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ERRATA

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P. 137, line 3: change "(fig. 3)" read "(fig. 4)"
P. 139, bottom line: add "Scale = 1 mm."
P. 142, delete first line
P. 149, line 20: for "pillar of axis" read "shell"
P. 166, bottom line: add "scale 1 mm."
P. 171, line 30: for "adolphos" read "adelphos"
P. 179, line 25: change "last" to "base"

SOME MEXICAN LAND SNAILS OF THE FAMILY UROCOPTIDAE

FRED G. THOMPSON [1]

SYNOPSIS: The genus *Anisospira* Strebel, 1880 is redefined on the basis of anatomical characters and divided into two subgenera. *Anisospira (sensu strictu)* is restricted to include only the species from the Tehuantepec region. *Trachycion* n. subgen., is proposed to include the remaining western Mexican species formerly placed in *Anisospira (s.s.)*. *Dissotropis* Bartsch, 1906 is redefined anatomically, removed from subgeneric status within *Anisospira,* and recognized as a distinct genus more closely related to *Coelocentrum.*

A. -liebmanni (Pfeiffer) and *A. dalli* (Martens) are redefined, and their anatomies are described for the first time. *Cylindrella hyalina* Pfeiffer, *A. orcutti* Dall, and *Liocentrum wilmoti* Bartsch are synonymized with *A. liebmanni.* New subspecies and species include: *A. d. strigens* n. ssp. from near Tehuantepec, *A. (T.) hadromylla* n. sp. from Coastal Michoacan, *D. castaneum* n. sp. from Jalisco, and *D. amplaxis* n. sp. from Colima. The anatomy *of D. castaneum* is described, providing a basis for relating *Dissotropis* to *Coelocentrum.*

Also included are the descriptions of the following: *Coelocentrum tanydeira* n. sp. from San Luis Potosi; *C. stenocion* n. sp. from Guerrero; and *C. tomacella adelphion* n. ssp., *C. tyla* n. sp., *C. cataclines* n. sp., and *Eucolodium otoides* n. sp. all from Chiapas. *Coelocentrum nelsoni* Dall is redescribed and its type locality restricted. The embryonic shells of *C. pfefferi* Dall, *C. turris* (Pfeiffer), *C. tomacella clava* (Pfeiffer), and *Eucolodium hegewischi* Bartsch are also described. *Crossostephanus* Dall, 1908 is synonymized with the subgenus *Coelocentrum* Crosse and Fischer, 1872. *Cylindrella ghiesbreghti* (Pfeiffer), 1856 is synonymized with *Eucolodium decollatum* (Nyst), 1841.

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Thompson, Fred G. 1968. Some Mexican Land Snails of the Family Urocoptidae. Bull. Florida State Mus., vol. 12, no. 3, pp. 125-183.

Introduction

Many genera and species of Mexican land snails are known only from the shells of a few specimens, and consequently their systematic status still remains uncertain. Such is the case of the Mexican Urocoptidae.

While conducting field studies in Mexico during 1964-1966 I collected a considerable amount of material referable to the genera *Anisospira, Coelocentrum,* and *Eucolodium.* Subsequent studies of this material emphasized the unsatisfactory state of our knowledge of these genera. The material has been sufficient to allow a review of the genus *Anisospira.* Some systematic changes are proposed within *Coelocentrum,* and descriptions of some new and poorly known species are given for this genus and *Eucolodium.*

Acknowledgements

I wish to express my gratitude to the following individuals who have aided me in this study: For the loan of type specimens in their charges I am indebted to Joseph P. E. Morrison, U. S. National Museum (USNM) and Henry van der Schalie, Museum of Zoology, University of Michigan (UMMZ). James A. Peters, U. S. National Museum, answered inquiries concerning the type locality of *Dissotropis henryi* (Solem). Neil Chernoff, Dennis R. Paulson, Wayne King, and my wife Donna M. Thompson assisted me in field work in Mexico during 1965 and 1966. Field work was supported by the National Institutes of Health research grant GM 12300.

Genus *Anisospira* Strebel

Anisospira Strebel, 1880; Beitr. Kennt. Fauna Mex. Land Sussw.-Conch., IV: 77.—Pilsbry, 1903; Man. Conch., 15: 24-25.—Solem, 1957; Not. Nat., (298): 4-5.

Type species: *Cylindrella liebmanni* Pfeiffer, 1846 (Pilsbry, 1903: 24).

Strebel (1880: 77) proposed *Anisospira* to include two Mexican species of *Eucolodium*-like snails that have two spiral lamellae on the axis of the last two whorls (*Cylindrella liebmanni* Pfeiffer and *C. hyalina* Pfeiffer). He related the genus to *Holospira* and similar genera that also have spiral axial lamellae. These lamellate genera he placed in the family Cylindrellidae (=Urocoptidae *s.s.*). *Eucolodium* and its allies he placed in the family Eucolodiidae (=Eucolodiinae, Urocoptidae). Pfeffer (1887: 21) expanded the concept of *Anisospira* to include *A. strebeli* Pfeffer, a species from southern Oaxaca with a single lamella. Dall (1896: 353) treated *Anisospira* as a

subgenus of *Eucolodium,* and described a fourth species, *E. (A.) strebeli* Dall (=*A. dalli* Martens). Martens (1890: 255) recognized *Anisospira* only as a section of *Eucolodium* and synonymized the family Eucolodiidae with the Cylindrellidae. Pilsbry (1903: 24-30, 298-300) followed Strebel and Pfeffer in his treatment of *Anisospira,* but emphasized its close relationship to *Eucolodium.* He included in the genus *Cylindrella recticosta* Pfeiffer and *A. r. townsendi* Pilsbry and Cockerell from Colima, and gave a partial description of the anatomy of the latter form. He also recognized the subfamily Eucolodiinae to include most of the Mexican Urocoptidae and the Hispaniolan genus *Archegocoptis.* Later (1946: 111) he placed the *Holospira*-like genera in the Holospirinae, thus restricting the Eucolodiinae to include *Eucolodium, Coelocentrum, Anisospira* and *Archegocoptis.* Bartsch (1906: 113-115) described *Dissotropis* as a subgenus of *Anisospira,* including two new species with a thin blade-like axial lamella with many uniform serrate teeth along its edge.

After Dall (1910: 34) described *A. orcutti (=A. liebmanni),* no additional contributions were made to the taxonomy of the genus until Solem (1957: 3-10) reviewed the known taxa and described *A. (Dissotropis) henryi.* Solem was handicapped in his review by the small amounts of material available at the time. Thus in nearly 90 years since its inception, the genus *Anisospira* has come to include 2 subgenera, 9 species, and 1 subspecies based upon only a few shells and a single anatomical examination.

The material before me, though not exhaustive, clarifies the identity of five specific names, brings to light one new species and one new subspecies of *Anisospira,* and necessitates the recognition of a new subgenus within *Anisospira. Dissotropis* is removed as a distinct genus, with the description of two new species. This review of *Anisospira* and *Dissotropis* is based upon 414 adult shells, many juvenile shells, and anatomical material of three species and one subspecies. I have examined the types of all species of *Dissotropis.*

DESCRIPTION – Shell medium sized to large. Color varying from brown to white. Cylindrical, fusiform, or pupiform in shape. Decollate, 6.5-11.0 whorls remaining in adult shells. Apical whorls frequently differentially reduced in size. Umbilicus imperforate. Surface sculptured with vertical ribs or threads. Spiral sculpture absent. Juvenile shell with distinct axial ribs that appear on 2nd half of 1st whorl and continue on following whorls with no change in intensity or spacing (fig. 1A); 3rd juvenile whorl 3.2-3.4 mm

wide, 5th and 6th whorls slightly constricted. Axis of juvenile shell very thin, but hollow, straight; smooth, without accessory sculpture or structures (fig. 1B). Axis in adult shell smooth, narrow, straight, or weakly twisted, especially in the last whorl or two. Axis of last 2-5 whorls with one or two simple spiral lamellae that act as spiral guides for movement of columellar retractor muscle.

The anatomy of the genus is described below under its two subgenera, which share a few anatomical peculiarities, that characterize the genus. The most important of these is the structure of the central (rachidial) tooth of the radula. The central tooth has a single enlarged mesocone; *ectocones are absent or very rudimentary*. Other genera of the subfamily have well developed ectocones on the central tooth.

Anisospira is characterized as a genus in the family Urocoptidae, subfamily Eucolodiinae with a cylindrical, decollate shell, a narrow, barely perforate axis bearing one or two simple spiral lamellae confined to the lower whorls, but lacking other sculpture of the axis at all stages of growth, and having a single, well defined cusp on the central tooth of the radulae.

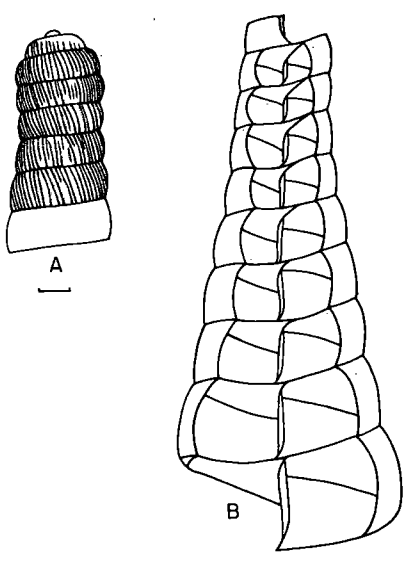

FIGURE 1. *Anisospira liebmanni* (Pfr.) A.—Embryonic shell and B.—juvenile whorls 6-14 showing simple axial structure (UF 19073). Scale=1 mm.

COMPARISONS WITH OTHER MEXICAN GENERA

Eucolodium. – This genus contains two subgenera, which are distinguished on the basis of axial structure. In *Oligostylus* the axis is simple, solid and straight or only slightly twisted. In *Eucolodium (s.s.)* the axis is solid, twisted, and bears a spiral lamella. The lamella extends the length of the shell and is a flattened extension of the twist in the axis. *Anisospira* differs in that the axis is narrowly perforate, and the lamellae are confined to the lower whorls and are thick deposits on the axis. In the bilamellate species of *Anisospira* the upper lamella overlies the region of the axis where a twist would occur, and is homologous in position to the axial lamella of *Eucolodium (s.s.).* The lower lamella of the bilamellate species and the single lamella in all other species of *Anisospira* lie just above the floor of the whorl and have no relationship to that part of the axis that would be involved in tortion if such existed. The presence and position of this lower lamella is unique to *Anisospira.*

Eucolodium was previously thought to be unique within the family because of the presence of a muscular plate produced by the fused ocular retractors over the pharynx. This feature also occurs in *Anisospira (s.s.)* (fig. 9). The extent of this character in other generic groups of the subfamily is not known; it suggests a close relationship between *Oligostylus* and *Anisospira.*

Coelocentrum. – This genus includes several subgenera, all of which are based upon the sculpture and modified shape of the axis. All species bear some type of axial sculpture, including granules, spines, ribs, or knobs. This sculpture is present on the axis of the juvenile as well as of the adult shell. All species also have a conspicuously hollow axis. In some species groups and subgenera the center of the axis has a spiral inflated bulge that may be greatly extended and lamellar-shaped, but hollow *(Crossostephanus* Dall, 1908), or may even bear a lamella upon the bulge *(Ptychocentrum* Bartsch, 1943). *Anisospira* differs from these groups by its completely smooth, very narrowly perforate axis, and by the relative position of the lamella with respect to other axial structures.

Solem (1957: 8) suggested that *Ptychocentrum* is transitional between *Coelocentrum* and *Eucolodium* because it has an axial lamella as does *Eucolodium (s.s.)* (and *Anisospira)* and a hollow axis and axial ribs as does *Coelocentrum.* This suggestion assumes that highly developed axial sculpture and well developed spiral lamella are primitive characters, and that evolution from this primitive condition involved the reduction or loss of both of these structures

in the respective genera. This is contrary to all other evidences, which indicate that axial sculpture and lamella become more complex in specialized groups, and that similar sculpture and lamella have evolved independently in different species groups and genera throughout the family. The well developed axial sculpture and lamella of *Ptychocentrum* are specialized characters that were undoubtedly derived from the more generalized type of axis of *Coelocentrum.*

Dissotropis. – This genus is characterized by having a large hollow axis, fine granular sculpture on the axis, and a high, blade-like axial lamella with serrate teeth along its edge. A spiral axial bulge is usually present above the lamella. The granular sculpture is always present on the axis of the juvenile shell, but may be much reduced in the adult shell.

Although the axial lamellae of *Anisospira* and *Dissotropis* are similar in position, the lamellae have different relationships to anatomical structures of the body and are analogous in function. In

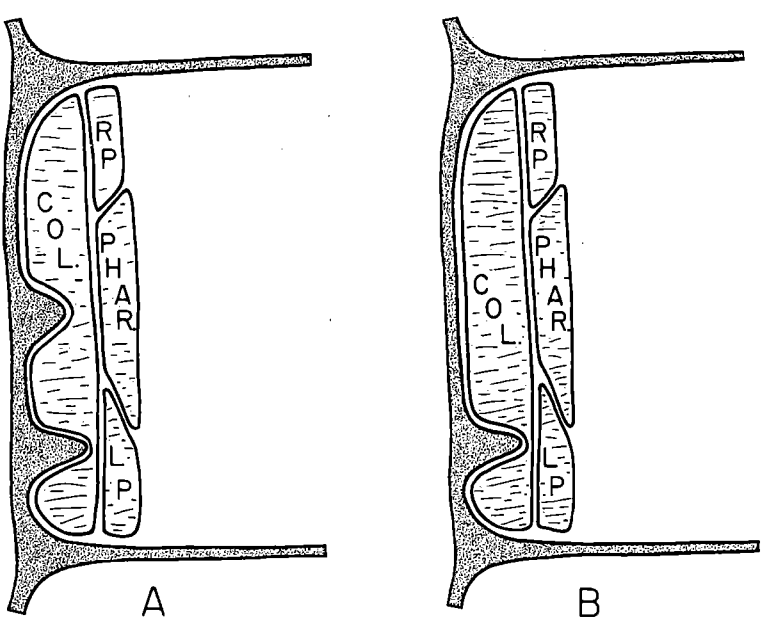

FIGURE 2. Diagrammatic cross-sections of A.—*Anisospira liebmanni* (Pfr.) and B.—*Anisospira d. dalli* (Martens) through first whorl above aperture showing relationship of axial lamella to free retractor muscles (COL, columellar retractor; LP and RP, left and right pedal retractors; PHAR, pharyngeal retractor).

Anisospira the whole surface of the axis in the lower 4 whorls is overlaid by the retractor muscles (fig. 2). The columellar retractor has longitudinally incised grooves on its ventral surface, and the lamellae fit into the grooves in such a way that they act as guides for the spiral movement of the muscle into and out of the shell. The rest of the viscera and the lung overlie the retractor muscles. In *Dissotropis* all of the retractor muscles and viscera are situated against the axis and lie above the axial lamella, which acts as a supporting shelf for the visceral mass and maintains a uniformly distended lung (fig. 12).

The different functions of the axial lamellae in the two genera imply independent origins and evolutionary sequences of this structure in each genus. If *Dissotropis* evolved from *Anisospira,* the retractor muscles and the viscera must have been translocated across the lamella at some point in its evolution. No evidence for such a "jump" exists, and simple mechanics argue against it. *Dissotropis* probably evolved from *Coelocentrum,* which only requires that the muscle and the viscera become localized around and above an axial bulge; subsequent origin and development of an axial lamella would retain the muscle and viscera in that position and maintain a uniformly distended lung. Such a restriction of the muscle and viscera has probably occurred along several independent lines in *Coelocentrum,* as is suggested by the spiral series of enlarged axial spines in the subgenus *Ptychodonta* and the lamellalike axial bulge in other species groups and subgenera.

Subgenus *Anisospira* Strebel

Shell as in genus except: Sculpture consisting of very fine threads or riblets; 4-7 thread-riblets per mm on antepenultimate whorl. Axis with one or two spiral lamellae.

Sole undivided longitudinally. Pallial organs long. Lung four whorls long. Kidney long, nearly semilunar, truncate at basal end. Sigmurethrous. Heart large, about ½ length of kidney, and lying near middle of kidney. Aorta continuous to mantle collar, without secondary branches.

Salivary glands long, but not surrounding esophagus. Jaw simple, solid, chitinous, with numerous very fine vertical striations on face.

Radular formula: $C\ \frac{1}{1} - L\ \frac{13}{2} — M\ \frac{12\text{-}15}{2}$ (101-124). Teeth lying in nearly straight transverse rows. Cusps simple, acuminate. Central

tooth without any indication of ectocones. Lateral and marginal teeth with one mesocone and one ectocone.

Reproductive system simple. Genital atrium moderately stout or slender. Penis small, with a basal constriction and a relatively large apical appendix which extends beyond epiphallus and is terminated by penial retractor muscle. Inside of penis with eight longitudinal folds and a fleshy pad around opening of epiphallus. Epiphallus very large and long, originating from side of penis. Spermathecal duct long and very large in diameter. Duct with a slender delicate appendix that is about ⅔ length of duct and originates from duct just above vagina.

Retractor muscles simple. Ocular retractors united over pharynx. Right ocular retractor passing between genitalia and trophic viscera. This subgenus contains two species and one subspecies, which are distinguished by characteristics of the shells. Very few differences occur in the anatomy of the three forms. They are distinguished as follows:

1. Axis of shell with two spiral lamellae ..... *A. liebmanni* (Pfr.)
1a. Axis of shell with a single spiral lamella ..... (2)
2. Size larger, 27.2-37.0 mm long, 9.5-13.0 mm wide; last few whorls not conspicuously constricted ..... *A. d. dalli* (Martens)
2a. Size small, 23.6-31.3 mm long, 8.3-10.0 mm wide; last few whorls more tightly coiled ..... *A. d. stringens* n. ssp.

