome, 1.6-2.0 mm.

The number of ribs on the lower whorls is variable. Though characteristic of different populations, the variation shows no geographic or ecological pattern. Other features of the sculpture and the structure are nearly constant.

B. dubia is similar to and may be only subspecifically distinct from *B. speluncae*, with which it has been confused. It is distinguished by its low number of whorls below the apical plug, by its low number of ribs per whorl, by its strong, low axial ribs, by its elongate cylindric-conical shape and by its narrow peristome.

This species has been confused with *B. speluncae* because of the lack of comparative material of the latter species in American collections. Pilsbry (1891: 316) recognized *Cylindrella speluncae* var. *dubia* on the bases of an aberrant population of small individuals from Labna, Yucatan. Later (1904: 70) he relegated *dubia* to the synonymy of *speluncae* because of a lack of satisfactory differences between *dubia* and other Yucatan populations of *Brachypodella* that he identified as *speluncae*. All subsequent authors followed this 1904 usage of the name *speluncae*. Large series of *B. speluncae* Henry van der Schalie collected in 1936 from the Peten is the first material of that species collected since Morelet visited the area. The material permits a redescription of that species, which warrants the recognition of *B. dubia* as a distinct species.

Brachypodella speluncae (Pfeiffer)

(fig. 5, F-H)

Cylindrella costulata Morelet; 1852, Test. Noviss., II: 12. (Type locality: Juebixinal Cave, near the capital of Peten, Guatemala). (Not *Cylindrella costulata* C. B. Adams, 1849).

Cylindrella speluncae Pfeiffer, 1852, Zeitschrift fur Malak.: 151. — Fischer and Crosse, 1872, Miss. Scient. au Mexico, Moll., I: 410; pl. 17, fig. 11.

Brachypodella speluncae (Pfeiffer), Pilsbry, 1904, Man. Conch., Ser. II, 16: 69-71 (in part); pl. 6, figs. 17, 18.

GUATEMALA (DEPT. PETEN): knoll 1.2 mi. s. Flores (UMMZ 64540. 78); Cubixinal Cave, s. of Flores (UMMZ 64541. 15); 7-9 km. s.w. San Benito (UMMZ 64543. 1); 2 km. s. Puebla Nueva (UMMZ 64538. 62); knoll e. La Libertad (UMMZ 64538. 51); w. shore Lago de Petenxil (UMMZ 64539. 108); San Andres (UMMZ 64542. 31).

This species is known only from a small area in Peten. Records outside this area refer to *B. dubia* (Pilsbry).

Shell dull, light beige; inside of aperture and peristome shiny white. Imperforate. Thin, nearly translucent. Elongate-turrete; widest at about the fourth or fifth from last whorl and tapering below. Spire very attenuate when complete. 21.2-23.6 whorls in adults with complete spires. Shell usually decollate at maturity; 13.0-14.6 whorls below apical plug. Whorls moderately convex; periphery above middle of whorl. Aperture extending forward and down on a long neck that is about $\frac{1}{2}$ as long as diameter of shell. Neck with a strong basal ridge. Aperture subcircular, with a broad flaring peristome that is about $\frac{1}{2}$ the width of the aperture. Peristome widest in baso-columellar region; 0.40-0.55 mm. wide along columellar margin. Aperture weakly angulate in lower and outer margins; 3 rounded embryonic whorls that are nearly uniform in size. Second embryonic whorl 0.5-0.6 mm. wide. Embryonic whorls sculptured with fine, regularly spaced axial threads that are about 0.05 mm. apart. Following whorls gradually increasing in size. Sculptured with numerous axial ribs that are nearly uniformly spaced over the surface of shell. 21-31 ribs on antipenultimate whorl. Ribs weakly sigmoid and slightly oblique; very thin and relatively high, about 3-4 times as high as wide. Ribs slightly thickened and raised near lower suture. Internal axis thin, rounded, weakly spiral.

Length of complete shell, 14.7-16.2 mm.; length of shell below apical plug, 10.7-13.3 mm.; width of shell, 2.0-2.4 mm.; width of aperture including peristome, 1.7-2.2 mm.

B. speluncae is conservative in variation. The sample gathered from beach drift along the west shore of Lago de Petenxil is unusual in that some stunted specimens have as few as 9.0 whorls.

This species is distinguished by its large number of whorls below the apical plug, by its thin, high sigmoid ribs, by its elongate-turret shape, by its large number of ribs per whorl, and by its wide peristome. Available material from Peten and the Yucatan Peninsula shows no intergradation in these characters with *B. dubia*.

XANTHONICHIDAE

Averellia coactiliata (Deshayes)

CAMPECHE: 5.1 mi. n.n.w. Dzibachén; 3.6 mi. s. Hopelchén; 6.1 mi. s.w. Seybalaya; 7.2 mi. s. Pixtún; 10.2 mi. e. Escárcega; 19.2 mi. e. Silvituc.

QUINTANA ROO: 4.0 mi. e. Xpujil, Campeche.

This species is usually found in mesic and rain forests, occasionally in dryer situations.

Averellia suturalis (Pfeiffer)

CAMPECHE: 5.1 mi. n.n.w. Dzibalchén; 19.2 mi. e. Silvituc.

QUINTANA ROO: 4.0 mi. e. Xpujil, Campeche; 2.3 mi. s.s.e. Xiatil.

This species has been found only in mesic and rain forests.

POLYGYRIDAE

Praticolella griseola (Pfeiffer)

CAMPECHE: 8.1 mi. s.w. Champotón; (17.2 mi. s. Champotón. Branson and McCoy, 1965: 6); (5-11 mi. e. Campeche. Branson and McCoy, 1963: 107).

Polygyra yucatanea (Morelet)

CAMPECHE: (Isla de Carmen. Fischer and Crosse, 1872: 277).

[*Polygyra oppilata* (Morelet). Bequaert and Clench (1933: 532) restricted the type locality of this species to Campeche ("Littora Yucatanea"). No Campeche material is on record, and the species is known only from northern Veracruz and adjacent regions of Tamaulipas and San Luis Potosí.]

Thysanophora caecoides (Tate)

CAMPECHE: 8.1 mi. s.w. Champotón.

QUINTANA ROO: 4.0 mi. e. Xpujil, Campeche; 7.1 mi. n.n.w. Xiatil.

YUCATAN: 1.0 mi. s. Puerto Telchac.

Thysanophora plagiptycha (Shuttleworth)

CAMPECHE: 7.1 mi. s.w. Campeche; 5.1 mi. n.n.w. Dzibalchén; 19.2 mi. e. Silvituc.

YUCATAN: 0.8 mi. n.e. Becanchén; 10.0 mi. n.e. Becanchén.

Thysanophora c. conspurcatella (Morelet)

CAMPECHE: 16.8 mi. s. Tenabo.

Thysanophora impura (Pfeiffer)

CAMPECHE: 0.9 mi. s.w. Champotón; 11.4 mi. e. Cayál.

YUCATAN: 0.8 mi. n.e. Becanchén.

All these species of *Thysanophora* are arboreal. Live specimens are difficult to find because of their minute size, but they can be collected in large numbers by shaking small trees and bushes over a sheet.

SAGDIDAE

Lacteoluna selenina (Gould)

CAMPECHE: 7.2 mi. s. Pixtún; 7.2 mi. s.w. Campeche; 5.1 mi. n.n.w. Dzibalchén.

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Conference of Biological Editors, Committee on Form and Style.

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