The two species are found in southeastern Oaxaca (fig. 3) where they occur in numerous isolated colonies with many local variations. The variations revolve about a few parameters of the shell that are frequently repeated in colonies from widely separated areas, so that most local varieties are difficult to characterize and distinguish from one another. These variations are due to genetic peculiarities of the colonies and are not environmentally induced. Throughout their distribution both species are confined to limestone terrain and show no tolerance of igneous rocks, lateritic soils, or alluvial plains. Hence each colony is ecologically confined to the limestone exposure on which it occurs. The variations in ground moisture and diversity of plant formations may be nearly as great on a single limestone hill as they may be among many small ranges of hills over a relatively large area. Most limestone hills in the Tehuantepec region have more ground moisture at their bases than near their tops, and the density and diversity of plants is also greater near their bases. Snails collected near the bottom of these hills where it is relatively cool, shaded, and moist are not distinguishable from specimens collected at the tops of

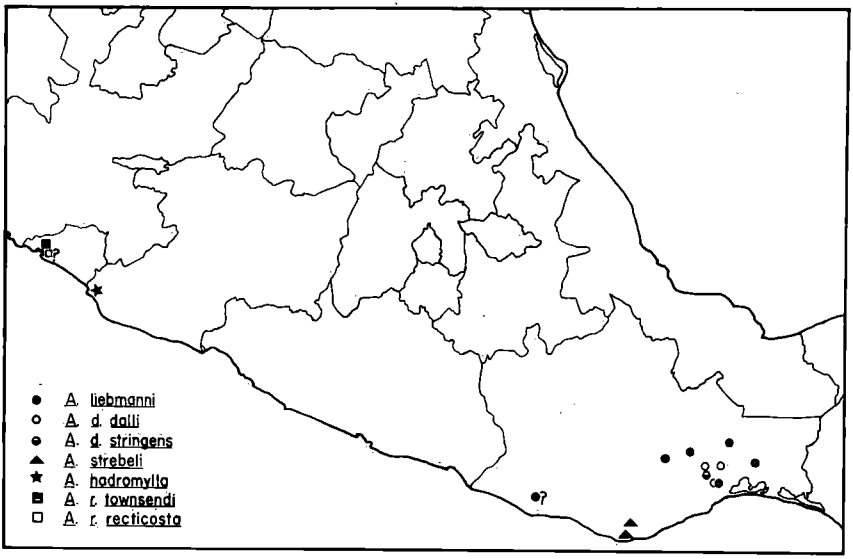

FIGURE 3. Geographic distribution in southwestern Mexico of species and subspecies of *Anisospira*.

the same hills where it is relatively hot and dry. Yet colonies on nearly identical limestone hills separated by only a few hundred yards of alluvial plains or laterites are frequently as different from each other as from remote colonies. These local variations can only be interpreted as isolated genetic variations and not phenotypic responses to particular physical or biotic factors.

Anisospira liebmanni (Pfeiffer)

Cylindrella liebmanni Pfeiffer, 1846; Z. Malak.: 159.

Anisospira liebmanni (Pfeiffer), Strebel, 1880; Beitr. Kennt. Fauna Mex. Land. Sussw.-Conch., IV: 79; pl. 5, figs. 12-13; pl. 14, fig. 2.—Pilsbry, 1903; Man. Conch. 15: 28-29; pl. 10, figs. 22-27; pl. 11, figs. 1-3.—Solem, 1956; Not. Nat., (298): 5-6; pl. 1, fig. 5.

Cylindrella trochaeformis Sowerby, 1843 *in* Reeve; Conch. Icon., XX; pl. 9, fig. 80 (young shell).

Cylindrella hyalina Pfeiffer, 1847, *in* Philippi; Abbild. u. Beschreib., 2: 47; pl. 2, fig. 2.

Anisospira hyalina (Pfeiffer), Strebel, 1880; Beitr. Kennt. Fauna Mex. Land Sussw.-Conch., IV: 19; pl. 13, fig. 16. —Pilsbry, 1903; Man. Conch., 15:26; pl. 10, figs. 18-21.

Eucolodium (*Anisospira*) *orcutti* Dall, 1910; Naut., 24: 34-36; —Dall, 1926; Proc. U. S. Natl. Mus., 66 (17):17; pl. 23, figs. 8, 11.

Anisospira orcutti (Dall), Solem, 1957; Not. Nat., (298): 6; pl. 1.

Liocentrum wilmoti Bartsch, 1948; Proc. Biol. Soc. Wash., 38: 52, fig. 2.

SHELL.—(fig. 4A-G.) Moderately large, size variable. Decollate, generally fusiform, but of variable shape; occasionally terete, or cylindrical. Imperforate. Color various shades of light brown, occasional populations almost white or pink. Shell solid and opaque though generally not thick walled, 6.8-11.0 whorls. Whorls nearly flat sided; generally gradually increasing in size from apex to about middle of shell, and thereafter remaining rather uniform in size or decreasing

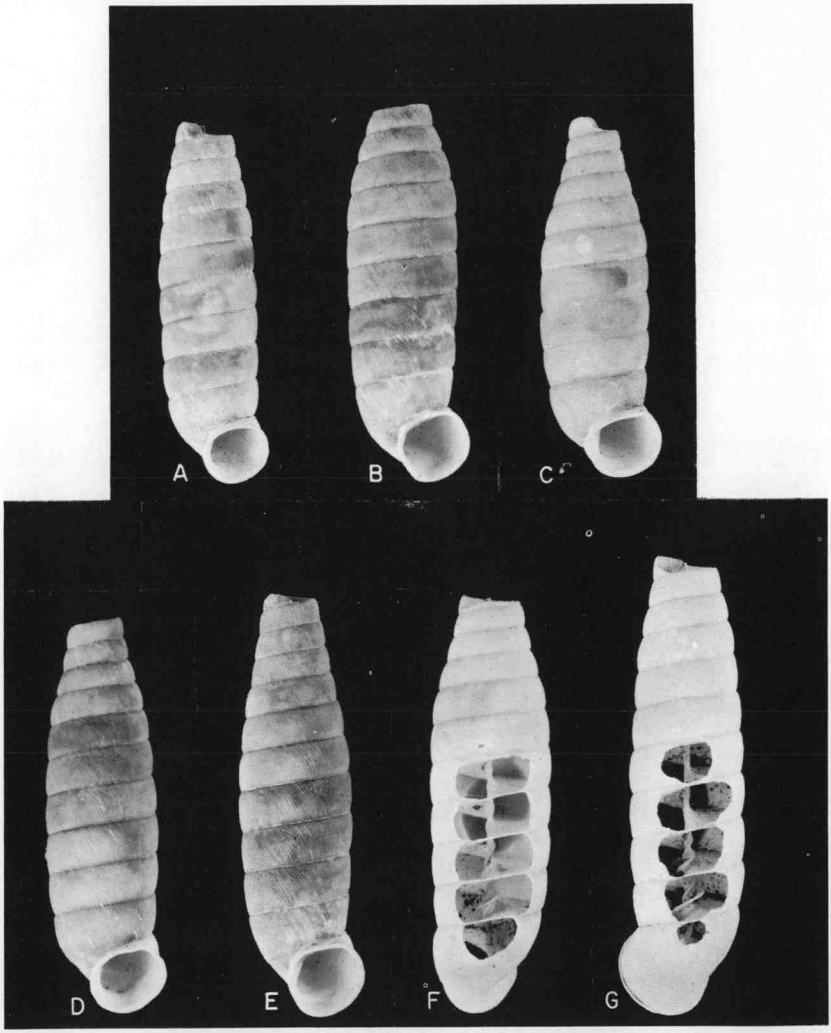

FIGURE 4. *Anisospira liebmanni* (Pfr.). Shells of seven specimens from Lagunas, Oaxaca (UF 19072) showing variation in shape and axial lamella.

slightly. Occasionally the initial few whorls may be nearly uniform in size and then rapidly expand to the size of the lower spire. Suture weakly impressed. Surface of whorls crossed by numerous fine, recurved, close, vertical threads that are continuous and equally developed between the sutures. Threads about ½ or ⅓ as wide as their intervals, 4-7 threads/mm. Base of last whorl with a low weak spiral crest that may be obsolete in some specimens or populations. Aperture free from preceding whorl, projected forward slightly. Aperture nearly circular, with its greatest diameter lying in an oblique direction from the upper outer corner to the basocolumellar corner. Interior of aperture white. Aperture lying at 22-28° to axis of shell in lateral profile. Lip slightly thickened and weakly expanded around aperture. Axis narrow, about 1/12 diameter of shell, very narrowly perforate. Axis with two spiral lamellae that are usually confined to last 2 whorls. One lamella located just above floor of whorl; second lamella located near middle of axis and may occur on low twist of axis.

Embryonic whorls (fig. 1A) not clearly demarcated from following whorls. First whorl protruding, gradually increasing in size through 3rd or 4th whorl which is 3.2-3.4 mm wide, next 2 or 3 whorls decreasing slightly in size. Following whorls regularly increasing in size to point of decollation. Rate of growth indicates about 12-15 whorls lost above decollation point of adult shell. Initial half whorl smooth; following whorl with vertical threads that become increasingly strong and thereafter are nearly equally developed. Axis of juvenile shell simple and very narrow (fig. 1B).

Length of shell, 25.0-41.3 mm; diameter, 8.9-13.2 mm; aperture, 6.2-9.1 mm. Measurements representing four population samples are given in table 1.

TABLE 1. MEASUREMENTS OF 131 SPECIMENS OF *Anisospira liebmanni* FROM 5 LOCALITIES.[1]

	Locality	*No.*	*Length*	*Width*	*Whorls*	*Apert. width*
A	16.5 mi. SE of El Cameron	12	30.0-36.7	9.9-10.5	7.1-9.3	7.0-8.9
B	Lagunas	20	31.1-41.3	9.4-11.8	8.9-11.0	6.4-8.9
C	Ojo de Agua	8	32.4-40.0	10.7-11.7	8.7-10.0	6.2-7.9
D	15.3 mi. NW Presa Benito Juarez	84	25.0-33.0	8.9-10.6	6.8-10.2	6.2-7.9
E	7.0 mi. NW Tehuantepec	7	32.8-37.0	11.4-13.2	7.7-9.1	7.9-9.1

[1]Standard deviations of measurements from populations A-D are graphically illustrated in Fig. 4.

The shell is highly variable in many features, including size, number of whorls, shape, color, and axial development. The most notable variations are in size and number of whorls. Each population tends to be characterized by a particular size class of individuals, but considerable variation occurs within any given population, and all measurements between different populations overlap. Quantitative characters that were statistically analyzed for standard deviations are presented graphically (fig. 5). All characters show such broad overlap that no statistical separation of the various populations can be made. Shape is highly variable within most populations, and no particular shape characterizes any single population. Color tends to be more conservative within a population, but the differences between populations are slight, and the same color hues recur among geographically remote populations as well as in various populations of *A. dalli* (Martens).

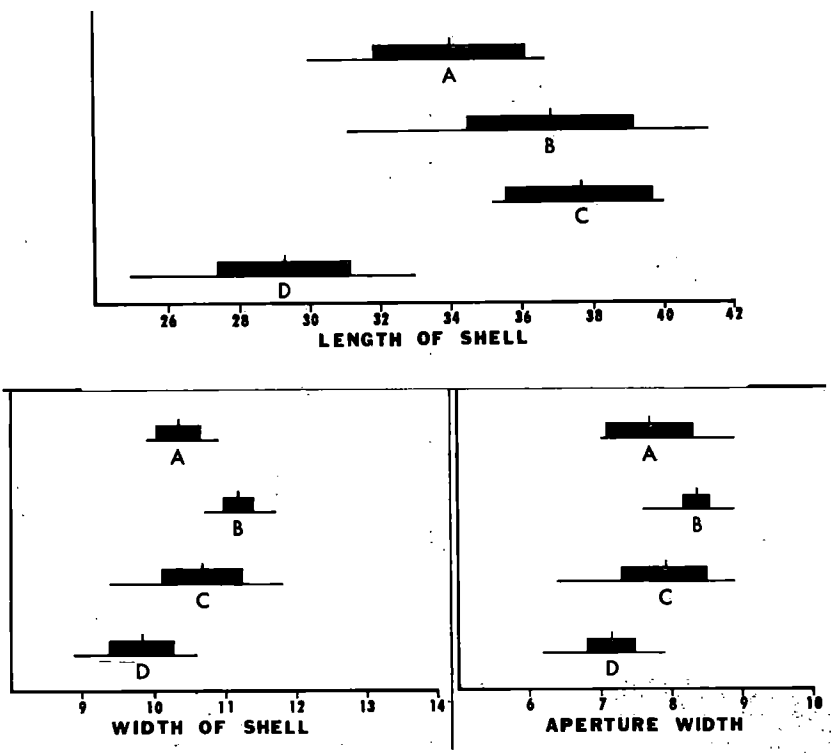

FIGURE 5. Standard deviations of three shell parameters of *Anisospira liebmanni* (Pfr.). Four population samples same as in table 1, A-D.

The development of the axial lamellae is also variable, and they vary more within populations than between different populations (fig. 4). In some specimens the upper lamella is very weak and low, and both lamellae may be confined to only the last two whorls. In other specimens both lamellae are very well developed and extend to the third or fourth whorl.

The characteristics of four nominate species fall within the observed variation: *A. liebmanni* (Pfeiffer), *A. hyalina* (Pfeiffer), *A. orcutti* (Dall), and *Liocentrum wilmoti* Bartsch. These species were recognized on the basis of size, number of whorls, color, and shape. *A. liebmanni* is stout, has 7-8 whorls, is brownish-yellow in color and has a strongly truncate upper spire in the adult shell. *A. hyalina* is "about 12 mm" wide, has 10-13 whorls, is white or pinkish, and is more nearly cylindrical. *A. orcutti* is large, is 10-14 mm wide, has 8.5-10.5 whorls, is pale cinnamon-brown, and is nearly cylindrical. *L. wilmoti* clearly was based upon an immature specimen of *A. liebmanni.*

The variation of the material examined encompasses the distinctions of these species and does not permit separation by these or any other characters. Even though some of the measurements of diameter and number of whorls exceed the ranges of the material that I have examined, the cited variations broadly overlap my measurements. Undoubtedly other populations exist that would expand the range of measurements I have found in the material before me and encompass these greater dimensions. The large number of whorls originally given for *A. hyalina* (Pfeiffer, *in* Philippi, 1847: 47) may represent an unusual specimen, or a specimen with two plugs in which decollation has taken place only above the upper plug, as occasionally occurs.

ANATOMY.—Holopod; sole undivided longitudinally. Sides of foot with a single series of low pilasters along sole. Sides and tail coarsely pebbled. Dorsal surface of tail flattened posteriorly, rounded anteriorly; without caudal pore. Genital opening lying below and behind right eye stalk.

Lung four whorls long. Pneumostome consisting of two slits in mantle collar covered with a thick fleshy fold. Pneumostome lacking accessory valves. Rectum and ureter discharging above pneumostome through a single slit. Kidney (fig. 6) nearly semilunar in shape, but blunt at basal end. Sigmurethrous. Primary ureter originating below apex and tightly appressed to side of kidney. Secondary ureter attached to rectum. Pericardium about ½ length of kidney. Auricle

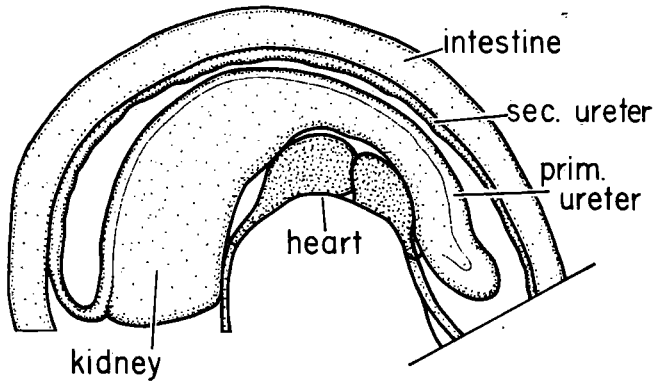

FIGURE 6. Inner view of kidney and associated organs of *Anisospira liebmanni* (Pfr.). Scale = 1 mm.

½ again as large as ventricle. Aorta simple, continuous to mantle collar, lying along base of whorl.

Jaw (fig. 7) arcuate, solid. Face smooth, with numerous very fine vertical striations, but no ribs. Posterior margin with a reinforcing ridge that parallels curvature of cutting edge. Ridge with a long, broad cartilaginous flange that projects posteriorly.

Radular formula: $C \frac{1}{1} - L \frac{13}{2} — M \frac{12\text{-}14}{2}$ ——— (114-124). The teeth are typical in shape and structure for the subfamily Eucolodiinae. Central tooth with a large lanceolate mesocone and no ectocones. Laterals with a large mesocone and a single small ectocone. Marginals with a reduced mesocone and one ectocone.

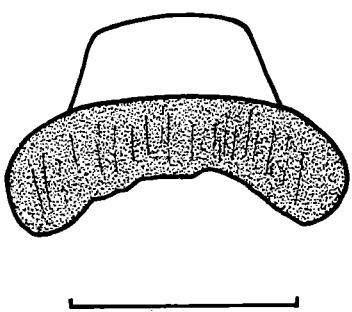

FIGURE 7. Jaw of *Anisospira liebmanni* (Pfr.). Scale = 1 mm.

Salivary glands long, flat, and diffuse posteriorly where they extend over sides and dorsal surface of the esophagus. Salivary ducts long.

Genital atrium (fig. 8A, B) moderately long and stocky. Penis small, slightly constricted above atrium, terminated apically by a relatively large and conspicuous diverticulum. Penial retractor muscle inserting on tip of diverticulum. Interior of penis below basal

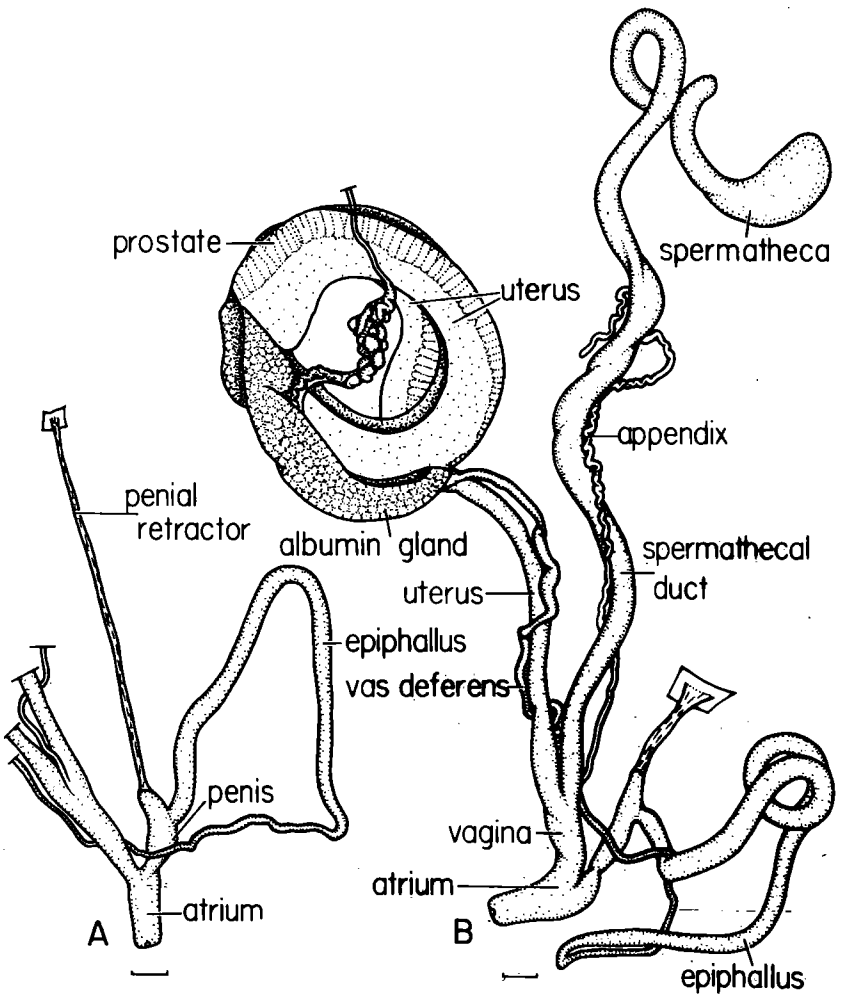

FIGURE 8. Reproductive system of *Anisospira liebmanni* (Pfr.). A.—15.3 mi. NW Presa Benito Juarez, Oaxaca. B.—Lagunas, Oaxaca. Scales = 1 mm.

constriction with 8-10 low longitudinal folds. A large fleshy pad lies along the epiphallic side of upper penial cavity. Lumen of epiphallus discharging through central slit in pad. Remainder of upper penial wall with eight narrow longitudinal folds. Epiphallus originating from side of penis. Interior of epiphallus with small conical elongate fleshy tubercles about 0.1-0.2 mm wide and high. Epiphallus long, well developed, almost as thick as penis, gradually diminishing in size to the vas deferens. Vas deferens lightly attached to genital atrium by a few fine muscular fibers. Vagina long and relatively wide. Inner wall of vagina with eight longitudinal folds that extend into atrium. Spermathecal duct originating from vagina shortly above atrium. Spermathecal duct very thick, basocolumellar in position. Spermatheca impressed against prostate immediately below albumen gland. Spermathecal duct with an appendix about ⅔ as long as duct; appendix very thin and delicate, and originating from duct immediately above vagina. Uterus and prostate tightly appressed thoughout their lengths. Albumen gland moderately long, strongly compressed or indented on each side by intestine and esophagus. Hermaphroditic duct convoluted near albumen gland, entering gland shortly above prostate. Ovotestis (not illustrated) with 6-8 lobes, each lobe consisting of about 25-40 claviform papillae.

Penial retractor muscle originating from inner wall of lung about one whorl above mantle collar and near lower left side. Length of muscle variable in specimens from different localities, but part of variation also due to degree of relaxation at time snail is preserved.

Columellar retractor muscle (fig. 9A) long, extending to apex of shell and attaching to integument; distal end thick. Left pedal retractor originating along left margin of columellar retractor in 4th from last whorl. Pharyngeal retractor originating slightly distal to this point and from dorsal surface of columellar retractor. Pharyngeal retractor divided and subdivided distally into many narrow slips that attach to base of pharynx. Right pedal retractor originating from columellar retractor about ½ whorl distal to origin of pharyngeal retractor. Right and left ocular retractors originating from corresponding pedal retractors, and united dorsally over pharynx by a thin muscular sheet. Right ocular retractor passing between the genitalia and the remaining viscera, and giving off several small fibers that attach to wall of vagina.

GEOGRAPHIC DISTRIBUTION.—(fig. 3.) This species is known from several localities in the Tehuantepec region (Solem, 1957: 5-6) north-

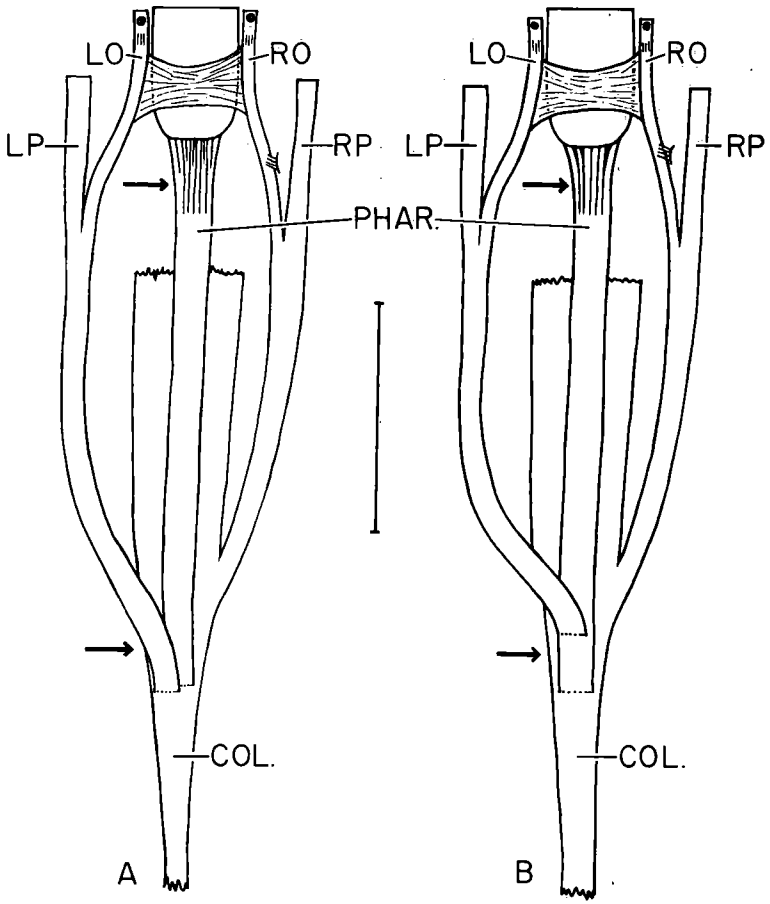

FIGURE 9. Diagrammatic illustrations of the free retractor muscles of A.—*Anisospira liebmanni* (Pfr.) and B.—*Anisospira d. dalli* (Martens) demonstrating differences in structure (COL, columellar retractor; LO and RO, left and right ocular; PHAR, pharyngeal retractor; LP and RP, left and right pedal retractor). Scale = 10 mm.

west to the area near Camaron, which is about halfway between Tehuantepec and Oaxaca, Oaxaca. If Dall's original locality for *A. orcutti* is correct (Dall, 1910: 34), the range extends considerably farther west to the Rio Verde Valley in southwestern Oaxaca. Solem (1957: 6) suggested that Dall's locality was incorrect, and that the types of *A. orcutti* actually came from the town of Rio Verde near Tehuantepec. This argument cannot be resolved without additional

typical in shape and structure for the subfamily Eucolodiinae. Central collections from the Rio Verde Valley, but Solem's suggestion is not necessary to explain the identity or variation of various populations in the Tehuantepec region.

The type locality for *A. liebmanni* was not given, but Strebel (1880: 79) cited specimens as having come from Juchitan. This city lies on a low alluvial plain many miles from limestone hills, but is situated on the Rio Juchitan, which drains several low limestone mountain ranges. Specimens reported from Juchitan probably were collected elsewhere or were taken from stream drift along the Rio Juchitan, for *A. liebmanni* has been collected alive only on limestone terrain.

SPECIMENS EXAMINED.—OAXACA: 16.5 mi. SE El Camaron, 3200′ elevation (14); Ojo de Agua, 5.3 mi. E Entronque La Ventosa, 200′ (8): Lagunas (20); 15.3 mi. NW Presa Benito Juarez on Rio Tehuantepec, 900′ (86); 7.9 mi. NW Tehuantepec (7). All material in the Florida State Museum collections.

RELATIONSHIPS.—This species is closely related to *A. dalli* (Martens), and may be only subspecifically distinct from it. All features of color, size, whorl counts, sculpture, and shape broadly overlap or are repeated in various populations of the two species. They can be separated consistently only on the basis of the axial lamellae within the last few whorls. All population samples that I have examined are consistent in the number of lamellae present, although there may be considerable variation in their development. *A. liebmanni* always has two distinct lamellae, *A. dalli* only a single lamella. Some specimens of *A. dalli* may have a twisted axis in the last whorl which imparts the appearance of a lamella, but it is clearly a twisted axis and not a raised solid deposit on the axis. Pilsbry (1903: 27) suggested that *A. hyalina* (=*A. liebmanni*) and *A. dalli* might be subspecifically related. Solem (1957) followed Pilsbry's suggestion and united the two, though he presented no data to justify this action. I have seen no indication that these two species intergrade in axial structure.

Anisospira d. dalli (Martens)

Anisospira strebeli Dall, 1897; Proc. U. S. Natl. Mus., 19: 353; pl. 33, figs. 7,8. (not *Anisospira strebeli* Pfeffer, 1887).

Eucolodium dalli Martens, 1901; Biol. Cent. Amer.: 633.

Anisospira dalli (Martens), Pilsbry, 1903; Man. Conch., 15: 26-27; pl. 1, fig. 12; pl. 10, figs. 28, 29.

Anisospira hyalina dalli (Martens), Solem, 1957; Not. Nat., (298): 5; pl. 1, fig. 6.

SHELL.—(fig. 10A-F.) Moderately large, fusiform with a subequal or pinched apex, terete or cylindrical, imperforate, decollate. Color various shades of light brown to nearly white; live shells generally light tan. Walls solid but not thick. Whorls, 8.3-11.7, nearly flat sided, only slightly arched between sutures. Generally initial 1-3 whorls conspicuously smaller than following whorls; next 2-3 whorls rapidly increase to maximum size of adult shell; last 1-2 whorls decreasing slightly in diameter. Occasional shells may be nearly cylindrical. Surface of whorls sculptured with numerous fine raised vertical threads that are moderately arched posteriorly and uniform and continuous between sutures; 4-7 threads/mm. Base of last whorl with a very faint weak spiral ridge. Aperture free from preceding whorls and projecting forward slightly, nearly circular or ovate, its greatest diameter lying in an oblique direction. Peristome slightly thickened and reflected around aperture. Interior of aperture and peristome white or grayish white. Aperture lying at 24-35° to axis of shell. Axis narrow, about 1/12 diameter of shell, very narrowly perforate, nearly straight throughout most of length of shell, but moderately twisted in last whorl. Axis with a single spiral lamella that is generally confined to the last 2 whorls. Lamella located on lower part of axis just above floor of whorl, generally low, but may flare out considerably in last whorl.

Embryonic and juvenile shell as in *A. liebmanni*. Rate of growth indicates about 12-14 whorls lost above decollation point in adult shell.

Length of shell, 27.2-37.0 mm; width of shell, 9.5-13.0 mm; aperture diameter, 6.5-8.8 mm. Measurements of four populations and their statistical analysis are given in table 2 and fig. 11A-C. As in *A. liebmanni* this species is highly variable in size, number of whorls,

TABLE 2. MEASUREMENTS OF 180 SPECIMENS OF *Anisospira dalli* FROM 4 LOCALITIES.[1]

	Locality	*No.*	*Length*	*Width*	*Whorls*	*Apert. width*
A	8.1 mi. NW Tehuantepec	82	27.2-37.0	9.5-13.0	7.0-9.3	6.5-8.8
B	2.2 mi. NW Mixtequilla	30	27.5-34.5	9.7-11.7	6.5-9.3	6.8-8.0
C	0.8 mi. N Presa Benito Juarez	16	28.8-34.3	9.6-11.1	7.7-9.3	6.6-8.1
D	*stringens*	52	23.6-31.3	8.3-10.0	6.9-9.6	5.5-7.1

[1]A-C represent populations of *A. d. dalli;* D represents the type series of *A. d. stringens* n. ssp. Standard deviations of these measurements are graphically illustrated in Fig. 11.

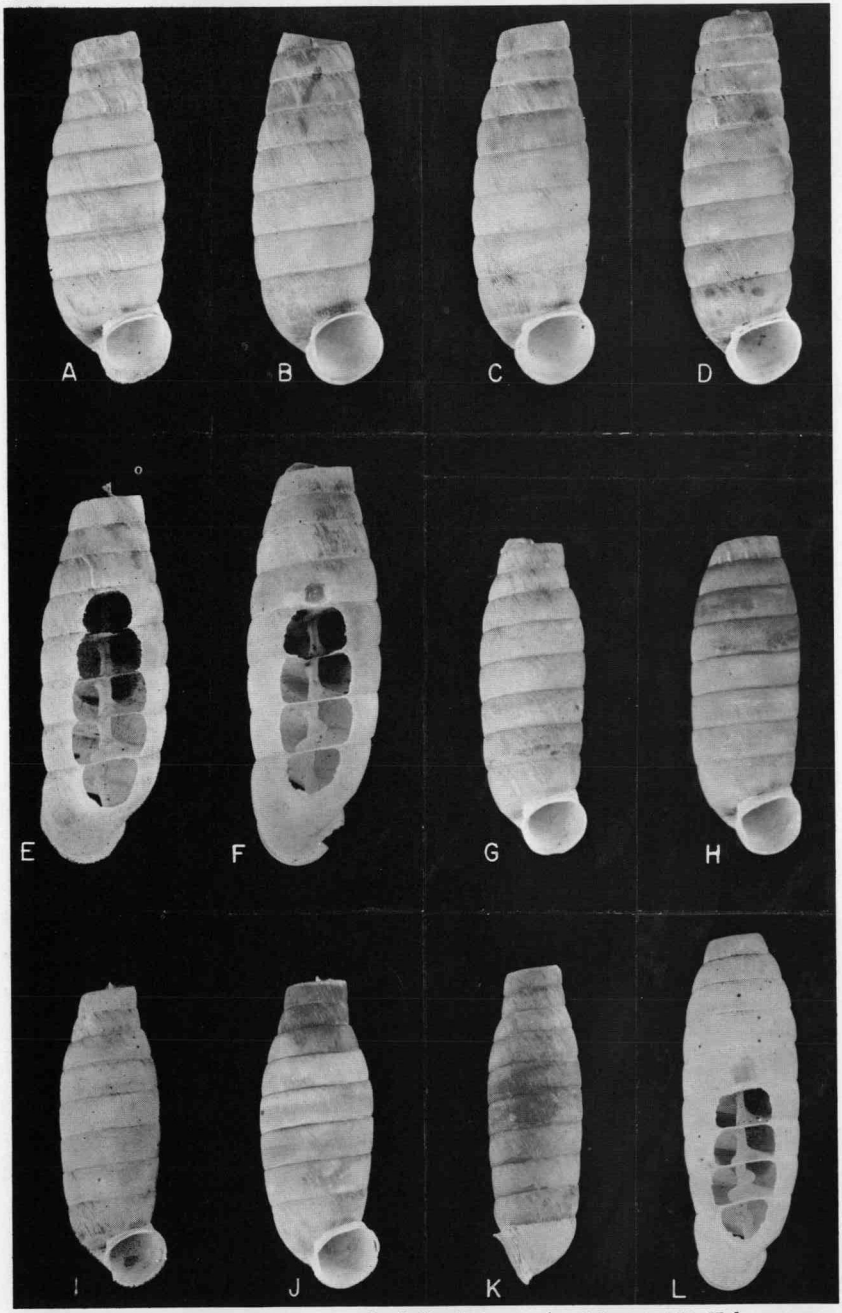

FIGURE 10. A-F.—*Anisospira d. dalli* (Martens), 8.1 mi. W Tehuantepec, Oaxaca (UF 19074). G-L.—*Anisospira d. stringens* n. ssp. G.—Holotype. H-L.—Paratypes, hill 0.4 mi. S Presa Benito Juarez, Oaxaca.

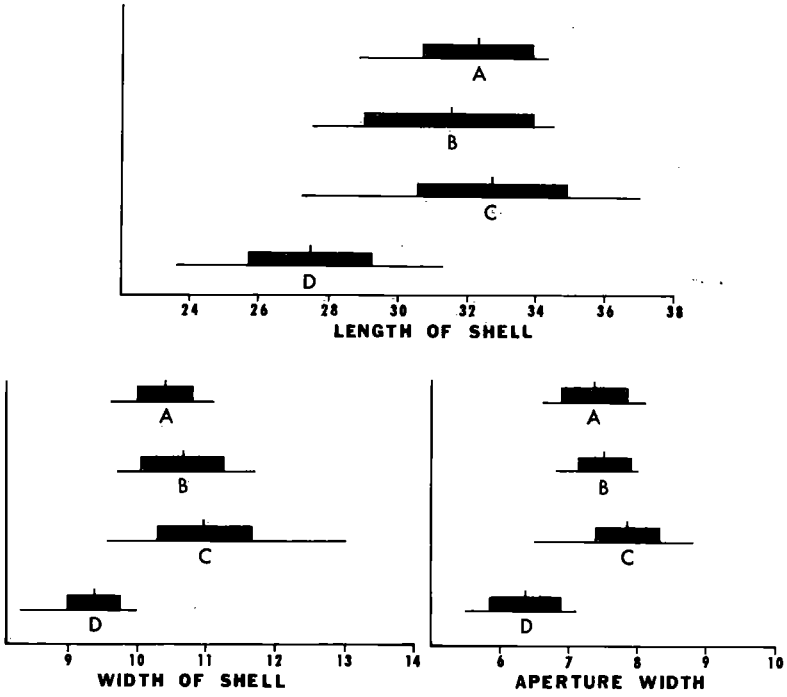

FIGURE 11. Standard deviations of three shell parameters of *Anisospira dalli*. Four population samples same as in table 2. A-C.—*Anisospira d. dalli* (Martens). D.—*Anisospira d. stringens* n. ssp.

shape and color, but to a lesser extent in the development of the axial lamella. Practically the same statements made about these characters in *A. liebmanni* also apply to this species.

Some colonies have rather striking aspects of shell size and appearance that tend to characterize them. In some instances the variation may be subspecifically significant; one such population is so described below.

ANATOMY.—This species is very similar in anatomical characters to *A. liebmanni*, and only the more important features are described.

Radular formula: $C \frac{1}{1} - L \frac{13}{2} - M \frac{14\text{-}15}{2}$ (101-106).

Reproductive system (fig. 12A) as in *A. liebmanni* except: Genital atrium more slender. Interior of penis below basal constriction with a heavy longitudinal fold. Fleshy pad along epiphallic wall of penis well developed (fig. 12B); 8-9 narrow fleshy folds on remainder of

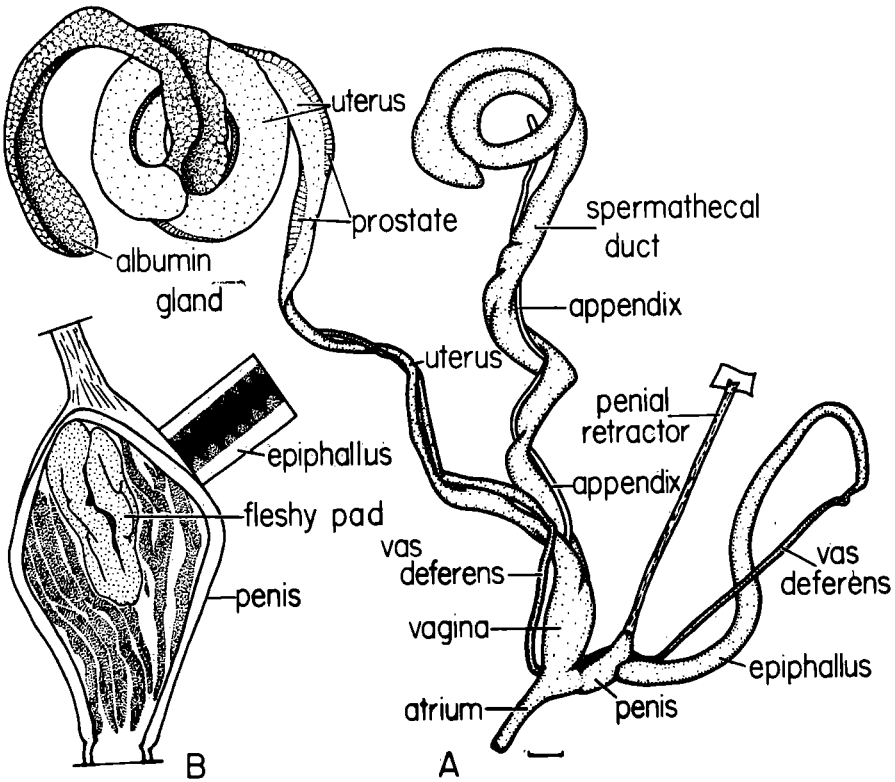

FIGURE 12. A.—Reproductive system of *Anisospira d. dalli,* 8.1 mi. W Tehuantepec, Oaxaca. B.—Inner view of penis showing fleshy pad with central slit opening from lumen of epiphallus. Scale = 1 mm.

penis wall. Interior of epiphallus with numerous small oblique folds and papillae that tend to be more elongate than in *A. liebmanni.* Lumen of vagina below spermathecal duct with seven heavy folds that extend into the atrium. Lumen of uterus above spermathecal duct with many low folds arranged in oblique series.

Retractor muscles (fig. 9B): Left pedal retractor originating on dorsal surface of pharyngeal retractor slightly distal to origin of latter muscle. Pharyngeal retractor divided distally into six bands that attach to base of pharynx.

GEOGRAPHIC DISTRIBUTION.—(fig. 3.) This species has been collected from a relatively small area of limestone hills and mountains west and north of Tehuantepec. Previous locality records from Huilotepec (Dall, 1897: 353, type locality) and Salina Cruz and La Ventosa

(Solem, 1957: 5) are questionable. As with the former species *A. dalli* is confined to limestone terrain. Huilotepec lies on a low alluvial plain along the Rio Tehuantepec and is far from any limestone outcrops. The only nearby hills are a low range of granitic mountains a few miles to the east. The type specimens may well have been collected from river drift carried downstream from farther north where this species does occur. Salina Cruz and La Ventosa both lie on the coast and the only stone in the immediate area is a soft crumbly granite. Specimens reported from these two localities may have been collected from beach drift or from farther west where limestones do occur.

SPECIMENS EXAMINED.—OAXACA: hill 8.1 mi. NW Tehuantepec, 450′ (82); hill 2.2 mi. NW Mixtequilla, 400′ (30); 0.8 mi. N Presa Benito Juarez on Rio Tehuantepec, 500′ (16). All material in the Florida State Museum.

RELATIONSHIPS.—The relationship of this species to *A. liebmanni* has been discussed under that species. Its affinities to the following form are discussed under that subspecies.

Anisospira dalli stringens new subspecies

SHELL.—(fig. 10G-L.) Relatively small, fusiform or terete; apex occasionally pinched. Decollate. Compactly coiled; initial 1-2 whorls small; following 2 whorls rapidly increasing in size; remaining whorls nearly equal in size, decreasing slightly near base; last whorl noticeably constricted. Umbilicus imperforate. Axial puncture very small or closed. Light brown to light tan in color, dull. Shell firm but not thick; 6.9-9.6 whorls remaining in adult shell. Suture moderately impressed; whorls nearly flat sided, only slightly arched between sutures. Surface sculptured with numerous fine, close, oblique, recurved vertical threads that are about 1/4 as wide as their intervals; 5-7 threads/mm. Last whorl with a nearly obsolete basal crest. Aperture nearly circular; its greatest diameter lying at an oblique angle. Aperture free from last whorl and projected slightly forward, lying at 26-34° to axis of shell in lateral profile. Peristome only slightly thickened and reflected. Interior of aperture and peristome white. Axis narrow, straight, increasing slightly in diameter in lower whorls, about 1/12-1/15 diameter of shell, very narrowly perforate. Axis with a spiral lamella confined to last two whorls; lamella located on axis just above floor of whorl.

Embryonic whorls not demarcated from following whorls, rapidly increasing in size to about 3rd whorl; following 3 whorls decreasing

slightly in size; remaining whorls gradually increasing in size to point where adult shell becomes decollate; 3rd whorl 2.8 mm wide. Rate of growth indicates about 14-15 whorls lost from adult shell above point of decollation. Initial 3/4 whorl smooth. Following whorl with fine axial threads that become increasingly strong and thereafter are nearly uniform in size and spacing.

Measurements of holotype: length, 27.8 mm; width, 9.3 mm; aperture diameter, 6.0 mm; 8.5 whorls remaining (fig. 10G).

Measurements of paratypes: length, 23.6-31.3 mm; width, 8.3-10.0 mm; aperture diameter, 5.5-7.1 mm.

TYPE LOCALITY.—OAXACA hill about 0.4 mi. S of the Presa Benito Juarez on the Rio Tehuantepec, about 18 mi. NW Tehuantepec. HOLOTYPE: UF 19079; collected 15 July 1966 by Fred G. Thompson. PARATYPES: UF 19080 (24), 19081 (3 juveniles), 19082 (23), 19083 (1 juvenile); Museo de Historia Natural de la Ciudad de Mexico (5).

The type locality lies in a narrow ravine on the north side of a hill paralleling the road to the dam. The bottom of the ravine is wooded with a sparse submesic forest, while the sides of the ravine and the top of the hill are xeric. Snails were found in the ravine and on the hillsides irrespective of the vegetational differences. Their distributions did not reflect any apparent preference for ground moisture.

DISTRIBUTION.—(fig. 3.) This subspecies is known only from the type locality and is probably restricted to the immediate vicinity. Typical *A. d. dalli* occurs on the immediately opposite side of the Rio Tehuantepec, as it does only a few miles east on both sides of the river, near Mixtequilla.

RELATIONSHIPS.—*A. d. stringens* is closely related to *A. d. dalli* from which it differs in its generally more terete or fusiform shape, its smaller size, and its more constricted last whorl. The differences between the two subspecies overlap, and only about 75 per cent separation is possible with size characters.

ETYMOLOGY.—The name *stringens* is derived from the Latin for constricted and refers to the nature of the last whorl.

Trachycion new subgenus

GENOTYPE: *Anisospira recticosta townsendi* Pilsbry and Cockerell, 1903.

Shell generally as in genus. Sculpture consisting of coarse ribs that are uniformly developed and evenly spaced over surface of shell; 3-5 ribs per mm on antepenultimate whorl. Juvenile shell unknown.

Radula with 27-1-28 rows. Central tooth barely tricuspid. Mesocone broad, lanceolate; ectocones very small and appearing only as lateral tubercles at base of mesocone. Lateral and marginal teeth bicuspid with a mesocone and a small ectocone.

Genital atrium very short (?). Penis very short and globose, with a broad, flat apex. Epiphallus originating from apex of penis. Penial retractor muscle inserting on apex of penis around origin of epiphallus. Inner wall of penis with a very short, high pilaster. Epiphallus about 4 times as long as penis, well differentiated, but not approaching size of penis. Spermathecal duct very long, but not noticeably swollen below spermatheca. Spermathecal appendix unknown. (Anatomical data from Pilsbry, 1903: 298-299).

Trachycion is found from southern Oaxaca northwest at least to Colima (fig. 3) and contains three species and one subspecies. The forms are represented by very few specimens, and little is known about local distributions and variation. The new species described below is the only new material that has been reported since Solem (1957) reviewed the genus.

ETYMOLOGY.—The name *Trachycion* is derived from the Greek *trachys* + *cion* and refers to the rough ~~pillar of axis~~ shell. The gender of the name is neuter.

Key to the Species of *Trachycion*

1. Sculpture consisting of coarse vertical ribs; 2-3 ribs/mm..... 2
1a. Sculpture consisting of fine vertical ribs; 4-5 ribs/mm..... 3
2. Axial lamella thin and wide. Peristome conspicuously thickened. Color white. Umbilicus imperforate.....*A. hadromylla* n. sp.
2a. Axial lamella rounded, no higher than wide. Peristome moderately thickened. Flesh-colored. Umbilicus rimate ..... *A. strebeli* (Pfeffer)
3. Whorls narrow, middle whorl of adult shell 4 mm wide..... *A. r. townsendi* (Pils. and Cock.)
3a. Whorls wider, middle whorl of adult shell 5 mm wide..... *A. r. recticosta* (Pfeiffer)

Anisospira recticosta recticosta (Pfeiffer)

Cylindrella recticosta Pfeiffer, 1847, *in* Philippi; Abbild. u. Beschreib.; 2: 48; pl. 2, fig. 3.

Eucolodium recticosta (Pfeiffer), Crosse and Fischer, 1872; Miss. Scient. Mex., Moll., 1: 386; pl. 14, figs. 12-12b.—Pilsbry, 1903; Man. Conch., 15: 16; pl. 3, figs. 21-23.

Anisospira r. recticosta (Pfeiffer), Pilsbry, 1903: Man. Conch., 15: 299.

The type locality of this species is not known. It has been recorded from Cualata, Colima, but those specimens probably belong to the following subspecies (Pilsbry, 1903: 299).

Anisospira recticosta townsendi Pilsbry and Cockerell

Anisospira recticosta var. *townsendi* Pilsbry and Cockerell, *in* Pilsbry, 1903; Man. Conch., 15: 298-300; pl. 63, figs. 51-55 (anatomy); vol. 16, pl. 11, fig. 85, 86 (shell).

This subspecies is known only from the holotype (ANSP 84385), which came from Cualata, Colima (fig. 3).

Anisospira strebeli Pfeffer

Anisospira strebeli Pfeffer, 1887; Verh. Ver. Naturw., Hamburg: 21.—Pilsbry, 1903: Man. Conch., 15: 29-30; pl. 10, figs. 30-34; pl. 11, fig. 4.—Solem, 1957; Not. Nat., (298): 5; pl. 1, figs. 3, 4.

Eucolodium strebeli (Pfeffer), Martens, 1900; Biol. Cent. Amer., 265; pl. 16, figs. 31-34.

This species is known only from Cerro de Plumas (type locality), and Puerto Angel, Oaxaca (fig. 3).

Anisospira hadromylla new species

SHELL.—(fig. 13A-D.) Large; cylindric-terete; solid, opaque; dull white. Periostracum absent. Apical puncture absent. Umbilicus imperforate. Base of last whorl rounded, marked with a weak, nearly obsolete basal keel. Decollate, adult shell consisting of 6.6-8.1 whorls. Suture impressed, whorls moderately arched between sutures. Apical whorl 0.52-0.59 times diameter of shell. Initial 1-2 whorls uniform in size, following 2-3 whorls rapidly increasing in size, rest of shell nearly cylindrical. Aperture broadly elliptical or broadly ovate, about as high as wide, usually free from preceding whorl, but may be adnate in some specimens. Aperture slightly oblique in lateral profile. Peristome conspicuously thickened and reflected around aperture.

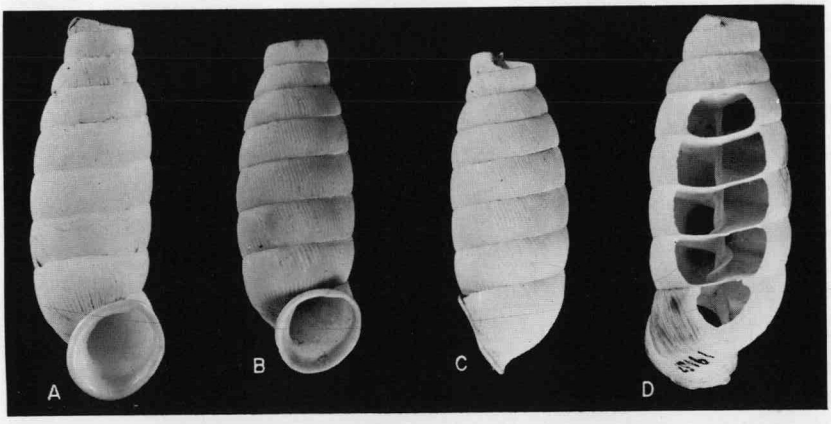

FIGURE 13. *Anisospira hadromylla* n. sp. A.—Holotype. B-D.—Paratypes.

Interior of aperture and peristome shiny white. Apical plug coarsely granular. Whorls with numerous moderately coarse, weakly recurved ribs, slightly stronger near bottom of whorl than top. Ribs about ½ as wide as their intervals and equally spaced over surface of shell; 99-104 ribs on antepenultimate whorl. Axis solid, smooth, very slightly sigmoid; increasing in diameter in lower whorls, about 1 mm wide in last 2 whorls. Axis with a smooth flat spiral lamella confined to the last 1 ½ whorls. Lamella located about ¼ of distance above floor of whorl. Width of lamella less than diameter of axis. Lamella visible within aperture as a columellar bulge.

Juvenile shell unknown.

Measurements of the type: length, 42.0 mm; width, 13.8 mm; aperture height, 11.5 mm; aperture width, 10.8 mm; diameter of apical whorl, 7.6 mm; 7.6 whorls remaining.

Measurements of the paratypes: length, 34.6-42.2 mm; width, 13.2-14.8 mm; aperture height, 9.6-10.8 mm; aperture width, 9.9-10.9 mm.

TYPE LOCALITY.—MICHOACAN: 10.0 mi. SE San Vicente; 200′ altitude. HOLOTYPE: UF 19055; collected 31 May 1966 by Fred G. Thompson.

PARATYPES: UF 19056 (2), UF 19057 (5); same locality as the type.

The type locality is in a small range of limestone hills along the Pacific coast (fig. 3). The range is a small extension of the Sierra de Coalcoman and lies about 10 miles southeast of the Rio Coahuayana, which forms the boundary between the states of Michoacan and Colima. The snails were found in debris and mulch around limestone blocks in a submesic deciduous forest.

REMARKS.—*A. hadromylla* is distinguished from other species of *Trachycion* by its stout, heavily ribbed white shell and its thick peristome. The only other forms of *Anisospira* known from western Mexico are *A. r. recticosta* (Pfeiffer) and *A. r. townsendi* Pilsbry and Cockerell, both of which occur in adjacent regions of Colima. *A. hadromylla* differs from *recticosta* and *townsendi* by its larger size, coarse sculpture, and thick peristome. *A. hadromylla* resembles *A. strebeli* (Pfeiffer) from southern Oaxaca in size and in sculpture, but differs from that species in its white color, its thick peristome, and its imperforate umbilicus. *A. strebeli* is a large flesh colored species with a moderately thickened peristome and a rimate shell. It also has a thick, low axial lamella, whereas the axial lamella of *A. hadromylla* is flat and blade-like.

ETYMOLOGY.—The name *hadromylla* is derived from the Greek *hadros,* meaning thick, and *myllon,* meaning lip, and refers to the nature of the peristome.

Dissotropis Bartsch

Dissotropis Bartsch, 1906; Proc. U. S. Natl. Mus., 31: 113.—Solem, 1957; Not. Nat., (298): 7.

Type species by original designation: *Anisospira* (*Dissotropis*) *stearnsi* Bartsch, 1906.

Shell medium to large cylindric-terete, decollate. Umbilicus imperforate. Axis hollow, apical puncture narrow; 7.8-10.4 whorls in adult shell. Sculpture consisting of uniformly spaced vertical ribs or threads. Axis with a wide serrate spiral lamella confined to the last 5 whorls of the adult shell. Spiral lamella acting as supporting shelf for viscera and maintaining a uniformly distended lung (fig. 14). Axis also with granular and spiny sculpture along central zone of axis or on axial bulge. Granular sculpture most strongly developed in

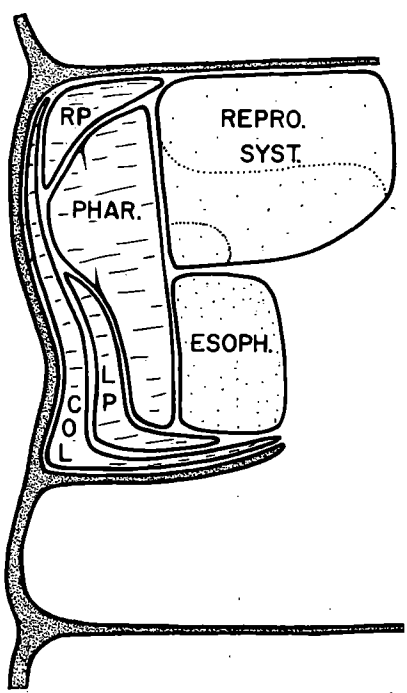

FIGURE 14. *Dissotropis castaneum* n. sp. Diagrammatic cross-section through 2nd whorl above aperture showing relationship of axial lamella to soft anatomy (COL, columellar retractor; ESOPH, esophagus; LP and RP, left and right pedal retractor; PHAR, pharyngeal retractor).

juvenile shell (fig. 16B, C), and may be much reduced in adult shell. Embryonic whorls not distinct from following whorls. First 1.0-1.5 whorls smooth. Following whorls with vertical ribs as in adult shell.

Sole of foot bipartite, with a medium longitudinal groove. Pallial organs long. Lung 4.5 whorls long. Kidney semilunar in shape. Sigmurethrous, primary ureter convoluted. Heart ½ as long as kidney. Pericardium separated from middle of kidney by a gap equal to width of heart. Aorta simple, continuous to mantle collar.

Salivary gland surrounding esophagus. Jaw simple, solid, chitinous, with many moderate vertical ribs on face. Radular formula: $\frac{1}{3}$ C – L+M $\frac{22}{2}$ (84-85). Teeth arranged in slightly arched transverse rows. Cusps simple, acuminate. Central tooth with a large mesocone and a small ectocone on each side. Lateral and marginal teeth with one large mesocone and a smaller ectocone each.

Reproductive system relatively complex for family. Genital atrium moderately stout. Penis large, bulbous, with two large fleshy internal pads. Epiphallus enlarged, arising from distal end of penis, with six longitudinal fleshy folds. Vas deferens small, partially imbedded in muscular wall of vagina. Spermathecal duct long, without accessory appendix. Vagina large, with a stout retractor muscle originating from pharyngeal retractor muscle. Talon and carrefour visible.

Retractor muscles simple. Ocular retractors not united over pharynx. Right ocular retractor muscle passing between genitalia and trophic viscera. Pharyngeal retractor with a stout ventral band that attaches to vagina, and a secondary band running from vaginal retractor to left pedal retractor.

Dissotropis is most closely related to *Coelocentrum*. The two genera are anatomically alike in features of the reproductive system, particularly the absence of a spermathecal appendix and of a muscular plate formed by the ocular retractors over the pharynx. It is difficult to make further comparisons with *Coelocentrum* because so little is known about the anatomy of its many species. The anatomical peculiarities of *Dissotropis* suggest the two genera are not closely related. These peculiarities include the presence of a vaginal retractor attached to the pharyngeal retractor muscle, the bulbous penis with two opposing internal fleshy pads, and the vas deferens imbedded in the wall of the vagina. The shell is also peculiar in the presence of a long wide serrate axial lamella. In other respects the shell resembles

that of *Coelocentrum* in having a hollow axis with granular sculpture.

The relationship between *Dissotropis* and *Schizopyla* cannot be determined at present. The two groups are alike in having a thin axial lamella, but differ in that *Schizopyla* has two additional lamellae in the 3rd whorl, one on the pallial wall and one on the outer wall. *Schizopyla* is anatomically unkown and is retained as a subgenus of *Coelocentrum* where it was first placed (Pilsbry, 1939: 27).

Dissotropis was described as a subgenus of *Anisospira* because of the presence of spiral lamellae in both genera. The location of the lamellae is a secondary feature, for they have different functions in the two genera. Their anatomies differ in many important aspects and indicate relationships with other genera.

Dissotropis contains five known species. Two of these (*D. stearnsi* and *D. blandi*) are known only from specimens in the Bland Collection in the USNM with the dubious locality of "near Mazatlan" (Sinaloa). Recent field work near Mazatlan has failed to reveal this genus in that region. A single specimen of *Anisospira dalli* (USNM 58055a) was originally catalogued with the type of *D. blandi* (USNM 58055b). *A. dalli* is known only from the Tehuantepec region. Manifestly either specimens and data have been mixed, or early collectors used the locality "near Mazatlan" indiscriminately for specimens without data. Recently Solem (1957: 7-8) described *D. henryi* from coastal Michoacan, and provided the first reliable locality record for *Dissotropis*. The two new species described below extend the known range of the genus to adjacent regions of Colima and Jalisco.

Key to the Species of *Dissotropis*

1. Axis relatively wide, about 0.20 times diameter of shell at widest point, straight sided or with only a very slight spiral bulge 2
1a. Axis relatively narrow, about 0.08-0.10 times diameter of shell. Axis with a noticeable raised spiral bulge that may even cause the axis to appear twisted 4
2. Sculpture consisting of prominent sinuous axial ribs ..... *D. henryi* (Solem)
2a. Sculpture consisting of fine axial threads 3
3. Axial lamella very wide. Axis with fine granular sculpture present along center of axis in upper whorls in adult shell. Axis with irregular, oblique white streaks ..... *D. amplaxis* n. sp.
3a. Axial lamella narrower. Axis smooth or with nearly obsolete granules in uppermost whorls. Axis without oblique white streaks ..... *D. blandi* (Bartsch)
4. Color brown. Sculpture consisting of prominant ribs. Axis of adult shell with fine granular sculpture along turgid bulge ..... *D. castaneum* n. sp.

4a. Color white. Sculpture consisting of fine axial threads. Axis of adult shell smooth or with fine granular sculpture nearly obsolete and confined to uppermost whorls ..... *D. stearnsi* (Bartsch)

Dissotropis stearnsi (Bartsch)

Anisospira (*Dissotropis*) *stearnsi* Bartsch, 1906; Proc. U. S. Natl. Mus., 31: 113-114; pl. 3, fig. 1.

TYPE LOCALITY.—"near Mazatlan". HOLOTYPE: USNM 58055b.

Dissotropis henryi (Solem)

Anisospira (*Dissotropis*) *henryi* Solem, 1957; Not. Nat., (298): 7-8; pl. 1, fig. 11-14.

TYPE LOCALITY.—MICHOACAN: La Placity (Sulatillo), Sierra de Coalcoman. HOLOTYPE: UMMZ 185499.

Dissotropis castaneum new species

SHELL.—(fig. 15.) Medium sized, decollate, cylindric-terete, shiny. Light brown in color. Generally thin and fragile but some specimens may be solid; commonly transparent. Umbilicus imperforate. Axial puncture very small. Initial whorl 0.51-0.55 times diameter of shell, 7.3-9.1 whorls remaining. Apical 3-4 whorls rapidly increasing in size to adult shell; following whorls of nearly equal size; last whorl slightly narrower. Suture moderately impressed. Whorls moderately

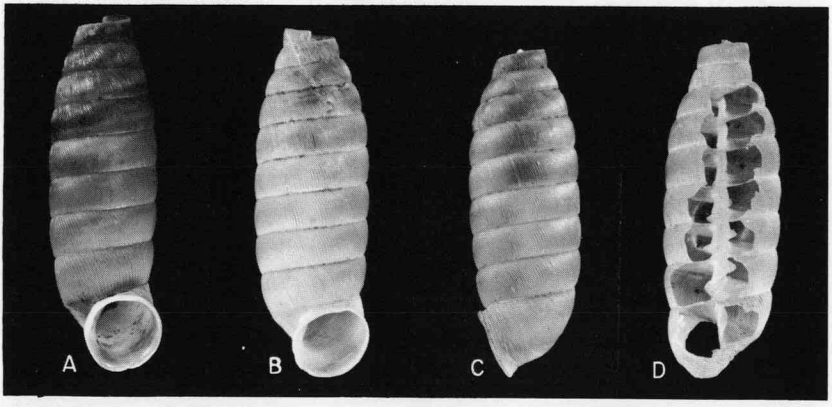

FIGURE 15. *Dissotropis castaneum* n. sp. A.—Holotype. B-D.—Paratypes.

arched between sutures. Aperture free from preceding whorl; projected slightly forward; slightly oblique in lateral profile. Aperture nearly circular, 0.96-1.07 times as high as wide. Peristome slightly or moderately thickened and reflected. Interior of aperture dusky white

or brownish. Columella visible within aperture. Sculpture consisting of oblique, low, vertical ribs that are about as wide as their intervals. Ribs weakly arched; about 4-5 ribs/mm; 120-150 ribs on antepenultimate whorl. Basal keel on last whorl very weak or absent. Axis hollow, straight but with a low spiral bulge, increasing slightly in diameter to last whorl where it becomes constricted closed. Axis about 1/6-1/7 diameter of shell. Axis with a thin wide spiral lamella on last 5 whorls just below spiral bulge on axis. Edge of lamella with about 25 low, serrate teeth per whorl. Spiral bulge on axis with numerous small spines and granules that continue from juvenile shell.

Embryonic whorls (fig. 16A) not distinct from following whorls. First 3 whorls rapidly increasing in size, 3rd whorl 2.9-3.1 mm wide, 5th and 6th whorls constricted, following whorls gradually increasing in size to decollation point. First whorl smooth, next whorl with low vertical ribs that become increasingly developed, following whorls

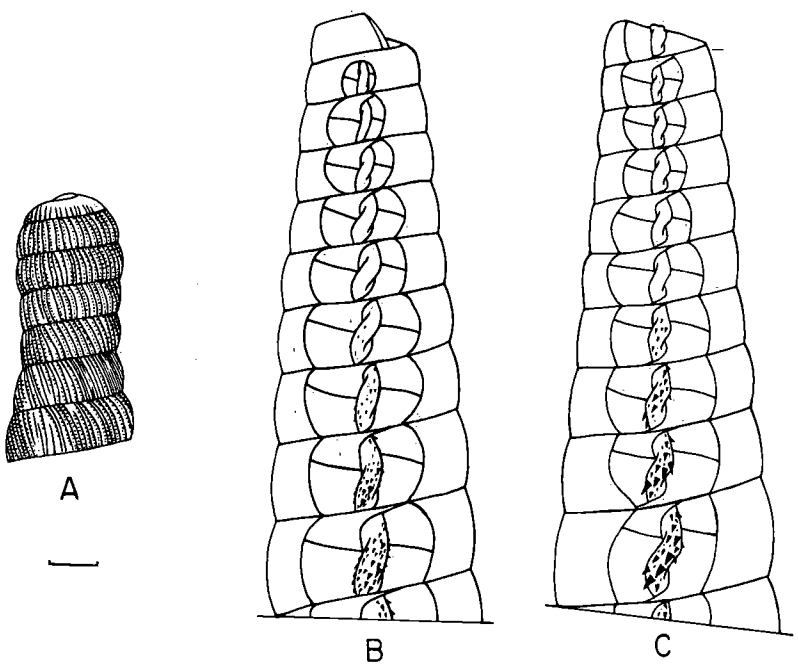

FIGURE 16. Juvenile shells of two species of *Dissotropis*. A.—*D. castaneum* n. sp., embryonic and early juvenile whorls showing sculpture (UF 19760). B.—*D. castaneum* n. sp., juvenile whorls 7-16 showing twisted, spiny axis (UF 19760). C.—*D. amplaxis* n. sp., juvenile whorls 7-14 showing axis (UF 19766). Scale = 1 mm.

through adult shell uniformly sculptured with low vertical riblets. Axis (fig. 16B) hollow, with a strong spiral bulge, which has many large spines that point forward and continue on bulge into adult shell. Rate of growth indicates about 14-16 whorls are lost above decollation point in adult shell.

Measurements of holotype: length, 34.2 mm; width, 10.5 mm; aperture height, 7.6 mm; aperture width, 7.6 mm; 8.2 whorls remaining.

Measurements of paratypes: length, 29.6-34.8 mm; width, 9.7-11.8 mm; aperture height, 6.9-7.7 mm; aperture width, 6.8-7.7 mm.

ANATOMY.–Holopod. Sole bipartite, with a medium longitudinal furrow. Sides of sole with a single row of fleshy vertical pillasters. Dorsal surface of foot and side of body pebbled. Dorsal surface of tail flattened posteriorly, moderately crested anteriorly. Dorsal caudal pore absent. Genital opening below and behind right eye stalk.

Lung 4.5 whorls long. Kidney (fig. 18C) sigmurethrous, semilunar, rounded anteriorly, truncate posteriorly, flat and thin. Heart about ½ length of kidney, separated from center of kidney by a space equal to its own width. Ventricle about ½ length of auricle. Aorta simple, unbranched, extending to mantle collar. Primary ureter with many loops loosely attached to kidney. Secondary ureter closely attached to intestine.

Salivary ducts entering dorsal surface of pharynx (fig. 17B). Salivary glands long, completely surrounding esophagus as a moderately thick spongy mass.

Jaw (fig. 17A) solid, arcuate, amber colored, with a moderately long, broad cartilaginous projection posteriorly. Face of jaw with many moderately coarse vertical ribs.

Radula (2 examined): Radular formula $C \frac{1}{3} L+M \frac{22}{2}$ (84-85). The central tooth has a large mesocone and two small but well developed ectocones. The lateral and marginal teeth are not distinguishable from each other and each has a large mesocone and a smaller ectocone. The teeth occur in slightly arched transverse rows.

Genitalia (fig. 18A): Genital atrium moderately stout and moderately long. Penis large, bulbous, solid. Penial lumen (fig. 18B) with two large fleshy pads that lie on opposite sides of cavity. Epiphallus originating from top of penis. Lumen of epiphallus entering penis

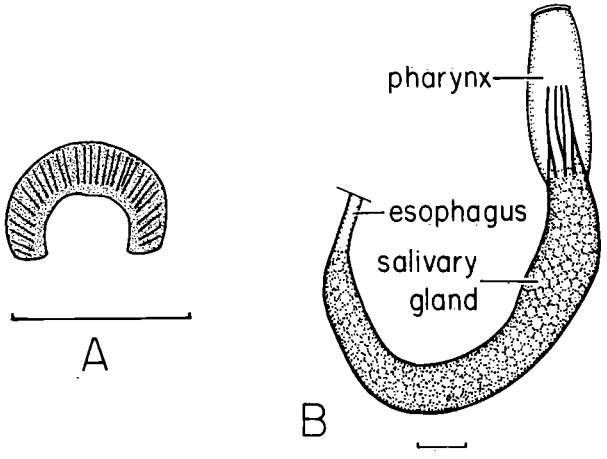

FIGURE 17. *Dissotropis castaneum* n. sp. A.—Jaw. B.—Esophagus and associated organs. Scale = 1 mm.

between fleshy pads. Epiphallus well developed, long, abruptly constricted at vas deferens. Interior of epiphallus with six low longitudinal folds. Penial retractor muscles moderately stout, originating on center of inner wall of lung about one whorl behind mantle collar and inserting on top of penis near origin of epiphallus. Vas deferens imbedded in wall of vagina shortly above genital atrium and emerging again above and opposite origin of spermathecal duct. Vagina stout, with a broad muscular band that inserts near top of vagina and originates from ventral surface of pharyngeal retractor muscle. Lumen of vagina with about 12 low longitudinal folds that occasionally anastomose. Spermathecal duct long, moderately stout, lying along basocolumellar side of prostate. Spermathecal duct without an appendix. Spermatheca elongate, slightly enlarged, lying near base of albumen gland. Uterus and prostate long, tightly attached to each other. Carrefour visible in oviduct below albumen gland. Talon exposed at base of hermaphroditic duct. Albumen gland slender, relatively short, thin, fragile.

Columellar retractor muscle (fig. 19) extending 5 whorls into shell and attached to integument, thin but broad distally. Pharyngeal retractor originating from dorsal surface of columellar retractor just below its origin. Right pedal retractor originating from right ventral side of pharyngeal retractor. Left pedal retractor originating from left ventral side of pharyngeal retractor distal to origin of right

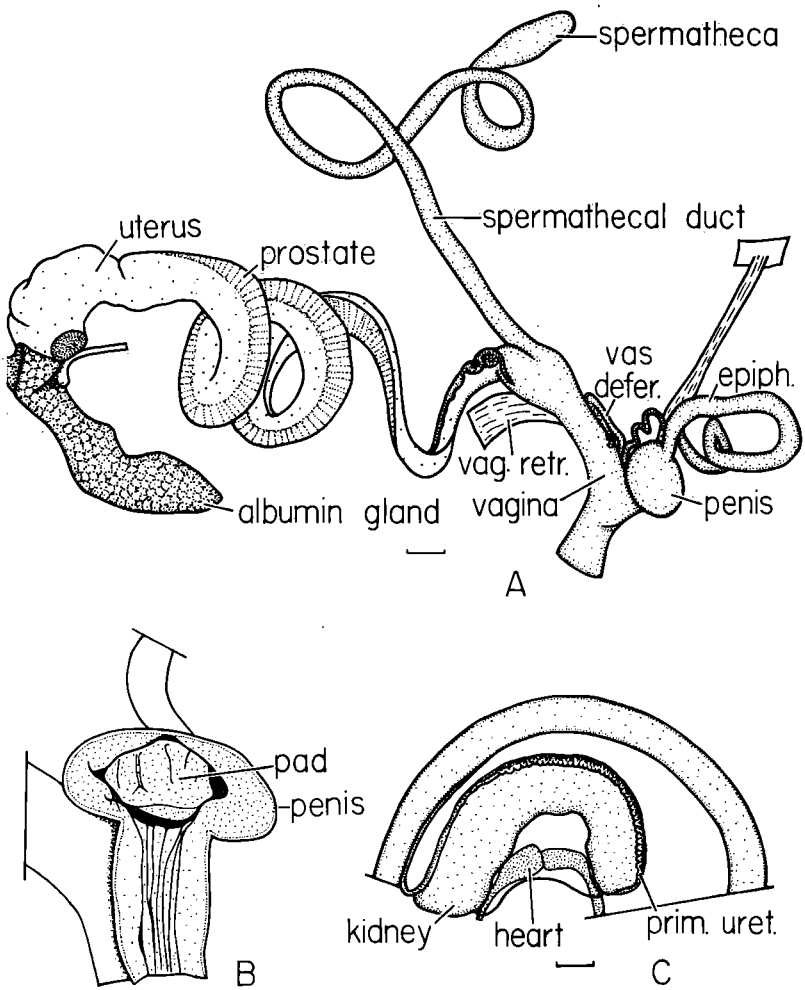

FIGURE 18. Anatomy of *Dissotropis castaneum* n. sp. A.—Reproductive system. B.—Interior of penis showing fleshy pad on opposite side of penial lumen. C.—Inner view of kidney and associated organs. Scale = 1 mm.

pedal retractor. Right and left ocular retractors originating from corresponding pedal retractors, *not united over pharynx*. Right ocular retractor passing between trophic viscera and genitalia. Pharyngeal retractor thick and stout, attached to end of pharynx with one stout central dorsal band and numerous small thin ventral bands and slips. A stout muscular band originates from ventral surface of pha-

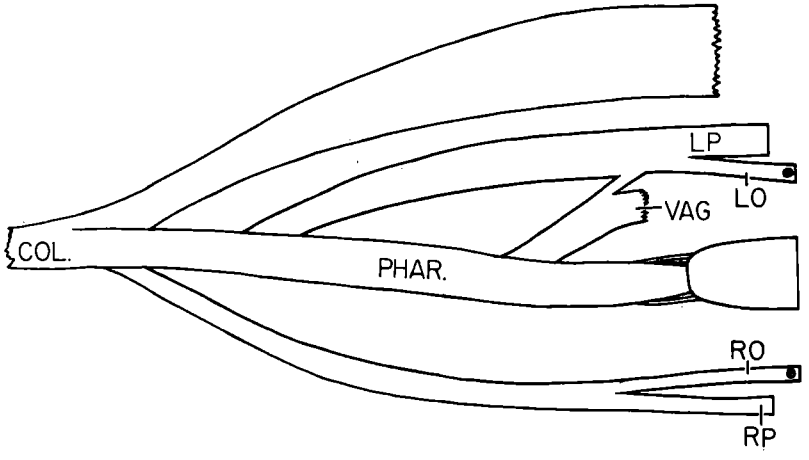

FIGURE 19. Diagram of free retractor muscles of *Dissotropis castaneum* n. sp. (COL, columellar retractor; LO and RO, left and right ocular retractor; LP and RP, left and right pedal retractors; PHAR, pharyngeal retractor; VAG, vaginal retractor).

ryngeal retractor and attaches to side of vagina; a smaller band connects this muscle to left pedal retractor.

TYPE LOCALITY. — JALISCO: limestone sink 6.0 mi. SW and 6.5 mi. E Pihaumo, 2200′ altitude. HOLOTYPE: UF 19758; collected 3 August 1966 by Fred G. Thompson. PARATYPES: UF 19761 (14 adults), UF 19759 (1 adult), UF 19762 (10 adults), UF 19763 (5 juveniles), UF 19760 (6 juveniles), Museo de Historia Natural de la Ciudad de Mexico (4 adults). Same locality as the holotype.

The type locality lies at the base of a large limestone sinkhole on the south side of a road that goes from a mine to Federal Highway 110. The base of the sink is covered with blocks of limestone and talus and has a submesic forest. Snails were found under talus, debris, and mulch along the walls of the sink.

RELATIONSHIPS.—This species is most similar to *D. amplaxis,* which it resembles in its granular and spiny sculpture on the axial bulge of the adult shell. Other species of *Dissotropis* also have this axial sculpture, but it is much finer and noticeable only on the upper whorls.

D. castaneum differs from all other species by its brown color and its axis. The raised spiral bulge gives the axis a twisted appearance, and in this way it resembles *D. stearnsi* (Bartsch). *D. stearnsi* lacks

distinct granulation on the middle axis, it is nearly white in color, and the ribs on the surface of the whorls are much finer. *D. castaneum* differs from *D. amplaxis* by its narrower axis bearing a spiral axial bulge, its narrower axial lamella, its brown color, and its much stronger ribs on the whorls.

ETYMOLOGY.—The name *castaneum*, Latin for chestnut, refers to the color of the snail's shell.

Dissotropis amplaxis new species

SHELL (fig. 20A-D). — Large, cylindric-terete, decollate, shiny. Light grayish brown in color. Thin and fragile. Umbilicus imperforate. Apical puncture very minute but open. 9.4-10.4 whorls remaining. Suture distinct but shallow; whorls only slightly arched between sutures. Initial whorl small, 0.44-0.47 times diameter of shell, following 3-4 whorls gradually increasing in size to adult shell, remaining whorls nearly equal in size, decreasing slightly near base.

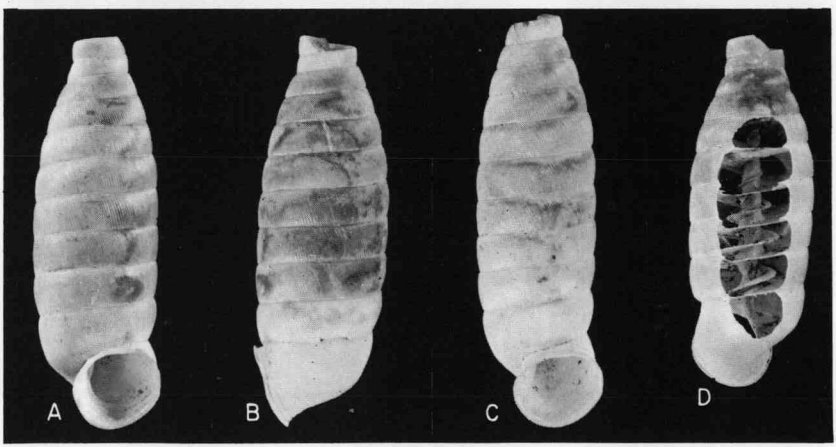

FIGURE 20. *Dissotropis amplaxis* n. sp. A-B.—Holotype. C-D.—Paratypes.

Aperture free from preceding whorl and projecting slightly forward, oblique in lateral profile. Aperture broadly ovate, 0.94-1.00 times as high as wide. Peristome moderately thickened and moderately reflected. Columella visible within aperture. Sculpture consisting of numerous low, smooth recurved vertical riblets that are about ½ as wide as their intervals. Riblets nearly equally spaced over surface of shell; 137-157 riblets on antepenultimate whorl. Basal keel absent on last whorl or only very vaguely indicated. Axis hollow, wide, grad-

ually increasing in width through penultimate whorl and becoming narrowly constricted in last whorl. Axis at its widest point about 1/5 width of shell. Axis with a spiral lamella and minute granular sculpture. Spiral lamella located slightly below middle of axis in last 5 whorls; low and smooth at first, but very wide in last 3 whorls where it bears about 20 large serrate teeth per whorl. Axis with a very low spiral bulge just above lamella. Bulge in earlier whorls with numerous small granular tubercles and spines that continue from juvenile shell to 4th from last whorl of adult shell. Axis marked with irregular oblique white streaks.

Embryonic whorls not distinct from following whorls. First 3 whorls gradually increasing in size, 3rd whorl about 2.5 mm wide, 5th and 6th whorls slightly constricted, following whorls gradually increasing in size to adult shell. First 1.5 whorls smooth, following half whorl with vertical threads that become increasingly strong and intense across whorl, thereafter riblets nearly equally developed and spaced over surface of shell. Axis of juvenile shell (fig. 16C) hollow, twisted. Spiral axial bulge with small granules and spines that point forward and continue on axis into adult shell.

Measurements of holotype: length, 37.0 mm; width, 12.5 mm; aperture height, 8.4 mm; aperture width, 8.6 mm; 10.1 whorls.

Measurements of paratypes: length, 31.8-38.2 mm; width, 11.4-11.7 mm; aperture height, 7.7-8.2 mm; aperture width, 7.7-8.7 mm.

Little variation other than size occurs among the four adult specimens comprising the type lot.

TYPE LOCALITY. – COLIMA: 1.9 mi. NE Tecolapa; 700′ altitude. Specimens were found under limestone slabs on a xeric hillside along the northwest side of the highway from Colima to Tecoman. HOLOTYPE: UF 19764; collected 1 June 1966 by Fred G. Thompson. PARATYPES: UF 19765 (3 adults), UF 19766 (3 juveniles); same data as the holotype.

RELATIONSHIPS.—This species is most similar to *D. castaneum*. It is distinguished by its fine sculpture consisting of very fine low riblets, its wide straight axis, its very wide axial lamella, and its light color. It is distinguished from other species by its granular axial sculpture, as well as other characters outlined in the key.

ETYMOLOGY. – The name *amplaxis* is derived from the Latin *ampliare*, to enlarge, and *axis*, and refers to the enlarged axis of this species.

Dissotropis blandi (Bartsch)

Anisospira (Dissotropis) blandi Bartsch, 1906; Proc. U. S. Natl. Mus., 31: 114-115; pl. 3, fig. 3.

TYPE LOCALITY.—"near Mazatlan." HOLOTYPE: USNM 58055.

Coelocentrum

Subgenus *Coelocentrum* Crosse and Fischer

Coelocentrum Crosse and Fischer, 1872; J. Conchyl., 20: 302. Type species: *Cylindrella turris* Pfeiffer, 1856.

Crossostephanus Dall, 1908; Proc. U. S. Natl. Mus., 35: 177. Type species: *Coelocentrum palmeri* Dall and Bartsch, 1908.

Crossostephanus has been considered as a distinct and isolated subgenus since it was originally proposed. Species described in this paper indicate that recognition of this subgenus as a separate entity from *Coelocentrum (s.s.)* is not justified. *Coelocentrum (s.s.)* has been defined by previous authors as a subgenus with a simple hollow axis that bears oblique axial ribs. The axis could be simple and tubular or could possess a low spiral swelling, and the ribs could be complete, broken, or modified into oblique rows of low tubercles. *Crossostephanus* was defined as possessing a turgid spiral axial ridge with numerous short cord-like ribs (Dall, 1908: 177). The axial modifications that occur in *C. tomacella* (Morelet), *C. tyla* n. sp., and *C. cataclines* n. sp. bridge the distinctions between the two subgenera. The short cord-like ribs on the axial swelling of *Crossostephanus* are of no more than specific value, as this character is only a matter of degree and occurs independently in *C. palmeri* Dall and Bartsch and *C. tyla* n. sp.

Coelocentrum (s.s.) is redefined as those species of *Coelocentrum (s.l.)* with a hollow axis which may bear a hollow spiral swelling. The swelling may project far into the lumen of the whorls, and may be compressed and lamellar in shape. The axis also bears oblique axial ribs that extend from the top of the whorl to the periphery of the swelling when it is present, and the ribs may be broken or modified into oblique rows of small tubercles, elongate cords, or knobs. Other internal barriers are absent. The axis of the embryonic shell is hollow and bears sculpture similar to that of the upper whorls of the adult shell. *Coelocentrum (s.s.)* includes the following described species.

1. *C. anconai* Bartsch, 1948
2. *C. anomalum* Strebel, 1880
3. *C. arctispira* (Pfeiffer), 1960

3a. *C. a. estephaniae* Pilsbry, 1903
4. *C. cataclines* new species
5. *C. dispar* Pilsbry, 1903
6. *C. fistulare* (Morelet), 1849
7. *C. gigas* Martens, 1897
8. *C. hinkleyi* Pilsbry, 1909
9. *C. huertae* Bartsch, 1947
10. *C. lundersi* (Pfeiffer), 1859
11. *C. nelsoni* Dall, 1896
12. *C. palmeri* Dall and Bartsch, 1908
13. *C. pfefferi* Dall, 1896
14. *C. pittieri* Bartsch, 1906
14a. *C. p. guatemalensis* Bartsch, 1906
15. *C. stenocion* new species
16. *C. tanydeira* new species
17. *C. tomacella* (Morelet), 1849 and varieties
18. *C. turris* (Pfeiffer), 1856
19. *C. tyla* new species

Although characters for natural species groups and subgenera have been difficult to define, features of the embryonic and juvenile shells are of value. These characters vary little within species groups or genera, whereas adult shells may differ radically. Our knowledge of juvenile shells is still too meager to allow the synthesis of a natural arrangement of species groups. Future collectors should make a concerted effort to collect juvenile shells whenever possible.

Coelocentrum tanydeira new species

SHELL.–(fig. 21.) Small, light brown, shiny; decollate, with 15.1-16.4 whorls remaining. Cylindric-terete in shape; initial whorl 0.48-0.58 times diameter of shell, reaching its greatest diameter at about the 6th or 7th whorl, or about ⅓ of distance from top of spire. Below this point shell nearly uniform in width until 3rd or 4th whorl from aperture, at which point the shell tapers inward. Aperture located on a long rounded neck that protrudes forward and slightly downward for a distance about equal to diameter of last whorl (2-3 mm). Neck rounded and without basal keel. Aperture small, nearly circular, slightly wider than long and tending to be flattened dorsally; peristome thickened and reflected all around aperture; peristome and interior of aperture white. Umbilicus imperforate, axial puncture generally open, occasionally closed. Whorls slightly convex. Su-

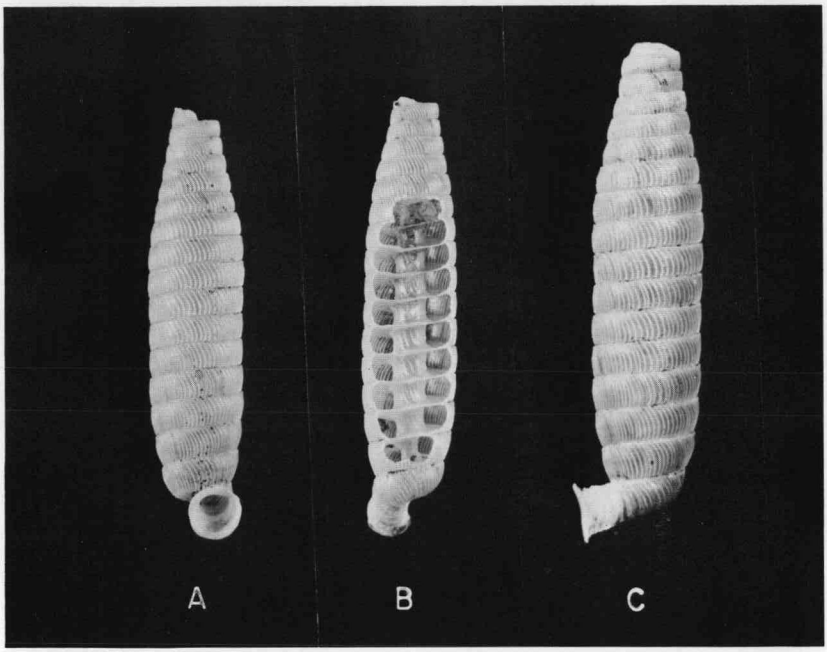

FIGURE 21. *Coelocentrum tanydeira* n. sp. A, C.—Holotype (UF 19040). B. —Paratype (UF 19042).

ture consisting of a narrow impressed groove accentuated by a sharp narrow spiral thread that runs along top of whorls by suture. Whorls sculptured with strong recurved axial ribs about ¼ diameter of intervals; ribs uniform in size throughout their length, continuous across whorls; 61-78 ribs on 4th from last whorl; ribs nearly uniformly spaced throughout length of adult shell. Upper ends of ribs connected by chord thread that parallels suture, spiral chord lying just below ends of ribs so that ends protrude slightly into suture, spiral chord terminating at base of neck. Axis hollow throughout its length, about ⅓-⅖ diameter of shell; axial pillar concave within each whorl and bearing about 15-20 oblique riblets per whorl; riblets occurring throughout length of axis to penultimate whorl, confined to upper ¾ of pillar within each whorl; riblets slightly thickened at their lower ends and may bear or be broken into many small conical tubercles.

Embryonic shell (fig. 22A) consisting of about 2.5 small, rounded, button-like smooth whorls 1.2 mm wide. Later whorls gradually increasing in size. Sculpture beginning on 3rd whorl as small uniformly spaced triangular knobs along suture and becoming progressively

longer so that at about the 9th whorl vertical riblets are continuous across surface of whorls.

Measurements of holotype: length of shell, 27.3 mm; width of shell, 6.1 mm; aperture height, 3.4 mm; aperture width, 3.5 mm; 16.0 whorls remaining; diameter of first whorl, 3.1 mm.

Measurements of paratypes: length of shell, 25.5-29.8 mm; width

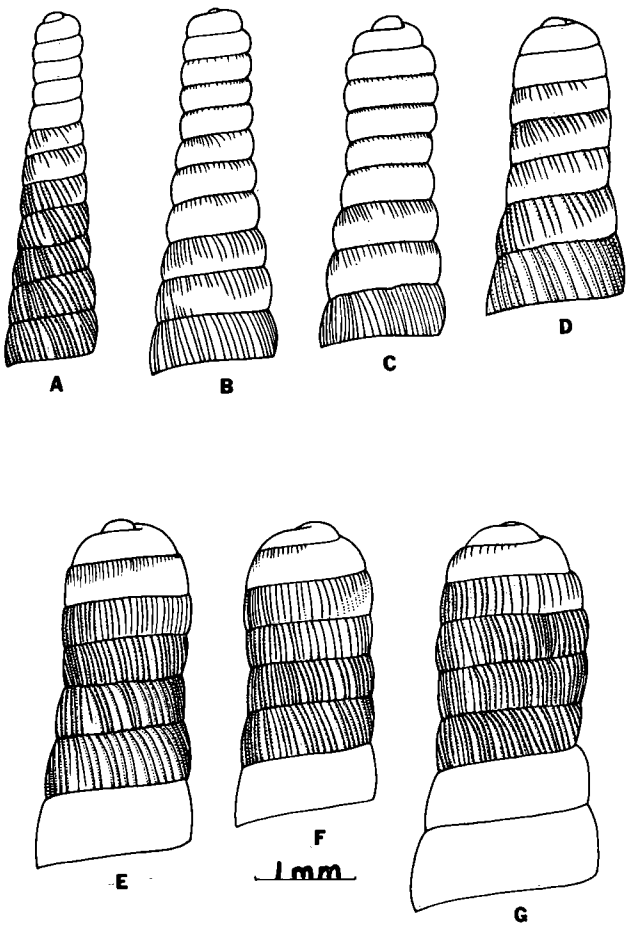

FIGURE 22. Juvenile whorls of various species of *Coelocentrum* and *Eucolodium*. A.—*C. tanydeira* n. sp., paratype (UF 19041). B.—*C. tomacella adelphion* n. ssp., paratype (UF 19046). C.—*C. turris* (Pfeiffer) (UF 19035). D.—*E. hegewischi* (Bartsch) (UF 19063). E.—*C. steriocion* n. sp., paratype (UF 19062). F.—*C. pfefferi* Dall (UF 19054). G.—*C. nelsoni* Dall (UF 19030).

of shell, 6.0-6.4 mm; aperture height, 3.2-3.4 mm; aperture width, 3.5-3.6 mm.

TYPE LOCALITY.—SAN LUIS POTOSI: 11.4 mi. by road E Xilitla; 1100′. The type locality lies in a deep ravine on a limestone hillside covered by a moist tropical forest that has been converted into a coffee grove. Snails were found in leaf mulch on the hillside near the bases of limestone boulders. HOLOTYPE: UF 19040, collected 20 May 1965 by Fred G. Thompson. PARATYPES: UF 19042 (7), 19041 (juvenile shell with embryonic whorls), same data as the holotype.

REMARKS.—*C. tanydeira* is distinct within the subgenus *Coelocentrum* because of its long projecting rounded neck, its strong, relatively sparse costulate sculpture with a connecting subsutural spiral thread, its small size, and its relatively large number of whorls. Nearly all other species within the subgenus have a much shorter neck or have the aperture juxtapose to the preceding whorl, have finer and more numerous riblets, lack a subsutural spiral thread, have a larger shell diameter, and fewer whorls in shells of about the same length.

C. tanydeira is most similar to *C. hinkleyi* Pilsbry, which is the nearest geographically of the related species. Both species are similar in shape and sculpture, but *C. hinkleyi* is longer (35-41 mm), has a greater diameter (8-9 mm), fewer whorls (11-15.5), a narrower axial pillar (about ¼ the diameter of the shell), and weaker sculpture on the pillar (the axial riblets being reduced to elongate granules or light streaks) (Pilsbry, 1909: 138).

ETYMOLOGY.—The name *tanydeira* is derived from the Greek *tanyein,* meaning stretched out, and *deire,* meaning neck.

Coelocentrum stenocion new species

SHELL.—(fig. 23.) Medium sized, slender, light brown, dull, lusterless. Decollate, with 8.7-11.6 whorls remaining. Shell moderately thick, opaque. Nearly cylindric in shape; apex slightly terete, but lower whorls nearly uniform in width. Initial whorl 0.61-0.73 times diameter of lower shell; following 4-5 whorls gradually increasing in size, and thereafter shell nearly uniform in diameter. Aperture free from and projecting slightly beyond previous whorl, slightly oblique. Neck rounded, with a very weak basal keel. Aperture nearly circular, weakly angulate at the parietocolumellar and parietolabial corners; aperture about as high as wide. Peristome slightly thickened and reflected all around aperture. Aperture and peristome shiny, dirty white.

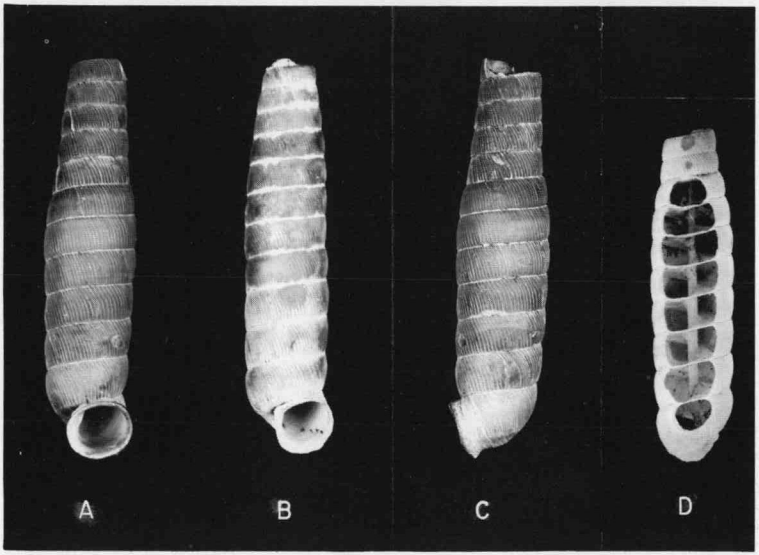

FIGURE 23. *Coelocentrum stenocion* n. sp. A, C.—Holotype (UF 19060). B, D.—Paratypes (UF 19061).

Umbilicus imperforate. Axial puncture very narrow. Whorls weakly convex. Suture weakly impressed. Whorls sculptured with weak recurved ribs that are continuous and nearly uniform between sutures; nearly equally developed and spaced over whole surface of adult shell. Ribs about ½ width of their interspaces, about 73-88 ribs on antepenultimate whorl. Axis hollow throughout its length, about ⅛ diameter of shell. Axial pillar straight-sided within each whorl, increasing slightly in diameter in upper whorls, but uniformly wide in lower whorls. Axis sculptured with oblique irregular, rugose ribs; about 15-20 ribs per whorl; ribs frequently broken and knobby.

Embryonic shell (fig. 22E) consisting of 4.3-4.4 whorls; 3rd whorl 2.0-3.0 mm wide, next 2 whorls decreasing in size to form a distinct neck from rest of shell, following whorls regularly increasing in size to adult shell. First embryonic whorl smooth, following whorls sculptured with fine ribs that begin as weak threads along suture and become progressively stronger through the 4th and 5th whorl, where they become fully developed for rest of shell. Rate of growth of juvenile shell indicates about 16 whorls occur above point where adult shell becomes decollate.

Measurements of holotype: length, 39.0 mm; diameter, 8.1 mm; aperture height, 6.0 mm; aperture width, 6.3 mm; diameter of first whorl, 5.9 mm; 11.3 whorls remaining.

Measurements of paratypes: length, 31.2-39.1 mm; diameter, 8.2-8.6 mm; aperture height, 5.9-6.0 mm; aperture width, 6.0 mm.

TYPE LOCALITY.—GUERRERO: limestone cliff 5.6 mi. NNE El Ocotito; 2900′ elevation. HOLOTYPE: UF 19060; collected 28 June 1966 by Fred G. Thompson. PARATYPES: UF 19061 (4), UF 19062 (7 juvenile fragments); same data as the holotype.

Specimens were found in debris and mulch at the base of a rugged limestone ledge. The base of the ledge and the immediate vicinity were covered with a dense scrub forest.

REMARKS.—This species is not closely related to any other known species from the Pacific slopes of Mexico, although adults resemble *C. tanydeira* and *C. hinkleyi* from San Louis Potosi. It differs from both of these species by its weak sculpture and its narrow axial pillar with more rugose oblique axial riblets. Its embryonic whorls are very different in size and sculpture, and suggest relationships with *C. pfefferi* and some other large species.

ETYMOLOGY. — The name *stenocion* is derived from the Greek *stenos,* meaning narrow, and *cion,* meaning pillar, and refers to the narrow axis of this species.

Coelocentrum tomacella adelphion new subspecies

SHELL.—(fig. 24.) Medium sized, dark brown, dull. Cylindric-conical, thin but solid, opaque, decollate, 12.0-14.1 whorls remaining. Width of initial whorl 0.54-0.63 times diameter of shell; whorls slowly increasing in diameter; greatest width of shell attained at antepenultimate whorl, below which point the shell decreases slightly in diameter. Aperture free from preceding whorl, extended forward on a short neck that is about 1/5-1/6 diameter of last whorl; aperture 0.89-0.96 times as high as wide, quadrangular or subtriangular in shape, basal and outer margins frequently rounded. Peristome strongly reflected, about 1.46-1.68 times width of neck; not noticeably thickened. Interior of aperture and peristome white. Umbilicus very narrowly but consistently perforate. Last whorl with a weak crest around base extending to peristome. Axial perforation open, about 1/4 diameter of first whorl. Surface of shell covered with fine but distinct recurved axial threads that extend unbroken across the

surface of the whorls; 87-106 threads on antepenultimate whorl; threads nearly equally spaced over whole surface of shell, strongest and most distinct on early whorls, rather weak on last whorl; threads about ½-⅔ width of intervals. Interspaces with very fine, sparse

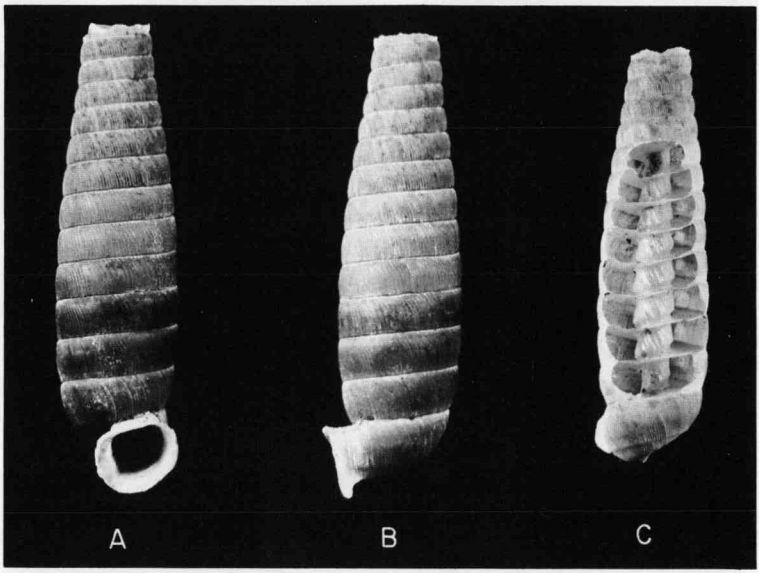

FIGURE 24. *Coelocentrum tomacella adelphion* n. ssp. A, B.—Holotype (UF 19052). C.—Paratype (UF 19046).

granules. Spiral sculpture absent. Axis hollow, about ⅓ or slightly less diameter of shell, weakly expanded below middle of whorl and moderately constricted below swelling. Axis with about 15-20 oblique, low, thin, occasionally serrate ribs that extend from roof of whorl to apex of swelling where they increase slightly in size. Axis smooth below swelling.

Embryonic whorls (fig. 22B) not demarcated from later whorls. First 5 whorls button shaped, narrow, very convex at periphery; 2nd whorl slightly wider than adjacent whorls, 1.8 mm in diameter; 6th and later whorls regularly increasing in size. First 2 embryonic whorls smooth, following whorls with weak axial crenulations appearing along sutures, becoming progressively more distinct and longer, and by 8th or 9th whorl forming threads that extend across surface of whorls. Rate of growth of juvenile shell indicates that

about 20 whorls occur above point where adult shell becomes decollate.

Measurements of holotype: length, 28.2 mm; diameter, 7.8 mm; aperture height, 4.8 mm; aperture width, 5.0 mm; diameter of first whorl, 4.4 mm; 12.6 whorls remaining.

Measurements of paratypes: length, 27.3-31.1 mm; diameter, 7.7-8.0 mm; aperture height, 4.6-5.0 mm; aperture width, 5.0-5.4 mm.

TYPE LOCALITY.—CHIAPAS: ravine 4.5 mi. N Jitotol; 5400′ elevation. HOLOTYPE: UF 19052; collected 16 July 1965 by Fred G. Thompson. PARATYPES: UF 19046 (9, including 1 juvenile), Museo de Historia Natural de la Ciudad de Mexico (1); same data as the holotype.

Specimens were found in debris at the base of a soft limestone ledge. The flora in the ravine consisted mostly of mesic vegetation because of seepage and ground moisture. The hills along the ravine were dry with sparse growths of oaks and pine.

REMARKS.—This subspecies is in nearly all respects a diminutive version of *C. t. tomacella* (Morelet), which differs in having a larger shell (length, 33-37 mm; width, 9.5-10 mm), a rimate umbilicus, and aperture that is higher than wide. These differences also distinguish *C. fistulare* (Morelet) from *C. t. adelphion.*

Northern Chiapas and Tabasco are inhabited by many populations of *C. tomacella* most of which have their own characteristics. This infraspecific variation includes *C. t. clava* (Pfeiffer), *C. t. rufescens* Martens, *C. t. attenuata* (Pfeiffer) and probably *C. fistulare* (Morelet), as well as *C. t. adelphion.* Until most of these populations have been studied, taxonomic recognition of subspecific variations is of questionable value. Recognition of *C. t. adelphion* is prompted by the necessity to refer to it in anatomical studies.

ETYMOLOGY.—The name *adelphion* is derived from the Greek *adelphos,* meaning brother, and refers to the close relationship between this subspecies and *C. t. tomacella.*

Coelocentrum tomacella clava (Pfeiffer)

TABASCO: 1.0 mi. E Teapa (UMMZ 121093 [6]).

The sculpture of the embryonic shell is in most respects similar to that of *C. t. adelphion.* The embryonic shell differs only in that the second whorl is 1.7 mm wide. Rate of growth of juvenile shell indicates about 17-18 whorls are lost above decollation point of adult shell.

Coelocentrum turris (Pfeiffer)

CHIAPAS: 8.2 mi. S Solusuchiapa, 1600' elevation (UF 19038 [1]).

TABASCO: hill 9.2 mi. S Tacotalpa (UF 19037 [1]); mogotes 2.4-2.6 mi. E Teapa (UF 19034 [6], 19035 [12], 19036 [5]).

The embryonic shell (fig. 22C) is similar to *C. t. adelphion.* Embryonic whorls not demarcated from later whorls. First 6 whorls strongly arched, button-like, suture deeply impressed, following whorls becoming progessively flatter; 3rd whorl wider than adjacent whorls, 2.1 mm wide; 4th-6th whorls constricted, following whorls regularly increasing in size. First embryonic whorl smooth, following whorls sculptured with fine axial threads that begin on 2nd whorl as short striations below suture and become progressively longer and stronger until about the 9th whorl where they form fine, continuous thread-riblets. Rate of increase in size indicates about 16-17 whorls are lost above decollation point of adult shell.

Coelocentrum pfefferi Dall

Coelocentrum pfefferi Dall, 1896; Proc. U. S. Natl. Mus., 19: 352; pl. 33, figs. 1, 2.—Pilsbry, 1903; Man. Conch., Ser. 11, 15: 34-35; pl. 11, figs. 5, 6 (copied from Dall).—Bartsch, 1906; Proc. U. S. Natl. Mus., 31: 116.

CHIAPAS: 14.6 mi. E Cintalapa, 2000' (UF 19054 [16]).

Dall's (1896: 352) description satisfactorily characterizes the adult shell of this species, but measurements of the specimens from near Cintalapa add significantly to the dimensions given by Dall (*l.c.*) and Bartsch (1906: 116) for the type specimens (USNM 107367).

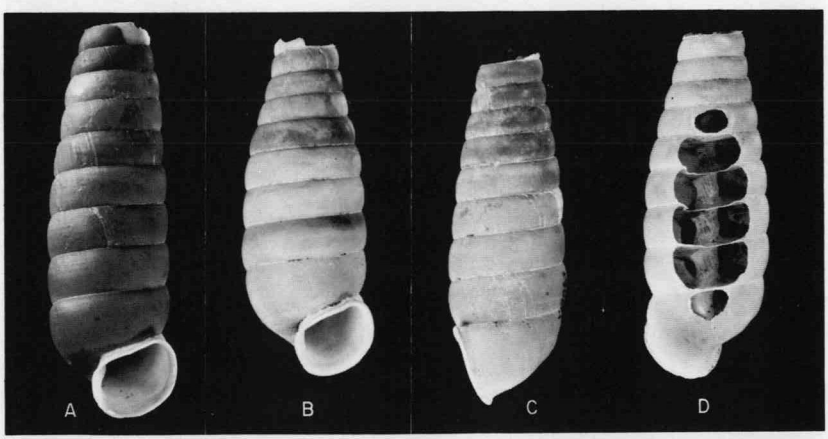

FIGURE 25. A-D.—*Coelocentrum pfefferi* Dall (UF 19054).

Measurements for the specimens from near Cintalapa are: length, 38.7-49.4 mm; width, 14.1-16.8 mm; aperture height, 9.7-11.9 mm; aperture width, 9.0-11.0 mm; 7.5-9.4 whorls remaining in decollate shells; diameter of apical whorl 8.2-10.2 mm. Adult shells are illustrated in fig. 25.

Embryonic shell (fig. 22F) consisting of 3.5 whorls, which rapidly increase in size through the 3rd whorl; 3rd whorl about 2.8 mm wide, next 2 whorls slightly reduced in size, remaining whorls gradually increasing in size through adult shell. Suture weakly impressed. First 1 ½ embryonic whorls smooth, following whorl sculptured with fine radial threads that first appear very weakly along upper suture, but soon extend completely across the whorl. Threads become increasingly distinct through 5th or 6th whorl where they form riblets. These continue equally developed through about the 15th whorl; thereafter they become much lower and less distinct; 18.8 juvenile whorls formed above decollation point of adult shell in only complete specimen examined.

The type specimens E. W. Nelson collected were stated to have come from Ocozocoautla, Chiapas (Dall, 1896: 352). They could actually have come from the immediate vicinity of the new locality cited above. Nelson visited this region on his way east from Rancho San Ricardo to Ocozocoautla and made varied ecological observations there (Goldman, 1951: 106-107). Nelson frequently labelled specimens collected on the way to a locality as having come from that locality (Goldman, 1951). The specimens from 14.6 mi. E Cintalapa are so similar to the type specimens as to suggest that they came from the same population.

Coelocentrum nelsoni Dall

Coelocentrum nelsoni Dall, 1896; Proc. U. S. Natl. Mus., 19:352; pl. 33, figs. 5-6.—Pilsbry, 1903; Man. Conch., Ser. 11, 15:35; pl. 11, figs. 8-9.

Dall's description of this species is misleading. It is based only on the holotype and ignores the variation shown by other specimens from the type series. He also describes important features of the species inaccurately and fails to mention others. Material recently collected could only be identified questionably with Dall's description. Thus it is advisable to redescribe the species from the holotype (USNM 107368), paratypes (USNM 185902 [5]), and recent specimens.

SHELL.—(fig. 26.) Large, stocky; cylindric-terete. Light grayish-

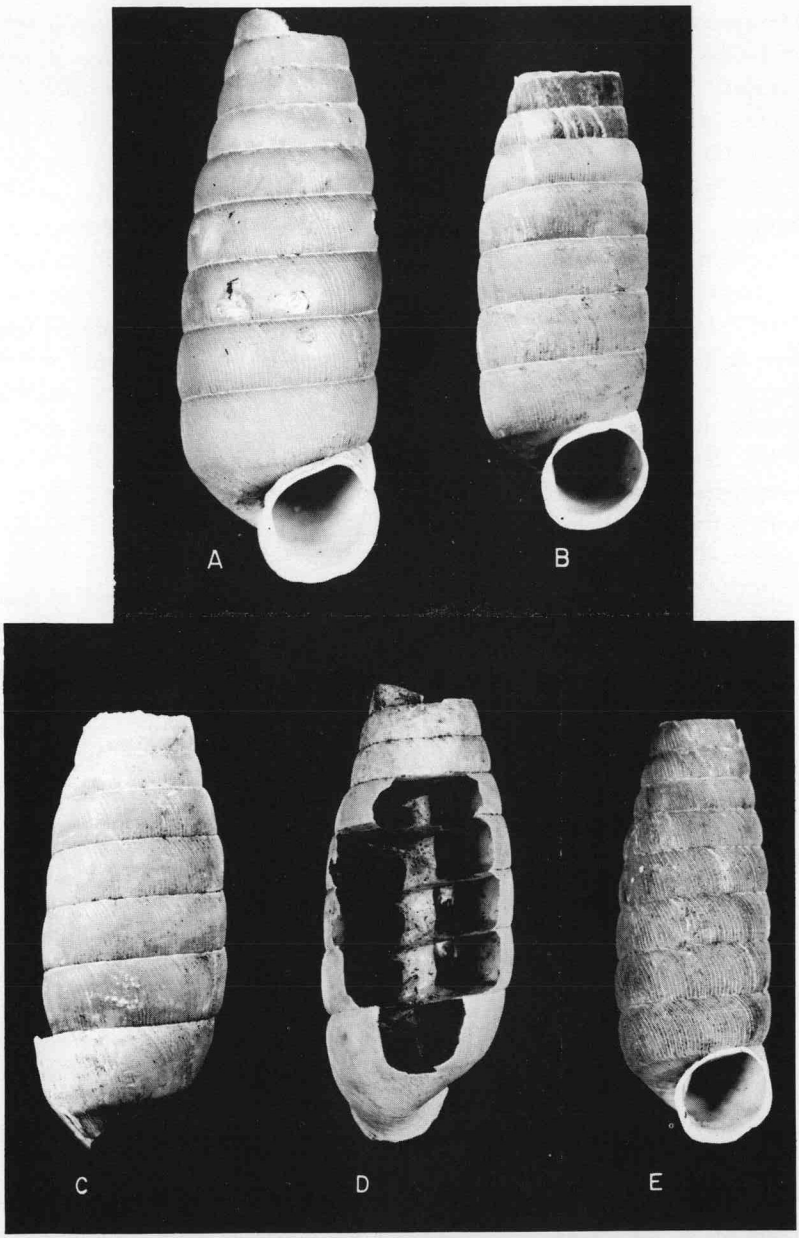

FIGURE 26. *Coelocentrum nelsoni* Dall. A.—Chiapas, 3.0 mi. SSE Tuxtla Gutierrez, 2700' elevation (UF 19030). B-D.—Chiapas, 8.0 mi. N. Tuxtla Gutierrez, 3800' elevation (UF 19027). E.—Chiapas, 7.3 mi. SE Tuxtla Gutierrez, 2700' elevation (UF 19029).

brown or brown; dull, lusterless; thickness of shell highly variable; opaque. Decollate, 6.6-10.0 whorls remaining. Width of initial whorl 0.44-0.68 times diameter of shell. Early whorls of adult shell rapidly increasing in diameter until about the 4th-5th from last whorl, below which point they are nearly uniform in size. Suture shallow, but sharply incised. Aperture free from preceding whorl and projected slightly forward; aperture 1.07-1.23 times as high as wide, subtrapezoidal in shape, basal and outer angle tending to be weakly rounded. Peristome usually only slightly expanded; generally only moderately thickened, although conspicuously so in the type. Interior of aperture and peristome white. Umbilicus rimate or very narrowly and obliquely perforate. Last whorl weakly angulate around the base. Axial perforation very narrow, about 1/10-1/12 diameter of top whorl. Surface of shell with weak, low, recurved axial threads that are slightly stronger near sutures; threads nearly uniformly spaced over most of shell, more crowded on narrow early whorl; 102-144 threads on penultimate whorl; threads about equal to half the width of their interspaces. Periostracum with many very thin, low, irregular spiral threads that are frequently lost through wear; spiral threads most conspicuous near lower suture of whorls and usually broken between axial threads. Axis hollow, about 1/6 diameter of shell; with a low spiral swelling lying just above lower partition within each whorl; and about 25-30 weak, low, oblique, axial threads that may be broken into rows of small conical granules.

Embryonic whorls (fig. 22G) not demarcated from later whorls. First 4 whorls large, dome-shaped, with a weakly impressed suture; 3rd whorl 3.2-3.4 mm in diameter; 5th-6th whorls slightly constricted. First 1.5 embryonic whorls smooth; succeeding whorls with fine, regularly spaced axial riblets that begin near the upper suture and become progressively longer and stronger until by the 2nd whorl they are continuous across the surface. Rate of growth of juvenile shell indicates about 20-22 whorls are lost above decollation point of adult shell.

Length, 42.9-53.9 mm; diameter, 16.1-19.1 mm; aperture height, 10.7-13.2 mm; aperture width, 9.3-11.0 mm.

SPECIMENS EXAMINED.—CHIAPAS: Tuxtla Gutierrez (holotype and paratypes); 8.0 mi. N Tuxtla Gutierrez, 3800′ elevation (UF 19027 [5], UF 19028 [5]); 7.3 mi. SE Tuxtla Gutierrez, 2700′ elevation (UF 19029 [5]); 3.0 mi. SSE Tuxtla Gutierrez, 2700′ elevation (UF 19030 [28]).

REMARKS.—*Coelocentrum nelsoni* is unique within the genus because of its raised spiral sculpture. It is also readily distinguished by its large size, stocky shape, and simple axial sculpture.

The type series E. W. Nelson collected was stated to have come from Tuxtla Gutierrez, Chiapas (Dall, 1896: 352). Actually the type series probably came from about 3 miles south of Tuxtla Gutierrez, the station where Nelson camped and worked during his first visit to the area (Goldman, 1951: 115). The holotype is more similar in size and other features of the shell to specimens from 3.0 miles SE of Tuxtla Gutierrez than to available specimens from other localities.

The specimens from 7.3 miles SE Tuxtla Gutierrez differ from others in that they are smaller, more slender, and have more rugose sculpture on the outer surface of the shell. Other features of the shell are normal. Measurements of these specimens are: length, 40.0-43.1 mm; width, 14.9-15.8 mm; aperture height, 9.6-10.5 mm; aperture width, 8.7-9.6 mm; 7.7-8.9 whorls.

Coelocentrum tyla new species

SHELL.—(fig. 27.) Medium-large; light brown, dull; thin; cylindric-conical in shape. Decollate, 13.3-15.3 whorls remaining; initial whorl

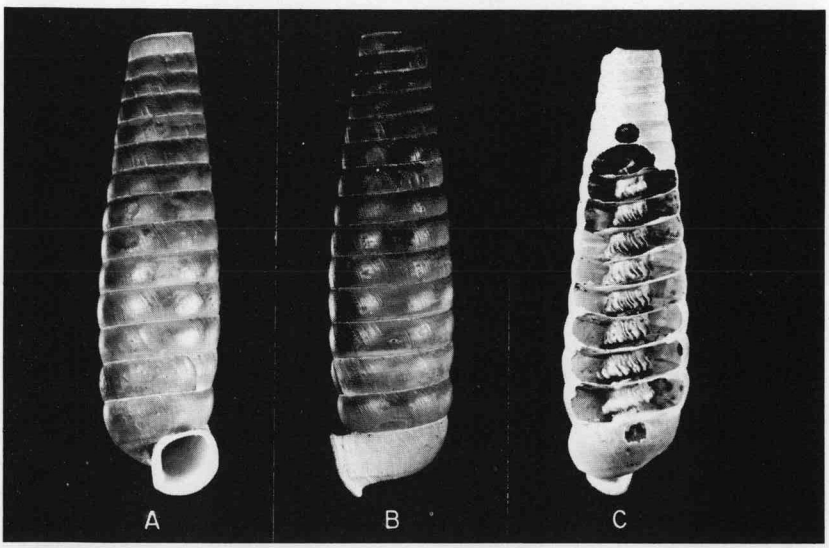

FIGURE 27. *Coelocentrum tyla* n. sp. A, B.—Holotype (UF 19044). C.—Paratype (UF 19045).

0.48-0.55 times diameter of shell; whorls gradually increase in diameter to about the ninth or tenth whorl, below which point the shell becomes more nearly cylindrical; last 1-2 whorls decreasing slightly in diameter. Aperture extending forward on a short neck that is about 1/6 as long as diameter of last whorl; inner base of neck strongly angulate. Aperture rhomboid, higher than wide. Peristome moderately thickened, reflected completely around aperture. Interior of aperture and peristome white. Umbilicus rimate or imperforate; axial puncture open. Whorls weakly convex. Suture shallow, narrow. Sculpture consisting of fine flattened, irregular, occasionally indistinct, oblique, recurved axial threads; 114-178 threads on 4th from last whorl. Many very minute, flattened granules superimposed on and between threads. Spiral sculpture absent. Axial pillar hollow, large; pillar with axial ribs slightly less than 1/2 diameter of shell. Pillar bearing a strongly convex spiral crest that lies slightly below the center of the pillar within each whorl and is continuous throughout length of shell to penultimate whorl. A relatively narrow, deep channel lies below the crest and occupies the lower 1/4 of the pillar within each whorl. The pillar bears about 20-30 thin, oblique axial ribs that extend from the top of the whorl to the top of the crest, where the ribs become much higher and are titled forward. Ribs weakly serrate and thin throughout most of shell; within antepenultimate and penultimate whorls ribs become thickened into elongate rounded nodules on top of spiral crest.

Juvenile shell unknown.

Measurements of holotype: length, 44.1 mm; width, 12.1 mm; aperture height, 6.9 mm; aperture width, 6.7 mm; 14.6 whorls remaining; diameter of first whorl, 6.3 mm.

Measurements of paratypes: length, 39.2-45.0 mm; width, 11.5-12.6 mm; aperture height, 6.2-7.3 mm; aperture width, 6.1-6.8 mm.

TYPE LOCALITY.—CHIAPAS: 8.6 mi. E by road from Chiapa de Corzo; 3100' elevation. The type locality lies in a wooded, semimesic ravine. Snails were found in mulch and talus at the base of a small limestone ledge. HOLOTYPE: UF 19044, collected 11 July 1965 by Fred G. Thompson. PARATYPES: UF 19045 (4); same data as the holotype. Shell characters and measurements were taken from two other specimens that were sacrificed for anatomical studies.

REMARKS.—*C. tyla* is distinguished from all other species of the subgenus *Coelocentrum* by its high axial ribs on the internal pillar and their modification into relatively large knobs within the penulti-

mate and antepenultimate whorls. It is most similar in size and general appearance to *C. tomacella* (Morelet), which differs by being slightly smaller in all dimensions and by having uniformly low and weak ribs on the pillar (Pilsbry, 1903: 38-39).

ETYMOLOGY.—The name *tyla* is derived from the Greek *tylos*, meaning knot or knob, and refers to the sculpture on the axis.

Coelocentrum cataclines new species

SHELL.—(fig. 28.) Large; light brown, dull; thin, fragile; cylindric-terete; decollate, 10.3-12.5 whorls remaining. Width of initial whorl about 0.44-0.49 times diameter of shell, whorls gradually increasing in size, reaching maximum width at about 7th or 8th whorl; last 1 ½-2 whorls decreasing slightly in diameter. Aperture extending forward

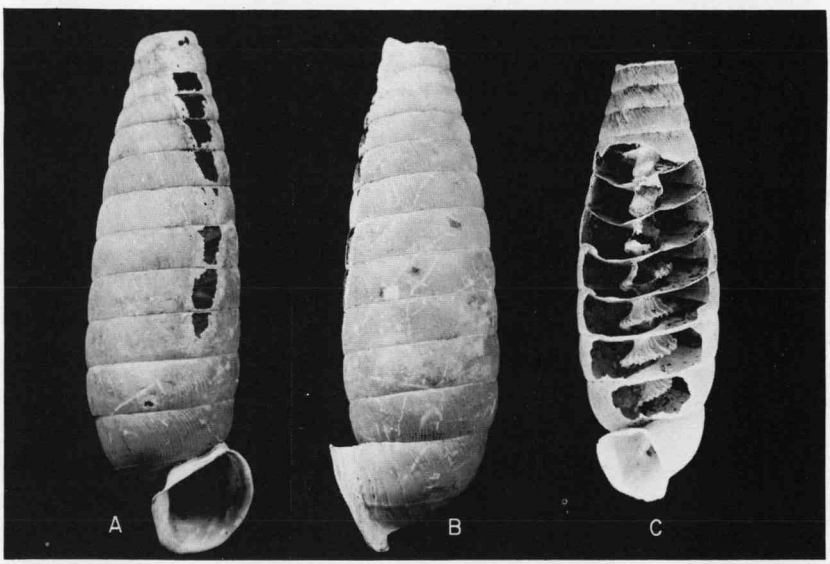

FIGURE 28. *Coelocentrum cataclines* n. sp. A, B.—Holotype (UF 19031). C.—Paratype (UF 19032).

on a short neck that is about ¼-⅕ as long as diameter of last whorl; inner base of neck strongly cristate. Aperture subrhomboid, higher than wide; basal and outer margins rounded, parietal and columellar margins nearly straight. Peristome slightly thickened and strongly reflected; interior of aperture and peristome white. Umbilicus imperforate; apical perforation open. Surface of shell sculptured with

many weak, occasionally indistinct, low, recurved axial threads; threads on early whorls of spire stronger than elsewhere; about 104-130 threads on 4th from last whorl; threads more widely spaced on early whorls and more closely spaced on penultimate and last whorls. Threads and interspaces finely punctate with very minute granules. Spiral sculpture absent. Axis hollow, highly modified into a broad flaring hollow lamella that is about 2/5 diameter of shell at its widest point. Lamella begins as a spiral swelling just below middle of whorls at top of spire and gradually increases in size to become a wide, flattened, sloping spiral lamella. Axis in last 6-7 whorls with rather regularly spaced, slightly oblique low axial ribs that extend from top of pillar to crest of lamella where they become most pronounced and onto underside of lamella to its base. Remaining portion of axis within each whorl smooth. Ribs in last 2-2.5 whorls modified into weak knobby crests on edge of lamella.

Juvenile shell unkown.

Measurements of holotype: length, 69.1 mm; width, 18.4 mm; aperture height, 13.2 mm; aperture width, 11.6 mm; 12.2 whorls remaining; diameter of first whorl, 8.2 mm.

Measurements of paratypes: length, 49.7-59.9 mm; width, 15.8-17.8 mm; aperture height, 10.0-14.0 mm; apterture width, 9.7-11.8 mm.

TYPE LOCALITY.—CHIAPAS: limestone knoll 15.8 mi. NW by road from Ocozocoautla, 2700′ elevation. Snails were collected from mulch and debris at the base of low ledges on the side and at the bottom of the knoll. The area was covered with tropical wet forest, but was relatively open at the ground level. HOLOTYPE: UF 19031; collected 21 July 1965 by Mary Lynn Paulson. PARATYPES: UF 19032 (2); UF 19033 (5); same locality as the holotype.

REMARKS.—*C. cataclines* is distinguished from all other species of *Coelocentrum* by its large size, sculpture and axial modifications. It is most similar to *C. tyla* new species, but is much larger and is more extreme in the projection of the axial swelling. *C. cataclines* bears some resemblance to *C. palmeri* Dall and Bartsch because of its axial development, but differs from that species by having thin oblique ribs on the spiral swelling and by lacking spiral threads along the sutures of the whorls (Dall, 1908: 177-178).

ETYMOLOGY.—The name *cataclines* is derived from the Greek *cata* + *clinein*, meaning a spiral stairway, and refers to the nature of the axis.

Eucolodium (Oligostylus) hegewischi (Bartsch)

Bulimus truncatus Pfeiffer, 1841; Symb. Hist. Helic.: 43-44. (Not *Bulimus truncatus* Bruguiere, 1792; Encycl. Method.: 319).

Oligostylus hegewischi Bartsch, 1947; J. Washington Acad. Sci., 37:286, 1948; J. Washington Acad. Sci., 38: 350-351.

MICHOACAN: 1.4 mi. W Angangueo, 9000′ elevation (UF 19063 [25]).

The juvenile shell is illustrated in fig. 22D. Embryonic whorls 5; first 2 embryonic whorls rapidly enlarging, 2nd whorl 2.1-2.2 mm wide, following 3 whorls decreasing slightly in size. Neanic whorls increasing in size to adult shell. Embryonic whorls separated from neanic whorls by a slight crease. Outline of juvenile shell slightly concave. First 2 embryonic whorls smooth, remaining embryonic whorls with weak low threads that begin along the upper suture and become increasingly long and distinct. Following neanic whorls with low thread-riblets that continue into adult sculpture. Rate of growth of juvenile shell indicates about 11-12 whorls are lost above point of decollation in adult shell.

Eucolodium decollatum (Nyst)

Pupa decollata Nyst, 1841; Bull. de l'Acad. Roy. de Sci. Belles-Lettres de Bruxelles, 8:344; upper fig. of pl.

Eucolodium decollatum (Nyst), Pilsbry, 1903; Man. Conch., Ser. 11, 15:3-4; pl. 1, fig. 1; pl. 4, fig. 9.

Cylindrella ghiesbreghti Pfeiffer, 1856; Proc. Zool. Soc. London :380; pl. 36, fig. 1.

Eucolodium decollatum var. *ghiesbreghti* (Pfeiffer), Pilsbry, 1903; Man. Conch; Ser. 11, 15:4-5; pl. 5, figs. 18-21.

TABASCO: mogote 2.4-2.6 mi. E Teape; UF 19047-19049 (8).

Pilsbry (1903: 4-5) noted that the only distinction between *decollatum* and *ghiesbreghti* was the lighter color of *decollatum* which could have been due to weathering of the type specimen, but he retained the name *ghiesbreghti* as a variety of *decollatum* because of its long standing in the literature. Fresh specimens before me vary from reddish-chocolate to very pale yellow, and allow no distinction between the two named forms.

Eucolodium otoides new species

SHELL.—(fig. 29.) Moderately large, solid, light yellowish gray to light reddish brown in color. Elongate conical, approaching conical-terete; dull, periostracum generally worn away. Decollate, 7.6-7.9 whorls remaining; first whorl 0.48-0.50 times diameter of shell. Imperforate. Last whorl with a very vague circumbasal ridge. Aper-

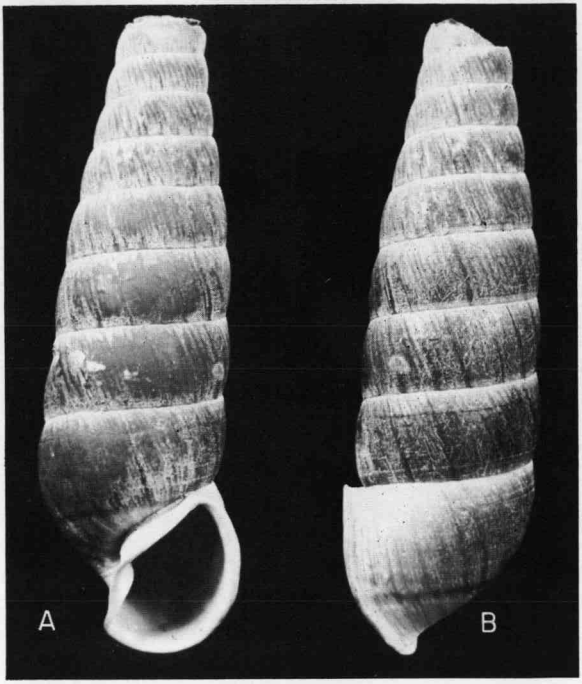

FIGURE 29. *Eucolodium otoides* n. sp. Holotype (UF 19050).

ture free from preceding whorl, projecting forward on a short neck. Aperture elongate auriculate, 1.26-1.40 times as long as wide; 0.29-0.30 times length of shell; upper corner strongly angulate. Outer and basal lip evenly rounded; columellar margin and basal margin forming a weak angle, both slightly concave into aperture; columellar lamella extending conspicuously into aperture along columellar margin. Peristome reflected, moderately thickened, particularly along outer lip. Aperture arched and slightly oblique in lateral profile. Sculpture on early whorls consisting of vague, irregular, frequently imcomplete riblets spaced about 3 mm. On later whorls these become obsolete and are reduced to irregular coarse incremental striations that become even finer on the last whorl. Superimposed on axial striations, particularly along sutures, are very fine, frequently indistinct spiral striations and threads. Columella twisted, with a wide, flat spiral lamella that is crenulate along outer margin.

Measurements of holotype and paratype (paratype in parentheses): length, 58.6 (57.5) mm; width, 17.9 (18.3) mm; aperture

length, 16.7 (17.5) mm; aperture width, 11.9 (13.9) mm; 7.9 (7.6) whorls.

TYPE LOCALITY. — CHIAPAS: forested ravine 3.5 mi. by road S Rayon; 5500′ elevation. HOLOTYPE: UF 19050; collected 10 July 1965 by Fred G. Thompson. PARATYPE: UF 19051; same locality as holotype.

REMARKS.—Three other species are recognized in *Eucolodium (s.s.)*: *E. decollatum* (Nyst), *E. compactum* Pilsbry, and *E. mexicanum* (Pfeiffer). *E. otoides* is most similar in size, solidity, and sculpture to *E. compactum*. It differs from all three species by the shape of its aperture, by the extent to which the columellar lamella projects into the aperture, and by the conical nature of the spire. The other three species have a shorter, more nearly circular aperture, the columellar lamella does not project into the aperture nearly as conspicuously, and they are more nearly cylindrical in shape.

ETYMOLOGY.—The name *otoides* is derived from the Greek *otos*, meaning ear, and refers to the ear-like shape of the aperture.

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